CONTENTS

12 COMMERCIAL FISHERIES

12.1 Introduction

This section presents the existing environment and assesses the impact of the marine works, namely the wind farm and export cables, associated with the Thanet Offshore Wind Farm (Thanet) project on commercial fisheries. It considers the fishery resource in the area and those directly dependent upon it i.e. the commercial fishing or catching sector. The catching sector supports a range of associated upstream activities such as vessel and gear suppliers, and downstream activities such as marketing, processing and distribution. This section should be read in conjunction with **Section 10, Natural Fish Resource**.

12.2 Assessment Methodology

12.2.1 Current guidance for assessing impacts on commercial fisheries interests

The assessment takes into account the broad assessment guidelines with respect to the Food and Environment Protection Act 1985 (FEPA) and the Coast Protection Act 1949 (CPA), as outlined in the 2004 Guidance Note for Environmental Impact Assessments for Offshore Wind Farms published by the Centre for Environment, Fisheries, Aquaculture Science (CEFAS).

The Thanet project is one of several major projects that are ongoing or planned for the Thames Estuary area. The Countryside Council of Wales (Oakwood Environmental, 2002) commissioned work on the development of a methodology for the assessment of cumulative effects of marine activities, which has been considered in undertaking the assessment of cumulative effects.

12.2.2 Data collection and consultation process

Information was collated from a number of sources including Department for Environment, Food and Rural Affairs (Defra), CEFAS, local fishermen, Fisheries Liaison Officer, fish surveys and observation trips.

Several data sets were obtained from Defra's Fisheries Statistics Unit, including:

- Annual landings by all vessels detailing live weight, value and species landed by vessel nationality and port of landing from ICES Statistical Rectangles 31F0, 31F1, 31F2, 32F0, 32F1 and 32F2 for 1999 to 2004;
- Monthly landings into the northeast Kent ports of Ramsgate, Broadstairs, and Margate for 2004, by ICES rectangle, species, live weight and value;
- Annual landings for all vessels for all ports within the Kent and Essex Sea Fisheries Committee area, by vessel nationality, species, live weight and value for 1999 to 2004;
- Annual effort (days fished) by all vessels into ICES Statistical Rectangles 31F0, 32F0, 31F1, 32F1, 31F2, 32F2 by vessel nationality, port of landing and gear type for 1999 to 2004;
- Defra UK fishing vessel list for vessels under and over 10m, 2004; and

- Air surveillance data detailing vessel nationality, vessel type, activity and number of sightings by year, month and day for ICES Statistical Rectangles 31F0, 31F1, 31F2, 32F0, 32F1 and 32F2 for 1999 to 2004.

Other reports such as the London Array Environmental Statement (RPS, 2005), the London Gateway Proof of Evidence on Commercial Fisheries (MacAlister Elliott and Partners, 2003) and Artisanal Fishing: Prospects for Community Survival report on the Thanet coast (University of Kent, 2005) have provided important background reading and allowed comparison with the findings for the Thanet project. Seafish and CEFAS are currently evaluating the physical and economic impacts that the development of offshore wind farms around the UK coast might have on commercial fishing activities. The authors of this report were contacted, but the final report will not be available until 2006.

Consultation with Thanet fishermen has been an important element in the development of this assessment. This has primarily occurred with the help of the Fisheries Liaison Officer for the project, Tom Brown MBE, who is also Secretary of the Thanet Fishermen's Association (TFA). Two separate consultation rounds were undertaken. The first focused on collating locally specific information on fishing grounds, species targeted, gears used and seasonality. This was crucial for gaining insight into local fishing practises and informal management arrangements or gentlemen's agreements made by the fishermen. Consultation also allowed the fishermen opportunity to voice their feelings regarding the Thanet project.

The second round of consultation focused on a ground-truthing exercise, where official government statistics and additional information collated was presented to local fishermen for discussion. This engagement provided opportunity to back up official data with the fishermen's knowledge and allowed them to provide feedback on the initial stages of this report.

Brown & May Marine and Royal Haskoning also undertook eight observer trips on six different vessels between July 2005 and September 2005. In addition to providing information on fishing locations and operating practices, these trips allowed further consultation with fishermen on an individual and informal basis.

Information was also obtained from the CEFAS run Voluntary Logbook Scheme with consent from the fishermen. Accounts were also provided from Foreland Fish, where many of the local fishermen market their fish.

12.2.3 Risks and uncertainty

Recorded landings data for ports where landings are predominantly by under 10m vessels, as with the Thanet ports, often underestimate the true volume and value of landings. There are widely recognised weaknesses in official data sources for the under 10m fishing fleet, as this sector is not required to submit logbooks to Defra detailing catch levels. A Voluntary Logbook Scheme has been operational for a number of years involving local vessels supplying catch data to CEFAS, but this information is not comprehensive and remains unpublished. As a result, official figures often rely on estimates and local suppliers of information rather than direct landings data corroborated by inspection.

Uncertainties in official data also extend to vessel lists, as the official Defra vessel list includes boats that are no longer active in the fleet. Former fishermen are keen to maintain a licence for a vessel in case their situation changes. It is important to avoid over reliance on one source of information, therefore, this investigation has addressed these uncertainties with corroboration wherever possible such as the use of anecdotal information supported by background information.

Fishing is a highly variable activity, even on a daily basis, as it is weather and tide dependent. There are significant uncertainties associated with future activity, as this depends upon a high number of variables including highly variable natural resources, economic conditions and individual circumstances. The ability to accurately predict the future status of the industry is, therefore, limited and an element of risk is associated with any resulting predictions.

12.3 Existing Environment

12.3.1 Study area

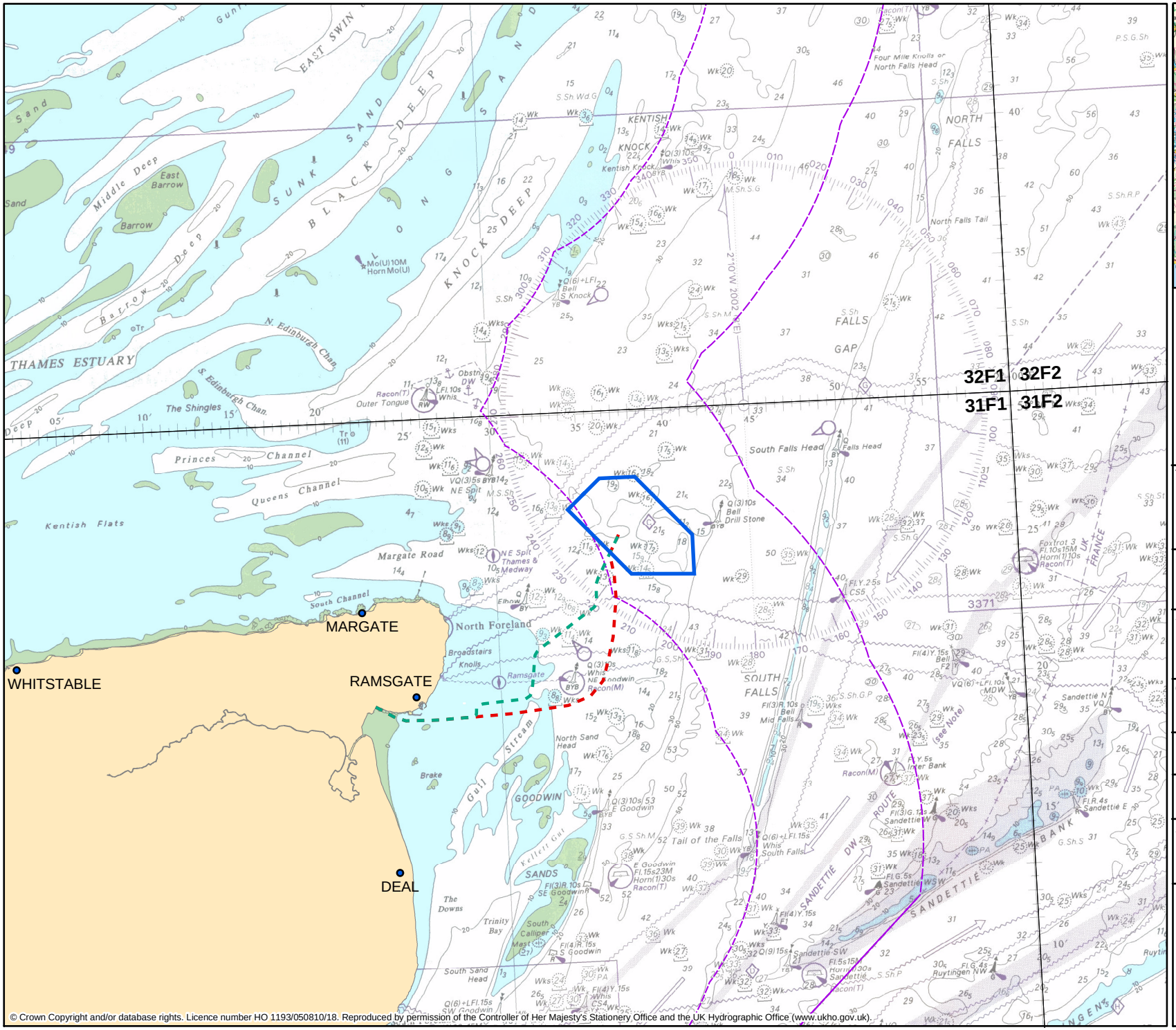
The Thanet site covers an area of 35km^2, 11.3km north east of Foreness Point. The bathymetry across the site ranges from -12m CD (below Chart Datum) to approximately -40m CD. The Thanet site lies in ICES division IVC and is located entirely within ICES statistical block 31F1, sub-square 2 (**Figure 12.1**). This area is under the jurisdiction of the Kent and Essex Sea Fisheries Committee (K&ESFC).

Two proposed export cable routes are being considered, both with a landfall at the northern end of Pegwell Bay (see **Section 2, Project Details**). The two export cables, having a nominal outside diameter of up to 250mm, would most probably be laid by ploughing, and buried to a depth of between 1-3m, depending on localised seabed conditions. Both export cable routes are located entirely within ICES statistical block 31F1 with the majority in sub-square 2, crossing into sub-square 1 prior to reaching land (**Figure 12.1**).

East of the site are the north-northeast / south-southwest aligned South Falls sandbanks, which are steep sided and rise from -40m CD to just -10m CD at their crest. Between the Thanet site and the South Falls banks, lies the Lobourg Channel, a major channel that runs through the Dover Strait, connecting the southern North Sea and the English Channel (Halcrow, 2002).

12.3.2 Species of Commercial Interest in the Study Area

The Thames Estuary has long supported exploitable populations of a wide range of fish species, including eels *Anguilla anguilla*, sole *Solea solea*, plaice *Pleuronectes platessa*, thornback ray (roker) *Raja clavata*, cod *Gadus morhua*, herring *Clupea harengus*, sprats *Sprattus sprattus*, bass *Dicentrarchus labrax* and spurdog *Squalus acanthias*. Consequently, many vessels traditionally targeted a succession of species throughout the year, using different techniques on a seasonal basis. Until recently, the two most important species were sole, fished in the summer months, and cod, providing a winter fishery. However, since 1998-1999, cod have been relatively scarce, and the fishery for several other species has also declined.



Legend:

- Wind Farm Site Location
- Proposed Cable Route 1
- Proposed Cable Route 2
- 6 Mile Fishing Limit
- 12 Mile Territorial Sea Limit

Title:

THANET SITE SHOWING ICES RECTANGLES AND FISHING LIMITS

Project:

THANET OFFSHORE WIND FARM

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Drawn by:	Checked:	Drawing No:
SMG	SDG	9P5164/06/502
Date: 31/10/2005		Figure: 12.1
Scale: 0 1 2 3 4 5 Kilometres		Revision No: 004

ROYAL HASKONING

It has been reported that the decrease in the winter cod fishery has seen the loss of up to 50% of gross income for some vessels (MacAlister Elliot and Partners, 2003). Many netters and some trawlers that would have traditionally switched to cod in autumn/winter, either continue to target sole, seek other species, tie up, or move away. However, the fishing industry is very dynamic, adaptable and capable of quickly adopting changes in technology and target fisheries. As resources become more exploited and fishing restrictions increase, the fishing industry responds where possible by modifying their gear and fishing techniques (RPS, 2005).

Currently, by far the most valuable and most widely targeted species in the area is sole (MacAlister Elliot and Partners, 2003). Finfish are targeted in the outer Thames Estuary by large vessels operating beam trawls and smaller under 10m vessels using gill nets and drift nets. Important species are sole, bass, cod, smoothhound, skates and rays. Pelagic fish include horse mackerel, herring, sprat and mackerel, but of these, only horse mackerel and herring are landed in the area.

Netting predominately takes place on the sandbanks bordering channels and nets are either anchored to the seabed or set to drift with the tide. Cross tide trammels are typically used to target sole, large mesh tangle nets for thornback rays and drift nets for bass. Netters are also known to take plaice, turbot, brill and even lobster.

The importance of non-quota species has increased in the past few years, as these are not subject to restrictions on the volume landed. For example, smoothhound, a dogfish and member of the elasmobranch (cartilaginous fish) family, has increasingly been targeted, as it currently achieves a good price on the French market and is not subject to Total Allowable Catch (TAC). Large bass continue to get a high price and also remain outside the TAC system.

A number of important shellfish fisheries exist within the Thames Estuary, with small dredgers targeting native oysters and cockles, but these commercially exploited shellfish resources do not extend into the study area, other than very occasional dredging of cockles within Pegwell Bay.

Potters target lobster and crab in the wider study area, most operating close to rocky shores, but some small potters do operate up to 20nm offshore including on Drill Stone Reef. A number of fishermen switch to targeting whelks if prices are good and other fishing opportunities are short.

Table 12.1 summarises the main commercial species found within the Thanet site. The biological status, quota trends and method of fish capture are detailed, along with the origin of vessels that target these species i.e. local, UK, non-UK.

The species are listed according to the highest level of importance relative to landed live weight data (Defra Sea Fisheries Statistics). The biological status indicates whether that species is deemed by scientists to be outside or inside safe biological limits. As can be seen from **Table 12.1**, a number of species of commercial importance lack the associated biological information with which to make an assessment and set a quota. It should not be inferred that these are, therefore, within or outside safe biological limits. The table illustrates the increasing importance of these non-quota species, including many shellfish, to the UK fleet. 'Proportion volume and value' illustrates the comparative importance in catch composition for ICES square 31F1. Where a quota is allocated, the

'quota trend' column in the table illustrates the change in quota levels from 2004 to 2005 in zone IVC (European Commission, DG Fisheries); '-' indicates the quota has decreased over this period; '+' indicates it has increased and '=' indicates it has remained the same. The relative importance of commercial species is expressed as percent contribution of landings and value for commercial species landed by local, other UK and non-UK vessels from ICES square 31F1.

12.3.3 Seasonality and distribution of effort

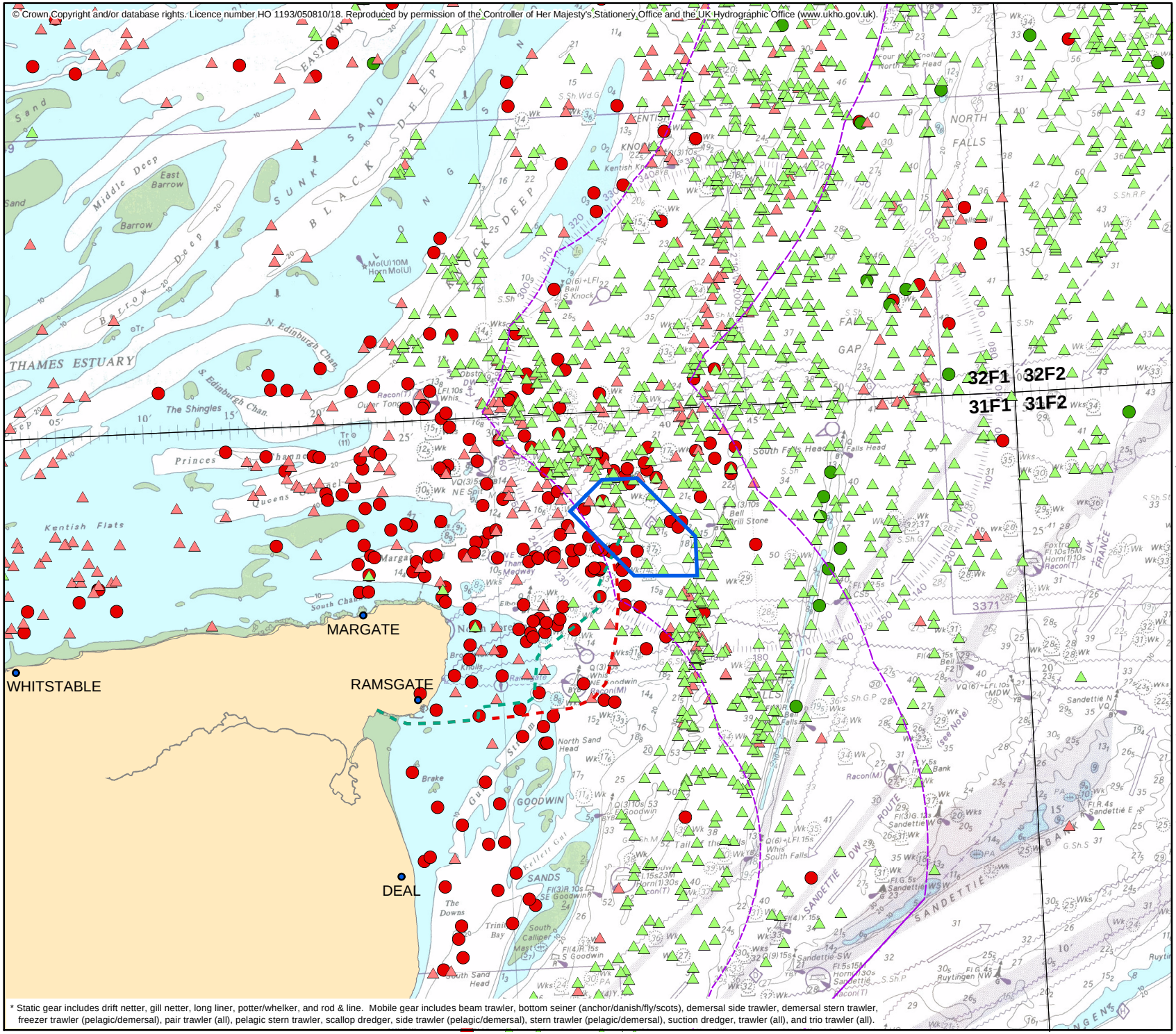
Fisheries surveillance data for the period 1999 to 2004 for the Thanet site and surrounding waters have been obtained from Defra (**Figure 12.2**). **Figures 12.3, 12.4, 12.5** and **12.6** present the fisheries surveillance data seasonally for the periods January to March, April to June, July to September and October to December respectively.

Table 12.2 illustrates the times of year that the most important species are targeted. **Figures 12.3** to **12.6**, along with **Table 12.2,** demonstrate the highly seasonal nature of commercial fisheries in the area. A quarterly breakdown of fisheries is presented and borne out by monthly landings data from Thanet ports for 2004 and is presented in **Table 12.3** and **Figure 12.7**.

Table 12.1 Main species of commercial interest to Local, UK and non-UK vessels in the area of the Thanet site

Species	Biological status	Quota trend	Method of capture	Targeted by			Importance	
				Local	UK	Non-UK	Volume	Value
Sole, *Solea solea*	Inside	+	Beam trawl and drifting anchored trammel and gillnets	✓	✓	✓	13%	33%
Bass, *Dicentrarchus labrax*			Pair and beam trawl and drifting anchored trammel and gillnets	✓	✓		8%	19%
Cod, *Gadus morhua*	Outside	=	Otter trawl, drifting anchored trammel and gillnets	✓	✓	✓	17%	13%
Skates and rays, *Raja sp.*			Beam trawl and drifting anchored trammel and gillnets	✓	✓		18%	8%
Lobster, *Hommarus gammarus*			Pots and nets	✓			2%	8%
Plaice, *Pleuronectes platessa*	Outside	-	Beam trawl and drifting anchored trammel and gillnets	✓	✓	✓	10%	7%
Crabs, *Cancer pagarus*			Pots	✓	✓		6%	5%
Horse mackerel, *Trachurus spp*			Pelagic trawl		✓		14%	1%
Whiting, *Meriangius merlangus*	Outside	+	Otter, pair and beam trawl	✓	✓		3%	1%
L. spotted dogfish, *Scyliorhinus canicula*			Beam trawl and drifting anchored trammel and gillnets	✓	✓		2%	0%
Smoothhound, *Mustelus mustelus*			Beam trawl and drifting anchored trammel and gillnets	✓	✓		1%	0%
Other							6%	5%

Source: Defra Sea Fisheries statistics



Legend:

- Wind Farm Site Location
- UK - Static Gear
- UK - Mobile Gear
- Non-UK - Static Gear
- Non-UK - Mobile Gear

Title:

FISHERIES SURVEILLANCE RECORDS (1999-2004) BY VESSEL NATIONALITY AND GEAR CATEGORY*

Project:

THANET OFFSHORE WIND FARM

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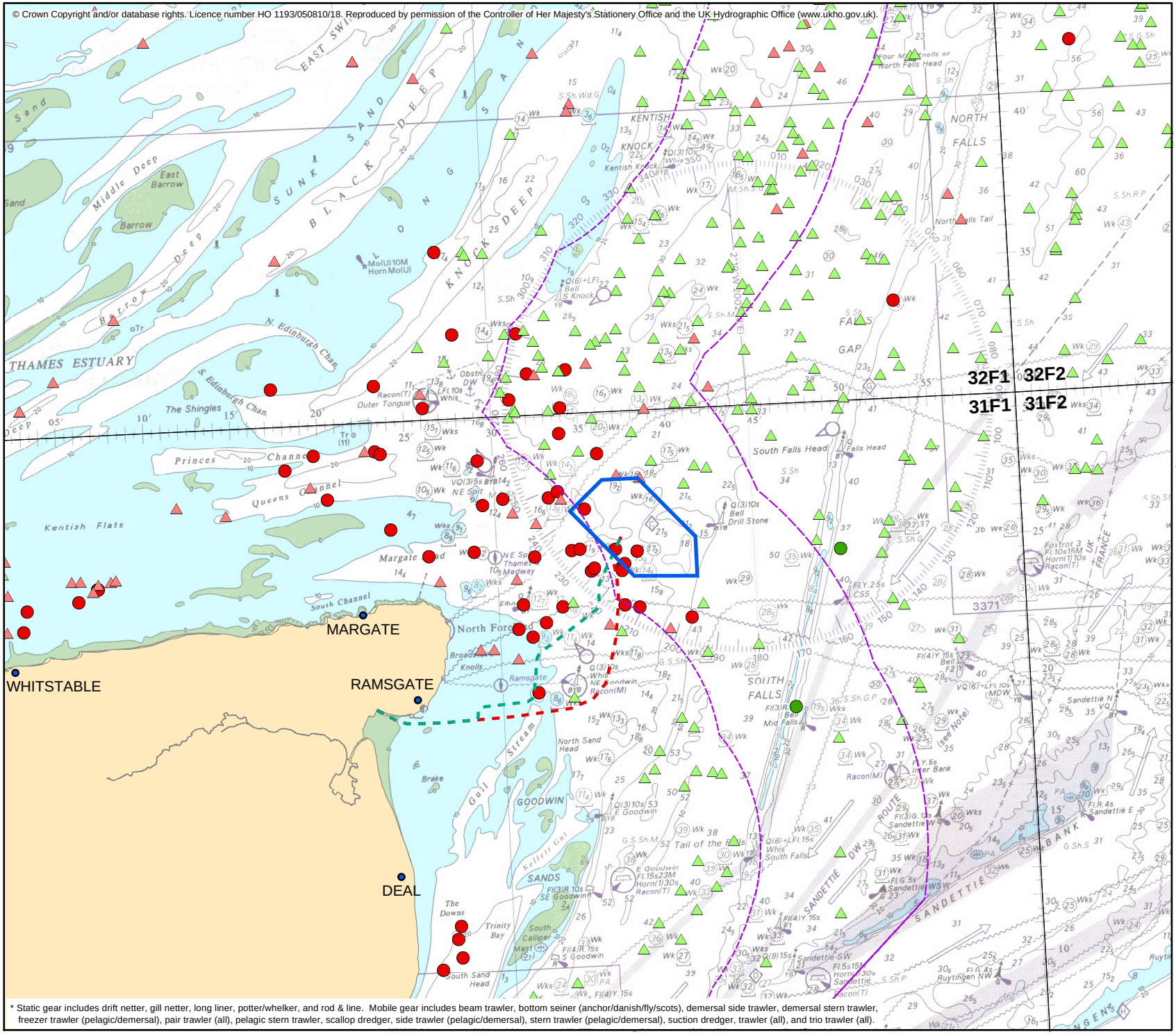
Date: 25/10/2005		Figure: 12.2
Scale: 0 1 2 3 4 5 Kilometres		Revision No: 004

ROYAL HASKONING

* Static gear includes drift netter, gill netter, long liner, potter/whelker, and rod & line. Mobile gear includes beam trawler, bottom seiner (anchor/danish/fly/scots), demersal side trawler, demersal stern trawler, freezer trawler (pelagic/demersal), pair trawler (all), pelagic stern trawler, scallop dredger, side trawler (pelagic/demersal), stern trawler (pelagic/demersal), suction dredger, trawler (all), and trio trawler (all).



Legend:

- Wind Farm Site Location
- UK - Static Gear
- UK - Mobile Gear
- Non-UK - Static Gear
- Non-UK - Mobile Gear

Title:
FISHERIES SURVEILLANCE RECORDS BY VESSEL NATIONALITY AND GEAR CATEGORY*
(JAN - MAR 1999 - 2004)

Project:
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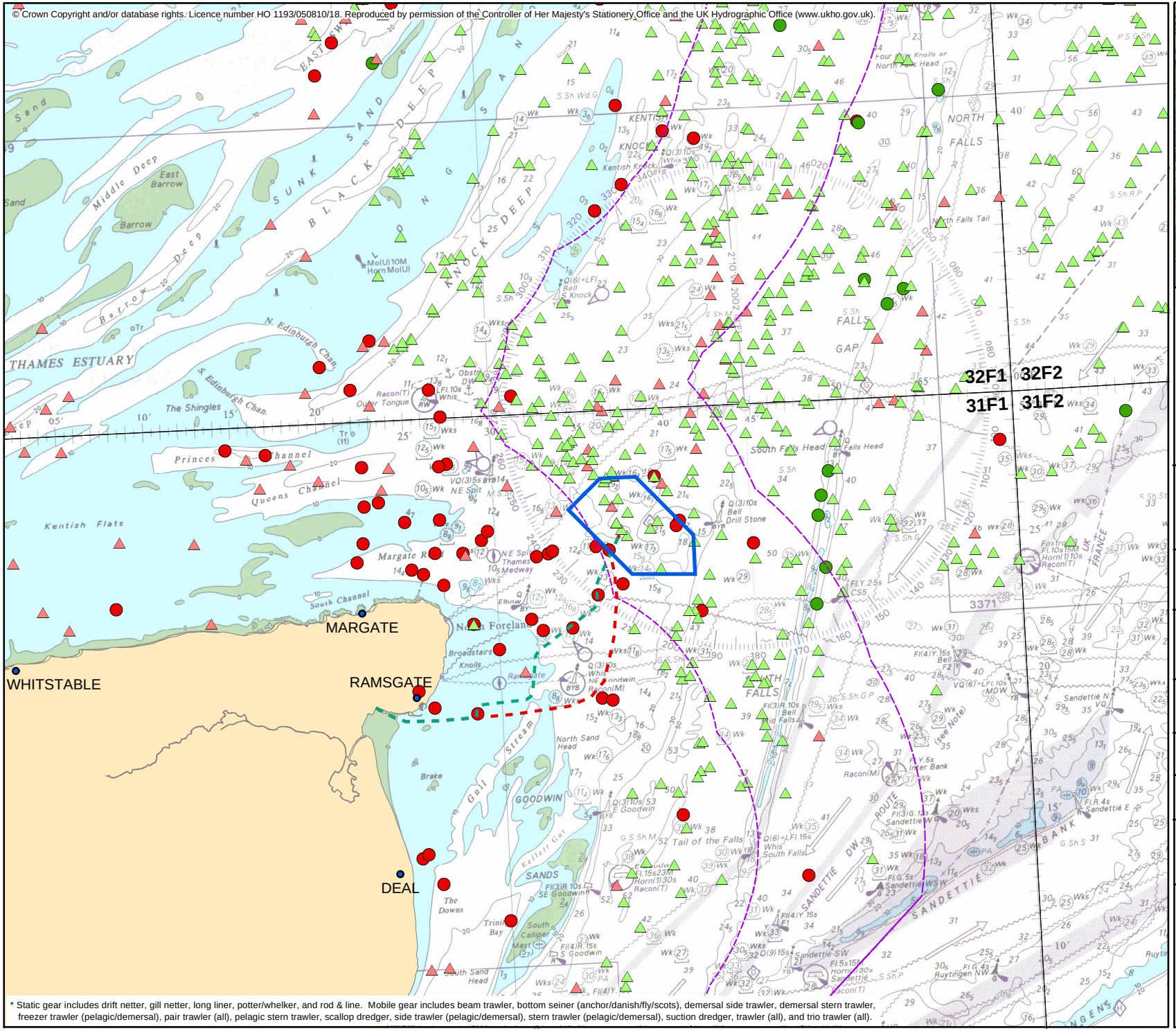
SMG	SDG	9P5164/06/504
Date: 25/10/2005		Figure: 12.3
Scale: 0 1 2 3 4 5 Kilometres		Revision No: 004

ROYAL HASKONING

* Static gear includes drift netter, gill netter, long liner, potter/whelker, and rod & line. Mobile gear includes beam trawler, bottom seiner (anchor/danish/fly/scots), demersal side trawler, demersal stern trawler, freezer trawler (pelagic/demersal), pair trawler (all), pelagic stern trawler, scallop dredger, side trawler (pelagic/demersal), stern trawler (pelagic/demersal), suction dredger, trawler (all), and trio trawler (all).



Legend:

- Wind Farm Site Location
- UK - Static Gear
- UK - Mobile Gear
- Non-UK - Static Gear
- Non-UK - Mobile Gear

Title:
FISHERIES SURVEILLANCE RECORDS BY VESSEL NATIONALITY AND GEAR CATEGORY*
(APR - JUN 1999 - 2004)

Project:
THANET OFFSHORE WIND FARM

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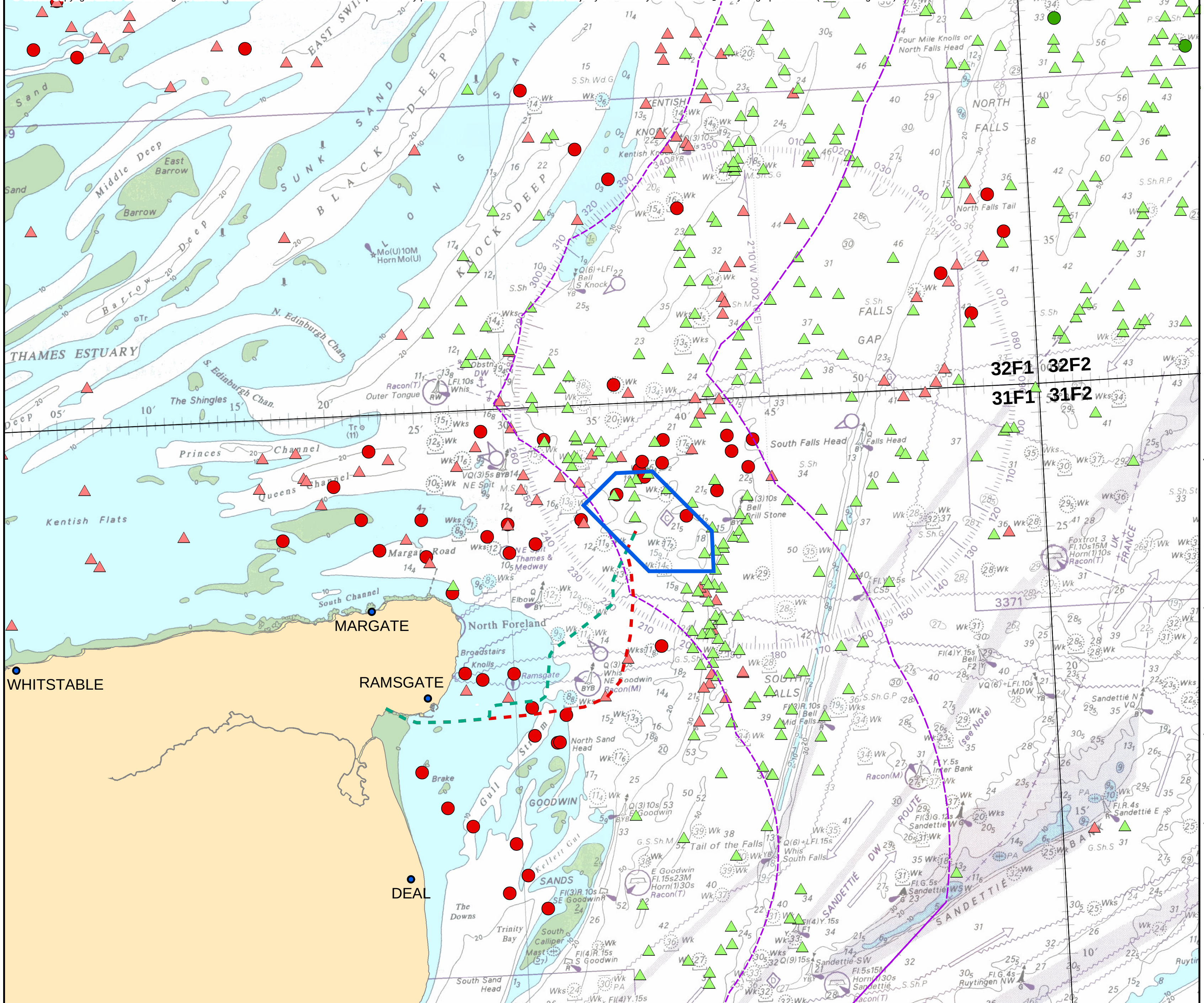
SMG	SDG	9P5164/06/505
Date: 25/10/2005		Figure: 12.4
Scale: 0 1 2 3 4 5 Kilometres		Revision No: 004

ROYAL HASKONING

* Static gear includes drift netter, gill netter, long liner, potter/whelker, and rod & line. Mobile gear includes beam trawler, bottom seiner (anchor/danish/fly/scots), demersal side trawler, demersal stern trawler, freezer trawler (pelagic/demersal), pair trawler (all), pelagic stern trawler, scallop dredger, side trawler (pelagic/demersal), stern trawler (pelagic/demersal), suction dredger, trawler (all), and trio trawler (all).



* Static gear includes drift netter, gill netter, long liner, potter/whelker, and rod & line. Mobile gear includes beam trawler, bottom seiner (anchor/danish/fly/scots), demersal side trawler, demersal stern trawler, freezer trawler (pelagic/demersal), pair trawler (all), pelagic stern trawler, scallop dredger, side trawler (pelagic/demersal), stern trawler (pelagic/demersal), suction dredger, trawler (all), and trio trawler (all).

Legend:
- Wind Farm Site Location
- UK - Static Gear
- UK - Mobile Gear
- Non-UK - Static Gear
- Non-UK - Mobile Gear

Title: FISHERIES SURVEILLANCE RECORDS BY VESSEL NATIONALITY AND GEAR CATEGORY* (JUL - SEP 1999 - 2004)

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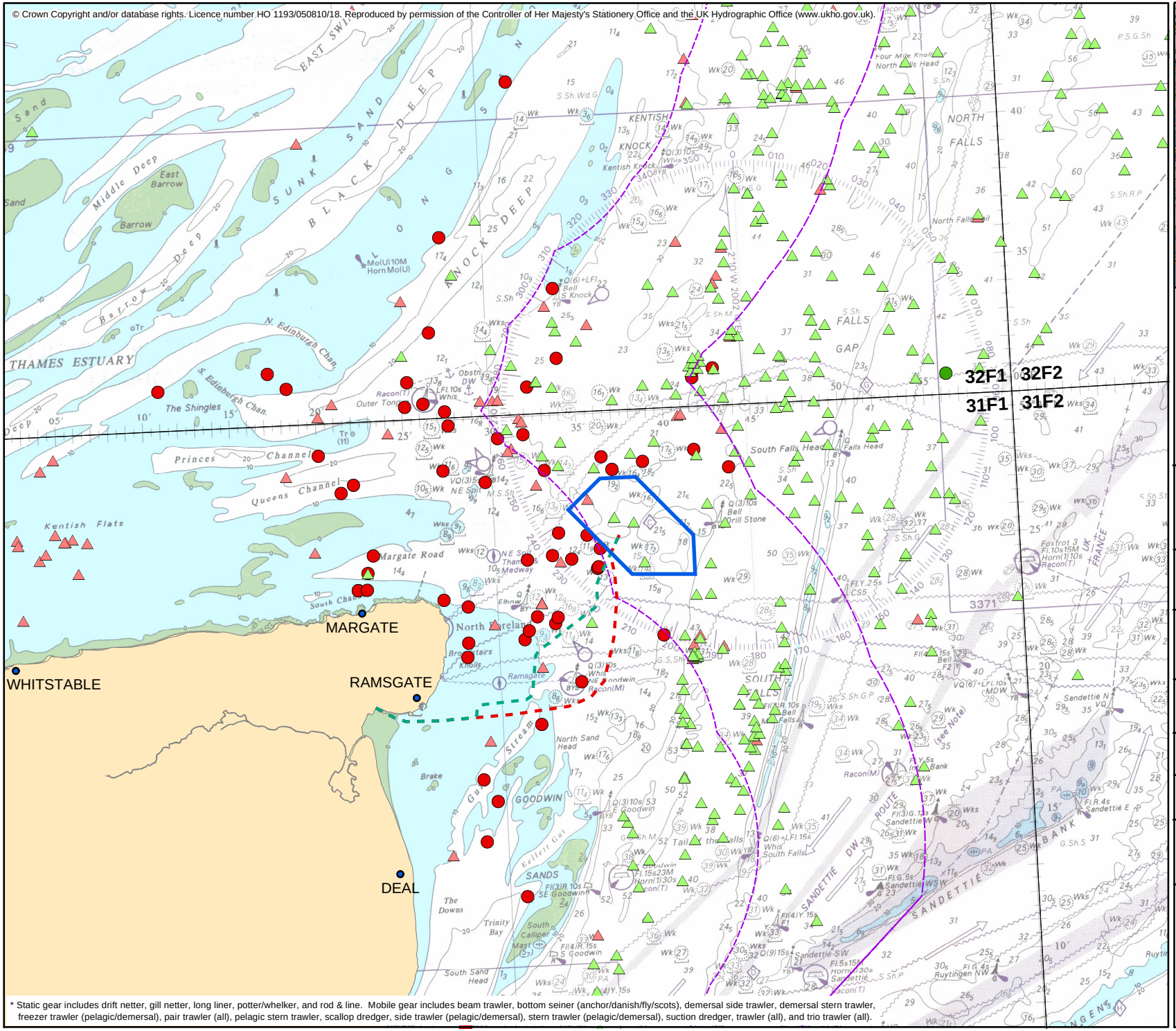
Revision No: 004

ROYAL HASKONING



Legend:

- Wind Farm Site Location
- UK - Static Gear
- UK - Mobile Gear
- Non-UK - Static Gear
- Non-UK - Mobile Gear

Title:
FISHERIES SURVEILLANCE RECORDS
BY VESSEL NATIONALITY AND
GEAR CATEGORY*
(OCT - DEC 1999 - 2004)

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Date: 25/10/2005		Figure: 12.6
Scale: 0 1 2 3 4 5 Kilometres		Revision No: 004

ROYAL HASKONING

* Static gear includes drift netter, gill netter, long liner, potter/whelker, and rod & line. Mobile gear includes beam trawler, bottom seiner (anchor/danish/fly/scots), demersal side trawler, demersal stern trawler, freezer trawler (pelagic/demersal), pair trawler (all), pelagic stern trawler, scallop dredger, side trawler (pelagic/demersal), stern trawler (pelagic/demersal), suction dredger, trawler (all), and trio trawler (all).

Table 12.2 Seasonal commercial fishing activity for main species in the Thames Estuary area

Species	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
Bass, *Dicentrarchus labrax*												
Whiting, *Meriangius merlangus*												
Cod, *Gadus morhua*												
Sole, *Solea solea*												
Plaice, *Pleuronectes platessa*												
Other flatfish												
Rays, *Raja sp.*												
Smoothhound, *Mustelus mustelus*												
Lobster, *Hommarus gammarus*												
Crabs, *Cancer pagarus*												

January to March

Historically the winter months had an important cod fishery in the area, targeted by many of the local fleets. This has declined significantly in recent years resulting in January to March being the quietest quarter of the year in terms of landings. This is supported by air surveillance data (**Figure 12.3**) that indicates lower vessel sightings during this period.

In recent years, conservation measures have included a ban on landing sole before 1st April for vessels under 10m. Bad weather means that the inshore fleet is often confined to port during these months.

April to June

Fishermen find that there is good fishing to be had on slack tides and this is the start of the sole season. Static gill nets are used to target sole and skate during this period. **Figure 12.4** illustrates a marked increase in vessel sightings, particularly for foreign mobile gear during this period.

July and August

During these months, there is less static gear fishing, since a lot of weed is present in the water, which snags the gear and causes problems with hauling the nets. During mid summer the sole fishery falls off, as the water becomes clear, with catches tending to rise again in September. **Figure 12.5** shows a greater presence of UK vessels using mobile gear in comparison to other times of the year.

September to December

This is the peak fishing period as the bass fishery is at its height and all other fisheries are ongoing. However, following the poor cod catches of recent years, there is no autumn switch to cod fishing. Sole are pursued through the autumn until catches fall off or until the quota is deemed taken and the fishery closed.

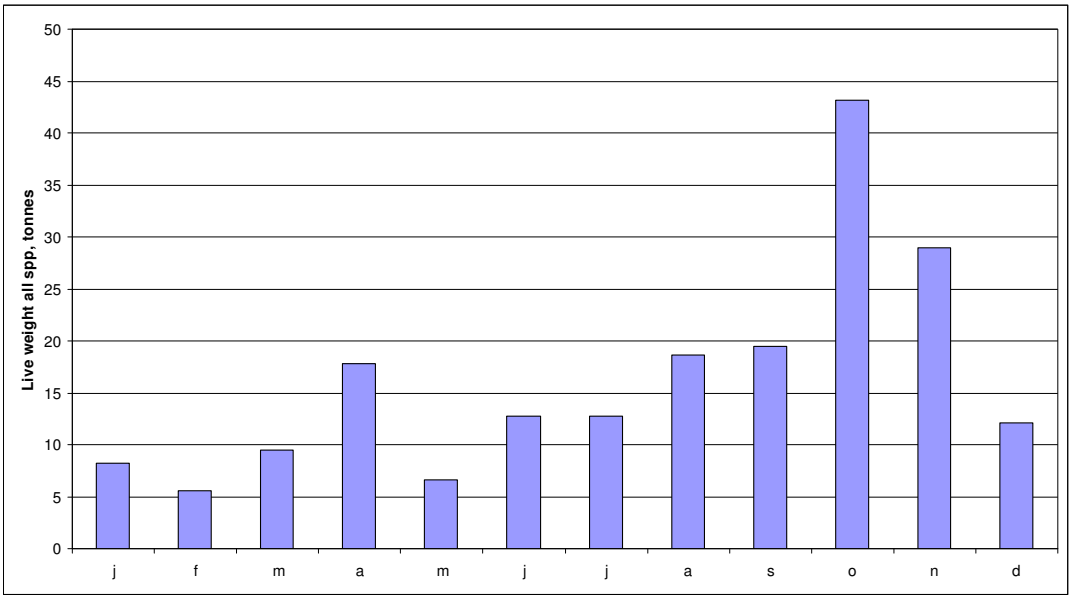
Table 12.3 Monthly volume (tonnes) and value (£) of landings to local Thanet ports, 2004

Month	Live Weight (tonnes)	Value (£)
January	8.24	£9,770
February	5.54	£7,646
March	9.49	£14,229
April	17.78	£36,539
May	6.64	£18,740
June	12.69	£55,100
July	12.69	£55,100
August	18.61	£64,978
September	19.49	£90,637
October	43.13	£126,311
November	28.91	£97,165
December	12.13	£22,402
Total	**182.65**	**£598,617**

Source: Defra Sea Fisheries statistics.

Defra data for June and July was amalgamated, so a 50/50 split has been assumed

Figure 12.7 Monthly volume (tonnes) of landings to local Thanet ports, 2004



Source: Defra Sea Fisheries statistics

Defra data for June and July was amalgamated, so a 50/50 split has been assumed

12.3.4 Key Species

Finfish

Sole *Solea solea*: Sole is the most valuable demersal fishery targeted in the area, representing around 40% of landed value to local ports and gaining £5,400 to £6,300 per tonne live weight. Sole is targeted by local, UK and non-UK vessels using beam trawl and netters.

Skate/ray *Raja sp.*: The most abundant *Raja* species in the area is the thornback ray, *R. clavata* (Ellis *et al,* 2004), which is landed throughout the year. Rays are one of the primary species targeted by the local fleet, making up 22% of landings by live weight in 2003. Skates and rays are elasmobranch fish with comparatively low reproductive rates compared to teleost (bony) fish species. They are, therefore, considered to be more prone to overfishing as recovery rates are slower.

Cod *Gadus morhua*: Cod are targeted by local, UK and non-UK fleets, primarily using trawlers and long liners, as well as gill nets and seiners, with most effort during the end of autumn and beginning of winter. North Sea cod stocks are presently considered well outside biological safe limits, with quota levels remaining at very low levels in the North Sea IVC zone to prevent targeted fishing effort as part of emergency recovery measures.

Bass *Dicentrarchus labrax*: Bass are targeted by local and UK fleets using gill netters and trawlers in the area. Bass are also targeted by pair trawl teams, although this method has not been observed in the area under consideration. They are a high value species, gaining circa £5,000 per tonne live weight landed by the local fleet in 2003.

Smoothhound *Mustelus mustelus:* Smoothhound are targeted by local and UK fleets using drift and anchor nets in the area. The catch and value of this species has significantly increased from 2002 to 2004, as a result of a new market being found in France.

Plaice *Pleuronectes platessa*: Plaice are targeted by local, UK and non-UK vessels throughout spring and summer, primarily with beam trawlers, but also stern trawlers and netters.

Whiting *Merlangius merlangus*: Whiting are primarily targeted by UK stern trawl fleets, and few are now caught by local vessels that have switched to netting.

Herring *Clupea harengus*: Herring are mainly harvested by large pelagic trawlers with a small seasonal fishery for local vessels in the autumn.

Sea trout *Salmo trutta*: Netting of sea trout by the marine fisheries sector is very unlikely. As a precaution, the Environment Agency requires no use of nets within 1.5nm radius of the disused power station at Richborough from April to September inclusive and this is written into the K&ESFC by-laws.

Shellfish

Lobster *Hommarus gammarus*: Lobster is mainly targeted by potters, but netters also take this high value shellfish. Lobster is found on uneven ground close to shore and

around hard substrate features offshore including Drill Stone Reef. Lobster is targeted all year round with the main landings being summer and autumn. Apart from national legislation that applies a minimum landing size for lobster, the K&ESFC has a by-law prohibiting the landing of berried females.

Crab *Cancer pagurus, and other sp.*: Crabs are also mainly targeted by potters on and around Drill Stone Reef. They are targeted on rocky ground throughout the year. Berried, soft and small crabs are returned to the sea if caught.

Cockle *Cerastoderma edule*: The Thames Estuary cockle fishery is one of the largest and most important in the UK. Cockles are harvested with suction dredges on nearshore sandy areas. The fishery is closed from January to May, and generally opens during the first week of June. This fishery is self-sustaining, depending on successful settlement of spat and shows large year to year variation both in terms of abundance and survival. Cockles are not targeted within the Thanet site, but occasional dredging does take place in the north of Pegwell Bay.

Native oyster *Ostrea edulis*: An important native oyster fishery exists within the Thames Estuary, but this is not targeted by vessels operating either in the Thanet site or along the export cable route.

The Thames Estuary and surrounding coastal waters are recognised as supporting important spawning and nursery areas for a number of commercially valuable species. The location of these, according to CEFAS data, is presented in **Section 10**. In addition to those species targeted locally, the area is also of importance for recruitment of species not currently targeted by the Thanet fleet, such as whiting and herring.

12.3.5 Fishing Activity in the Area

The Thanet site is close to the southern end of ICES Area IVc, southern North Sea, near the border with ICES area VIId, eastern English Channel. Fisheries surveillance data for the period 1999 to 2004 for the Thanet site and surrounding waters have been obtained from Defra (see **Figure 12.2**). This indicates that from a regional perspective the site was moderately to heavily fished in recent years, although activity, particularly by larger vessels, appears to have decreased recently. The fishing vessels have been categorised by type of gear used.

Vessels deploying static gear include:

- Drift netter;
- Gill netter;
- Long liner;
- Potter/whelker; and
- Rod and line.

Mobile gears include:

- Beam trawler;
- Bottom seiner (anchor/danish/fly/scots);

- Demersal side trawler;
- Demersal stern trawler;
- Freezer trawler (pelagic/demersal);
- Pair trawler (all);
- Pelagic stern trawler;
- Scallop dredger;
- Side trawler (pelagic/demersal);
- Stern trawler (pelagic/demersal);
- Suction dredger, trawler (all); and
- Trio trawler (all).

Three distinct fleets of fishing vessels operate in the area:

- The local Thanet fleet, whose level of fishing activity is dependent on season and species;
- Larger UK vessels from distant ports are permitted to fish up to 3nm from the coast, conditional on meeting local Sea Fisheries Committee (SFC) byelaws; and
- Large trawlers from Belgium and France are permitted to fish seaward from the 6nm limit. All other EU member states are permitted to fish seaward of the 12nm territorial sea limit, where the Dutch beam trawl fleet dominates fishing.

Local ports include Ramsgate, Broadstairs and Margate. Whitstable is sometimes listed within this group, however, it is considered outside the Thanet area and is, therefore, not included with in this report. The majority of fishing activity at the Thanet site is by coastal vessels, mainly netters, from the port of Ramsgate.

Table 12.4 illustrates the trend in volume and value of landings from ICES rectangle 31F1. The figures relate to landings into UK ports and do not take into account the significant catches made in 31F1 and landed into non-UK ports by EU vessels. **Section 12.3.7** discusses the level of non-UK vessel activity in this area, but catch statistics have not been made available for inclusion. The increase in value from landings by other UK vessels into UK ports from 2003 to 2004 can be accounted for by an increase in catches of mussels and cockles.

In recent years, local vessels have accounted for around a third of the value of UK landings from 31F1 and far less in terms of volume. The mean value for landings into local Thanet ports from 31F1 over the six year period from 1999 to 2004 was approximately £710,000, with £1.7 million into UK ports by UK vessels and £22,000 into UK ports by non-UK vessels.

Discussions with local fishing interests suggest that these figures are an underestimate of actual landings. This is to be expected with a fleet that is predominately under 10m and which is not required to submit logbooks. A value of around £1.5 million has been suggested by local consultees as being more reflective of total landings into local ports.

Table 12.5 shows the volume and value of landings into UK ports from ICES rectangle 32F1. The volume and value of catch taken from 32F1 is significantly lower than that landed from 31F1, with the local fleet only contributing 0.1% of the volume landed. The mean value for landings over the six year period from 1999 to 2004 was approximately £4,000 into local ports, with £926,000 into UK ports by UK vessels and £12,000 into UK ports by non-UK vessels.

Table 12.6 shows the average proportion of landed volume and value by local, other UK and non-UK vessels into UK ports from ICES rectangles 31F1 and 32F1. This illustrates that in recent years, larger UK vessels landing outside the Thanet ports take the vast majority of the catch in the area, in volume terms. In the last few years this has altered with local vessels accounting for a higher proportion of catch from the area and this is largely due to quota restrictions and fuel costs altering the operating patterns of the larger vessels.

Larger beam trawlers over 10m from elsewhere in the UK, Belgium, France and the Netherlands have been known to operate in the area. In the last few years, however, days at sea restrictions and fuel price increases, has meant that non-local UK vessels have not significantly targeted the area. Local fishermen report the sighting of 10 to 12 Belgian beam trawlers fishing the area (see **Section 14, Shipping and Navigation**).

Table 12.4 Landing statistics for ICES rectangle 31F1 showing live weight (tonnes) and value (£) landed into local* ports and other UK ports by vessels of UK nationality and by non-UK vessels.

	1999		2000		2001		2002		2003		2004	
Landing port	**Vol**	**Value (£)**	**Vol**	**Value (£)**	**Vol**	**Value (£)**	**Vol**	**Value (£)**	**Vol**	**Value (£)**	**Vol**	**Value (£)**
Local ports	503	898,478	487	801,094	298	585,533	278	642,393	300	732,996	195	598,619
Other UK ports by UK	1,328	2,071,579	1,309	1,391,157	651	948,071	3,935	1,726,722	1,806	1,259,730	8,575	2,575,389
Other UK ports by non-UK	2	3,417	1	1,719	6	15,200	11	49,080	3	7,657	18	53,219
Total	**1,833**	**2,973,474**	**1,797**	**2,193,970**	**955**	**1,548,804**	**4,223**	**2,418,195**	**2,109**	**2,000,383**	**8,788**	**3,227,227**

*Local ports include Ramsgate, Broadstairs and Margate.

Source: Defra Sea Fisheries Statistics.

Table 12.5 Landing statistics for ICES rectangle 32F1 showing live weight (tonnes) and value (£) landed into local* ports and other UK ports by vessels of UK nationality and by non-UK vessels

	1999		2000		2001		2002		2003		2004	
Landing port	**Vol**	**Value (£)**	**Vol**	**Value (£)**	**Vol**	**Value (£)**	**Vol**	**Value (£)**	**Vol**	**Value (£)**	**Vol**	**Value (£)**
Local ports	1	5,337	3	8,969	0	0	0	0	1	3,597	1	2,765
Other UK ports by UK	1,443	956,838	1,913	569,357	2,249	661,883	2,308	794,556	1,677	1,437,973	1,198	1,132,938
Other UK ports by non-UK	0	690	1	1,654	2	3,456	8	38,391	6	20,936	3	5,186
Total	**1,445**	**962,865**	**1,916**	**579,980**	**2,251**	**665,339**	**2,317**	**832,947**	**1,683**	**1,462,505**	**1,201**	**1,140,889**

*Local ports include Ramsgate, Broadstairs and Margate.

Source: Defra Sea Fisheries Statistics.

Table 12.6 Proportion of landings by vessel origin in ICES rectangles 31F1 and 32F1 averaged over 1999-2004

Origin	ICES 31F1		ICES 32F1	
	Live Weight	Value	Live weight	Value
Local fleet	18.1%	29.2%	0.1%	0.4%
Other UK	81.7%	70.1%	99.7%	98.3%
Non-UK	0.2%	0.7%	0.2%	1.3%

Source: Defra Sea Fisheries Statistics.

12.3.6 Overview of the local fleet

A combination of Defra vessel license databases and interviews with local fishermen and fishery officers were used to compile a list of vessels operating within the study area.

The local fleet has reduced in size with manly larger trawlers leaving the industry for a number of factors, including reductions in quotas. The years 1999 and 2000 saw the largest decline in the fleet, in response to government measures to decommission vessels. However, there has been a recent growth in netting, mostly by under 10m vessels, but this has not fully compensated for the loss of fishing power associated with the sale or decommissioning of the larger trawlers. For instance, of 14 trawlers over 12m fishing from Ramsgate in 1988, only six remained active in 1994, one in 2001 and none in 2003 (MacAlister Elliott and Partners, 2003). Only one under 10m trawler currently operates from Ramsgate. Logically, this change in fleet structure has also altered the composition of the catch.

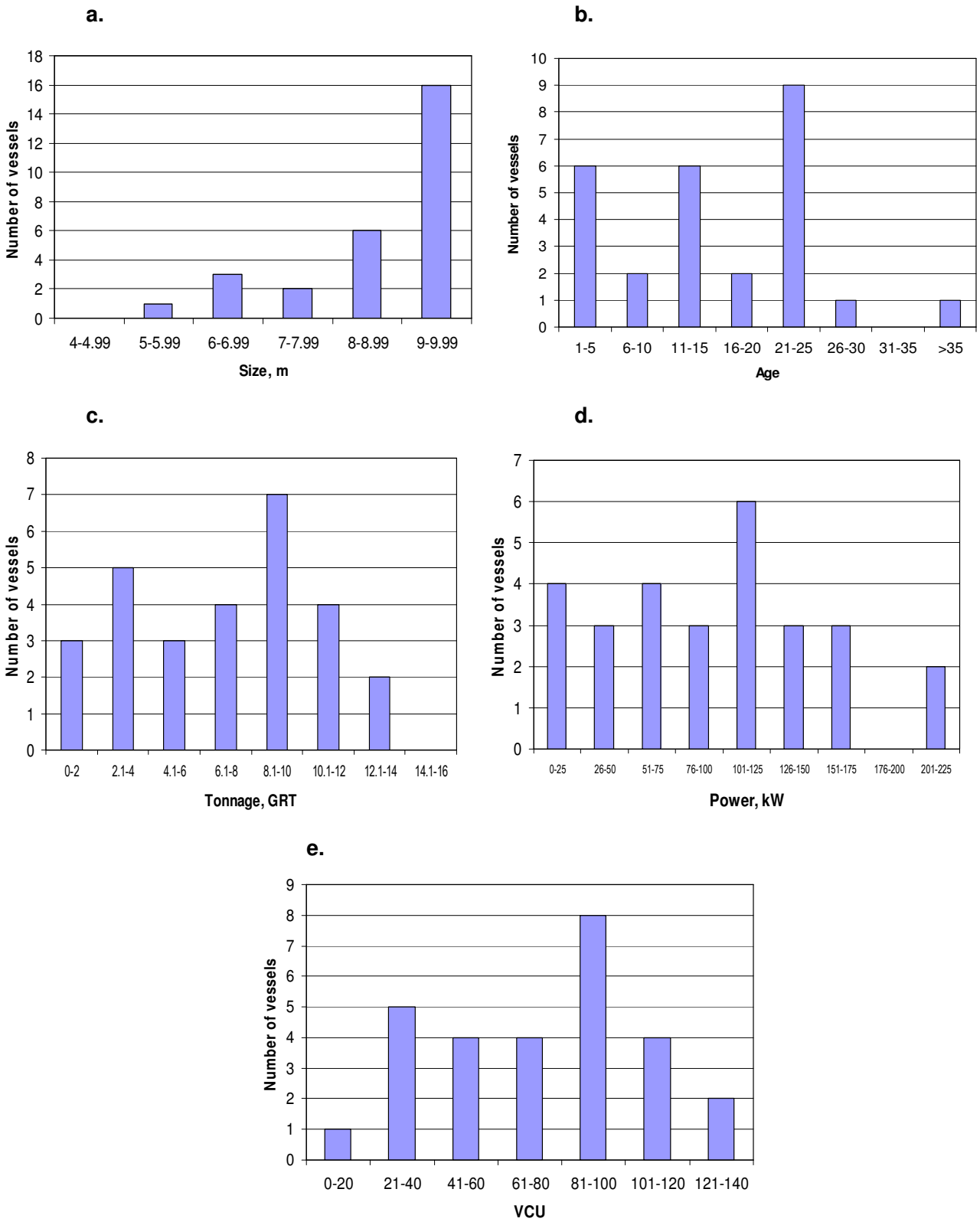
Vessels

Defra vessel figures show that 64 vessels are registered to local Thanet ports, but local consultation indicates that approximately 33 currently operate in the area from the home ports of Margate, Broadstairs and Ramsgate, with the majority from the latter. There are around ten vessels based in Ramsgate that operate full time and fish the area at certain times and tides throughout the year. Three vessels have been undergoing extensive refit and repair work for more than a year and a further 17 or so vessels operate more seasonally, ranging from a part-time basis down to very occasional operation.

All vessels currently operating from Thanet ports are under 10m, with an average length of 8.9 m (**Figure 12.8a**). These vessels normally operate as day boats and have the capacity to fish a variety of gears, at a range of up to 20-25nm from their home port. The average vessel tonnage is 7GRT, with an average power and vessel capacity of 96kW and 74VCU, respectively (**Figures 12.8c, d** and **e**).

The age of local vessels ranges from 3 to 42 years, with an average age of 16 years (**Figure 12.8b**). There is ongoing reinvestment in the fleet through extensive refits, but few new boats are being purchased. Fishermen are keen to use the vessels for as long as they are fit for purpose, choosing to refit existing vessels, over the significant capital investment in a new vessel, despite the lost fishing time that results. An estimated replacement cost for an inshore vessel is typically around £150,000.

Figure 12.8 Profile of Thanet vessels showing the structure of the fleet in terms of size (a), age (b), tonnage (c), power (d) and vessel capacity units, VCU (e)



Source: Defra vessel list and local consultation

Gears used

The fleet is made up of small under 10m vessels that range approximately 20-25nm from port. Factors that influence the gear type used include species targeted, type of seabed being worked and physical water conditions. Some fishing vessels have a degree of flexibility when operating gear. Netters can alternate between fixed/anchor nets and drift nets depending on tides and other vessels, such as potters, will occasionally deploy nets.

Fish and shellfish are harvested using a variety of fishing methods. Demersal fish assemblages are targeted with beam, single and multi-rig otter trawls, anchored and drifting gill and trammel nets and long lines. Pair trawls and drift nets are used to capture small pelagic finfish. Cockles, mussels and oysters are harvested with mechanical and suction dredges while crabs, lobsters and whelks are taken primarily in pots.

Trawls can be configured in a variety of ways, but all forms are towed. The primary forms of trawl within ICES rectangle 31F1 include pair trawls, beam trawls and single or multi-rig otter trawls. The small local vessels used to operate trawls on a seasonal basis, but no longer do so due to the poor health of trawl fisheries, such as cod, and the higher fuel costs associated with trawling. There is only one remaining active trawler based in Ramsgate.

In recent years, drift netting and static gill netting has been favoured by most of the fleet. **Entangling nets** have been adapted to target a variety of species and operate over diverse grounds. They can be anchored to the seabed or set to drift with the tide. Drift nets have been used in the area since the late 1970s to harvest primarily bass and mullet. The nets are typically 500m long, single-wall construction of 80–100mm monofilament mesh. Fishermen set the gear strategically to drift with the tide and may fish either daylight or nighttime hours. There are seven full time entanglement netters in the area.

Pots are usually set in 5-35m of water. The baited pots are strung together on a lead line of up to 20 pots. Flounder is normally used as bait, since there is no market for this fish. Pots are allowed to soak for 12 to 48 hours and then retrieved. On occasion, pots are left longer, but after around two days they no longer fish since the bait has deteriorated or been eaten. Furthermore, the crabs and lobsters may become aggressive and fight. If the crabs or lobsters are berried, undersize or soft they are returned to the sea (**Figure 12.9a**). Approximately half of the crabs caught are returned. There is one dedicated potter operating in the area around Drill Stone Reef.

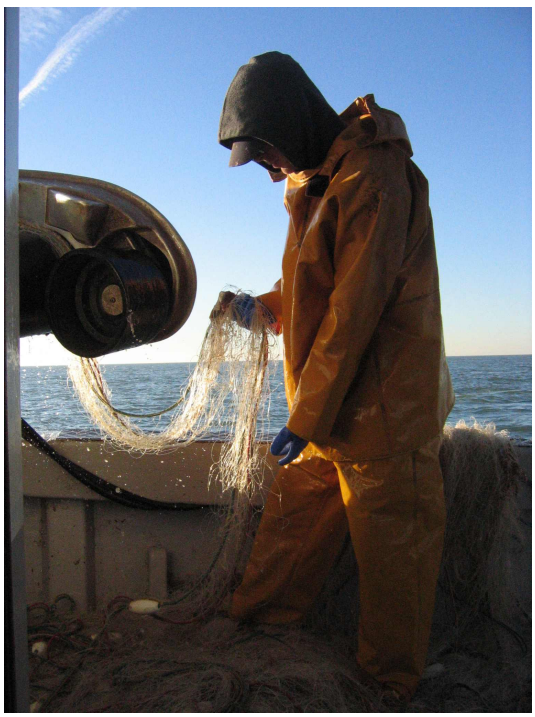
Modern **suction dredges** are used to harvest cockles and work most effectively in water depths of 1.5-3.0m. Cockle dredges are constructed of a heavy steel rectangular frame, to the bottom of which a steel blade is attached. These occasionally operate in Pegwell Bay.

Some vessels have the ability to switch between different methods of fishing depending on conditions, abundance and market prices. For example, one potter will also deploy nets in waters adjacent to potting grounds and will, on occasion, alternate between the two fishing methods in one trip. The full time netters tend to only have net hauling and stacking equipment on deck (**Figures 12.9b** and **c**). Employing other fishing methods would require investment in other gears and other deck equipment. However, the fishermen are not averse to experimenting with different gear set-ups in order to penetrate different grounds. For example, one full time netter was experimenting using

trailers attached to the bottom of the drift net, so that the net would sit about 0.5m above the seabed. If successful, this may allow drift netting over rougher grounds.

Figure 12.9 Images taken on board Ramsgate vessels during observer trips:

(a) Fisherman checks for berried crabs,



(b) on deck net hauling gear

(c) net sorting gear

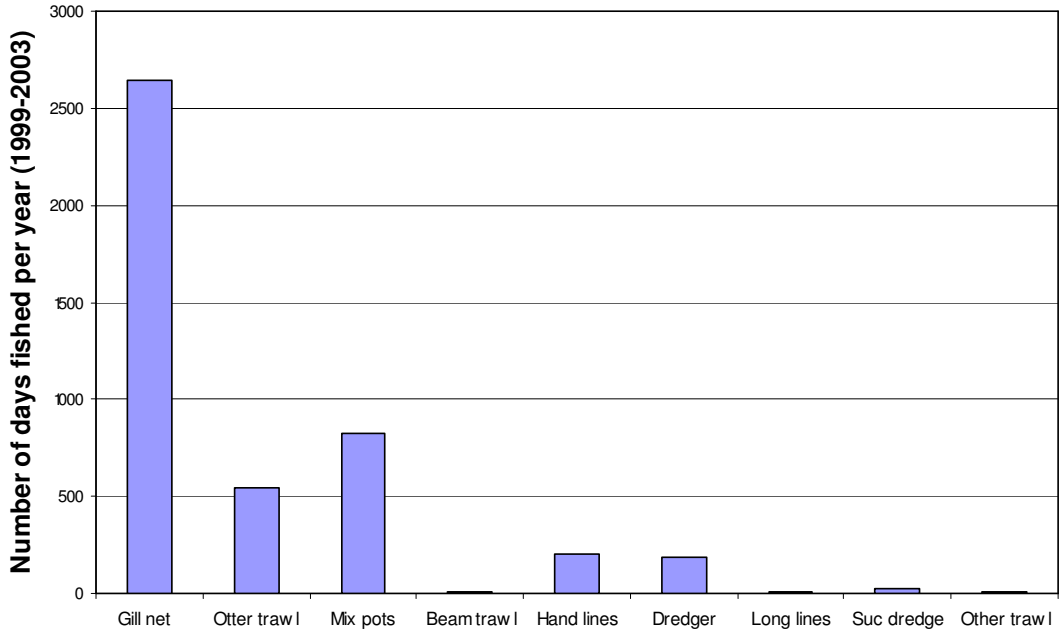
Images © Royal Haskoning

Fishing effort of the local fleet

Figure 12.10 illustrates fishing effort (in number of days fished) by gear type for the local fleet. The number of small trawlers has declined significantly in recent years with most inshore vessels in the area operating a mixture of drift nets and static gill nets depending on the tides and the ground. Effort is focused on drift netting, with fixed anchor netting only occurring during slack tides, which are not suitable for drift netting.

Drift netting lends itself to areas of smooth ground, with few obstructions that could snag the net, while static gill nets are placed around wrecks and over uneven ground. Local fishermen, through gear alterations and their developing knowledge of the ground, are attempting to extend the use of drift nets into areas previously deemed unsuitable.

Figure 12.10 Number of days fished per year by gear type* (averaged over 1999-2003) by local fleet



Source Defra Sea Fisheries Statistics

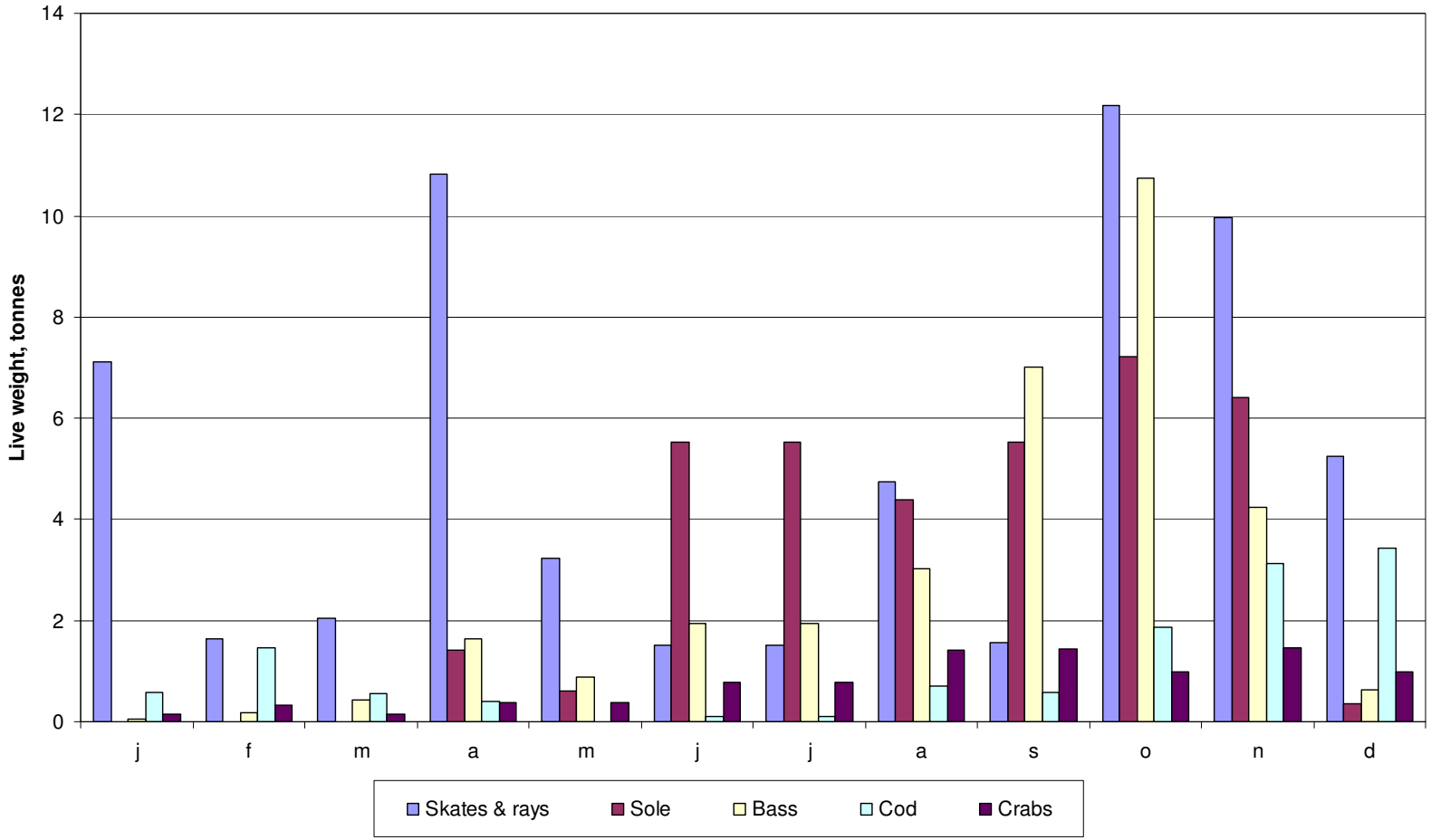
*NB. No hand lines or dredgers are known to currently operate from Ramsgate

The number of days at sea per year varies across the local fleet, dependant on the gear used and full-time / part-time status of the fishermen. Data from the Voluntary Logbook Scheme suggests an average of 150 to 180 days fished per year by full-time fishermen, this is supported by local consultation with the fishermen. Ten full-time vessels operate from Ramsgate, totalling 1,500 to 1,800 days fished per year. The remaining days at sea result from the 17 seasonally operated vessels that significantly vary between occasional and full-time during the summer fishing season.

Species of commercial importance to the local fleet

Figures 12.11 and **12.12** show the seasonal landings to the local ports. These show the highly seasonal nature of landings and importance of skates and rays (volume) and sole and bass (value) being landed.

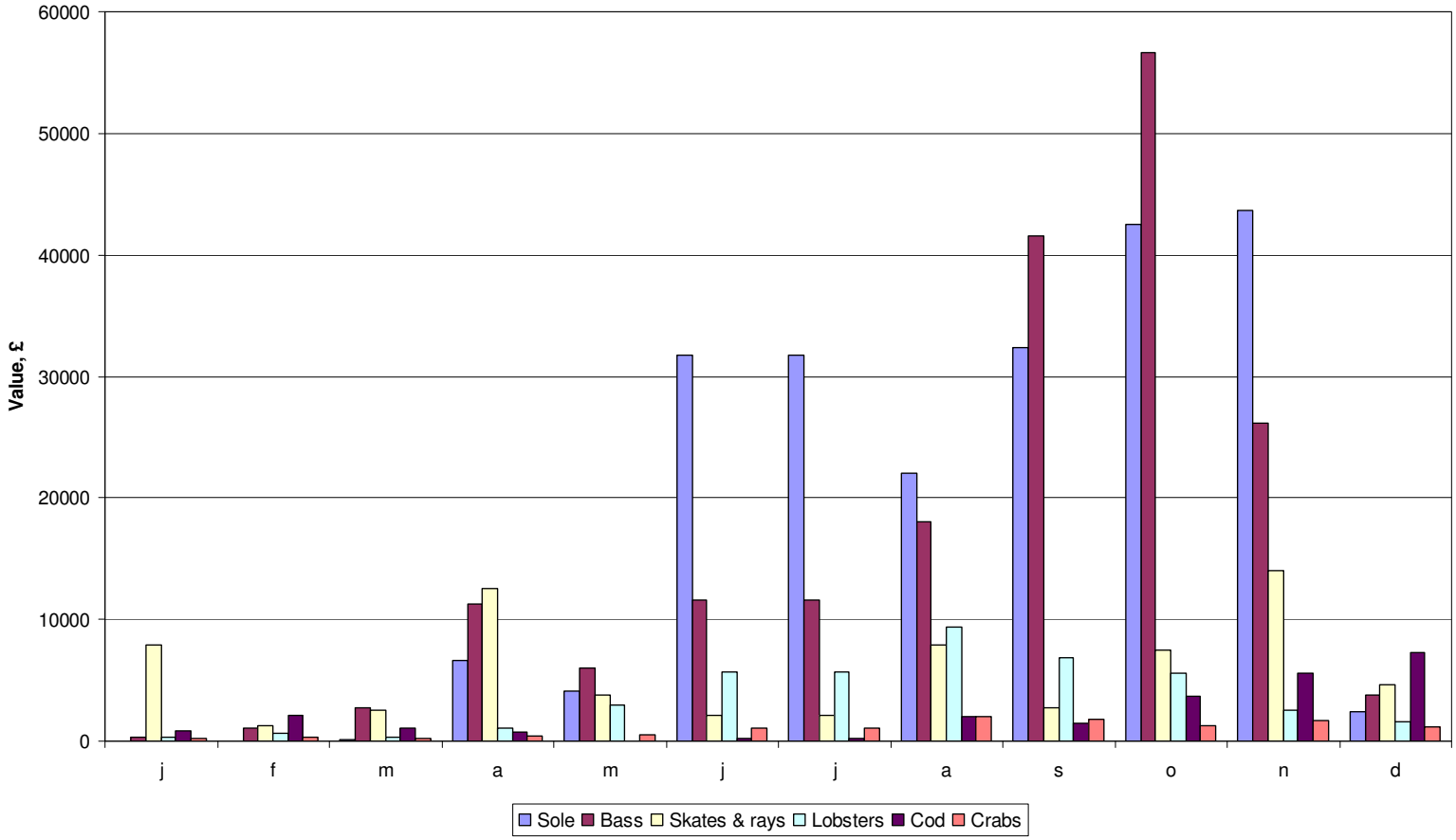
Figure 12.11 Live weight (tonnes) landed at the ports of Margate, Ramsgate and Broadstairs from January to December 2004



Source Defra Sea Fisheries Statistics

Defra data for June and July was amalgamated, so a 50/50 split has been assumed

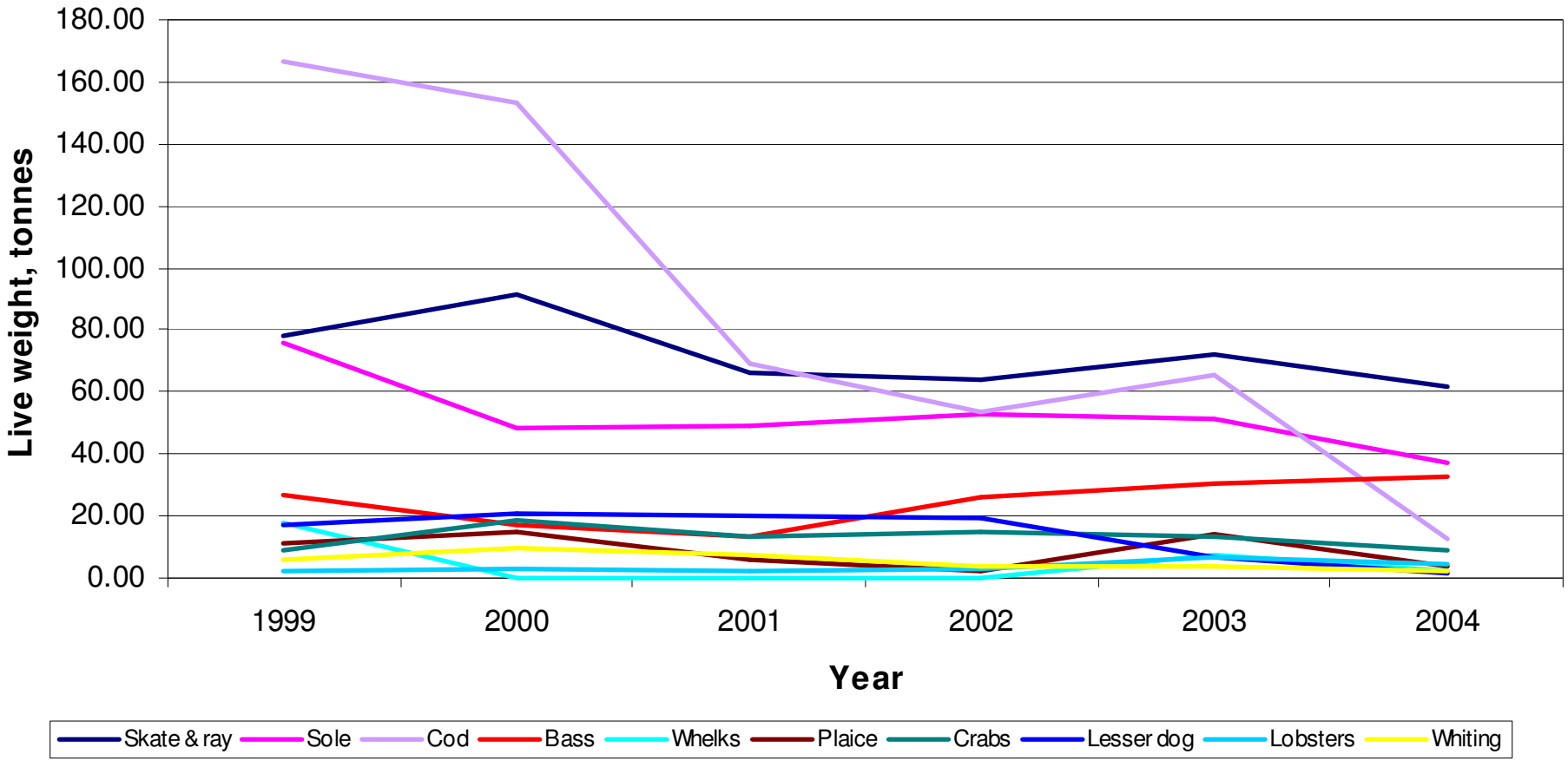
Figure 12.12 Value (£) landed at the ports of Margate, Ramsgate and Broadstairs from January to December 2004



Source Defra Sea Fisheries Statistics

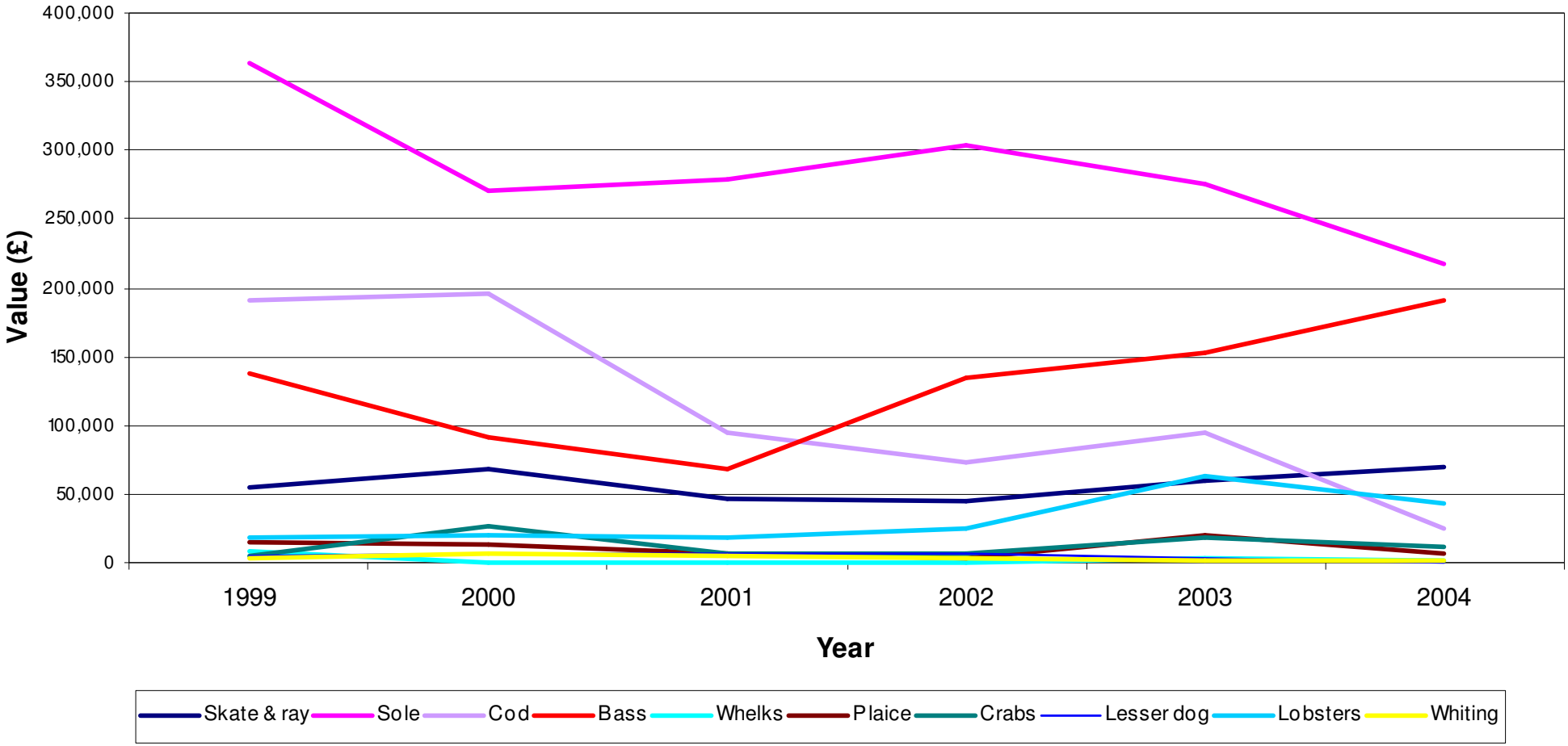
Defra data for June and July was amalgamated, so a 50/50 split has been assumed

Figure 12.13 Landings live weight (tonnes) of key commercial species into the local ports over period 1999-2004



Source: Defra Sea Fisheries Statistics

Figure 12.14 Landings value (£) of key commercial species into the local ports over period 1999-2004



Source: Defra Sea Fisheries Statistics

Table 12.7 Landings statistics for ICES rectangle 31F1 for the local ports of Ramsgate, Margate and Broadstairs showing live weight in tonnes and value (£) for the years 1999 to 2004

Species	1999		2000		2001		2002		2003		2004	
	Live Weight	Value (£)	Live Weight	Value (£)	Live Weight	Value (£)	Live Weight	Value (£)	Live Weight	Value (£)	Live Weight	Value (£)
Skate and rays	78.20	54,731	91.31	67,335	66.36	46,063	63.77	44,515	72.41	59,129	61.59	69,106
Sole	75.69	363,176	48.29	270,321	49.44	279,081	52.95	303,870	51.55	275,982	36.94	217,290
Bass	26.71	137,215	17.26	92,068	13.34	67,961	25.78	133,659	30.54	153,228	32.7	190,902
Cod	166.42	190,455	153.22	195,918	69.47	94,210	53.68	72,266	65.22	94,117	12.87	25,336
Crabs	8.89	4,206	18.27	27,312	13.74	6,486	14.64	7,015	13.64	18,994	9.19	11,671
Smoothhound	0.00	0	0.00	34	0.00	0	0.00	0	5.37	4,232	8.43	4,774
Lobster	2.52	18,876	2.67	20,078	2.50	18,578	3.28	24,886	6.97	63,057	4.58	42,713
Plaice	11.52	15,362	14.88	14,029	6.26	7,087	2.49	4,024	13.89	19,804	4.07	6,136
Whelks	17.59	7,724	0.00	12	0.00	5	0.00	241	7.09	3,180	2.37	1,180
Whiting	5.97	2,767	9.98	6,670	7.48	5,079	3.66	3,082	3.59	2,240	2.15	1,822
L. spotted dog	17.44	5,578	21.10	6,980	20.37	6,556	19.51	6,281	6.85	3,072	1.56	40
Herring	8.08	3,338	25.27	10,440	4.76	1,964	4.44	1,835	1.24	513	1.39	1,383
Mixed demersal	1.57	734	1.30	578	1.87	732	2.11	707	1.69	546	1.1	265
Brill	0.00	1,890	2.10	7,088	1.66	5,565	1.22	4,075	1.26	3,902	1.05	4,591
Dabs	4.47	2,343	2.49	5,933	3.17	1,493	1.45	774	1.28	617	0.82	430
Tope	0.00	140	0.00	581	1.18	694	2.23	1,315	1.08	1,443	0.67	769
Cuttlefish	4.03	2,546	3.20	2,375	1.30	901	0.00	54	1.01	642	0.08	64
Other	73.64	87,397	75.52	73,342	34.81	43,078	26.49	33,794	15.27	28,296	13.79	19,775
TOTAL	**503**	**898,478**	**487**	**801,094**	**298**	**585,533**	**278**	**642,393**	**300**	**732,996**	**195**	**598,619**

Source: Defra Sea Fisheries Statistics

Table 12.8 Relative importance of commercial species expressed as percent contribution of landings and value of all species landed into local ports (Ramsgate, Margate and Broadstairs) from ICES rectangle 31F1

Species	1999		2000		2001		2002		2003		2004	
	Live Weight	Value (£)	Live Weight	Value (£)	Live Weight	Value (£)	Live Weight	Value (£)	Live Weight	Value (£)	Live Weight	Value (£)
Skate and rays	17.59%	6.63%	20.12%	8.90%	24.16%	8.22%	24.35%	7.18%	25.43%	8.28%	31.53%	11.54%
Sole	17.02%	43.98%	10.64%	35.71%	18.00%	49.82%	20.22%	48.99%	18.11%	38.65%	18.91%	36.30%
Bass	6.01%	16.62%	3.80%	12.16%	4.86%	12.13%	9.84%	21.55%	10.73%	21.46%	16.74%	31.89%
Cod	37.42%	23.07%	33.77%	25.88%	25.30%	16.82%	20.50%	11.65%	22.91%	13.18%	6.59%	4.23%
Crabs	2.00%	0.51%	4.03%	3.61%	5.00%	1.16%	5.59%	1.13%	4.79%	2.66%	4.7%	1.95%
Smoothhound	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.89%	0.59%	4.32%	0.8%
Lobster	0.57%	2.29%	0.59%	2.65%	0.91%	3.32%	1.25%	4.01%	2.45%	8.83%	2.34%	7.14%
Plaice	2.59%	1.86%	3.28%	1.85%	2.28%	1.27%	0.95%	0.65%	4.88%	2.77%	2.08%	1.03%
Whelks	3.96%	0.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.04%	2.49%	0.45%	1.21%	0.2%
Whiting	1.34%	0.34%	2.20%	0.88%	2.72%	0.91%	1.40%	0.50%	1.26%	0.31%	1.1%	0.3%
Lesser spotted dog	3.92%	0.68%	4.65%	0.92%	7.42%	1.17%	7.45%	1.01%	2.41%	0.43%	0.8%	0.07%
Herring	1.82%	0.40%	5.57%	1.38%	1.73%	0.35%	1.70%	0.30%	0.44%	0.07%	0.71%	0.23%
Mixed demersal	0.35%	0.09%	0.29%	0.08%	0.68%	0.13%	0.81%	0.11%	0.59%	0.08%	0.56%	0.04%
Brill	0.00%	0.23%	0.46%	0.94%	0.61%	0.99%	0.47%	0.66%	0.44%	0.55%	0.54%	0.77%
Dabs	1.01%	0.28%	0.55%	0.78%	1.15%	0.27%	0.55%	0.12%	0.45%	0.09%	0.42%	0.07%
Tope	0.00%	0.02%	0.00%	0.08%	0.43%	0.12%	0.85%	0.21%	0.38%	0.20%	0.34%	0.13%
Cuttlefish	0.91%	0.31%	0.71%	0.31%	0.47%	0.16%	0.00%	0.01%	0.36%	0.09%	0.04%	0.01%
Other	3.5%	1.77%	9.35%	3.85%	4.28%	3.16%	4.07%	1.87%	0%	1.3%	7.06%	3.3%

Source: Defra Sea Fisheries Statistics

Figures 12.13 and **12.14** clearly illustrate the decline in the cod fishery and the increased dependence on non-quota species. Sole has remained the most important fishery to the local ports.

The statistics for volume and value landed into local ports and the relative importance of commercial species are displayed in **Tables 12.7** and **12.8** respectively. When considering individual ports, Margate has declined considerably and Broadstairs barely registers landings, while Ramsgate has steadied the decline and has increased the value of landings in the last couple of years through its diversification into non-quota species and a switch to drift netting by the local fleet.

Landing statistics for catch volumes were obtained from a number of Ramsgate vessels that participate in the CEFAS Voluntary Logbook Scheme. These figures support Defra data shown in **Table 12.7** for the majority of species, except sole where a discrepancy is evident. The accounts for Foreland Fish, the company that markets the catch from the main netters, also suggest the values recorded by Defra are underestimated. Consultation with the fishermen has confirmed this apparent underestimation, which is often associated with port landings dominated by the inshore fleet, results from the under 10m fleet being under no statutory obligation to report landings in log books.

Fishing grounds

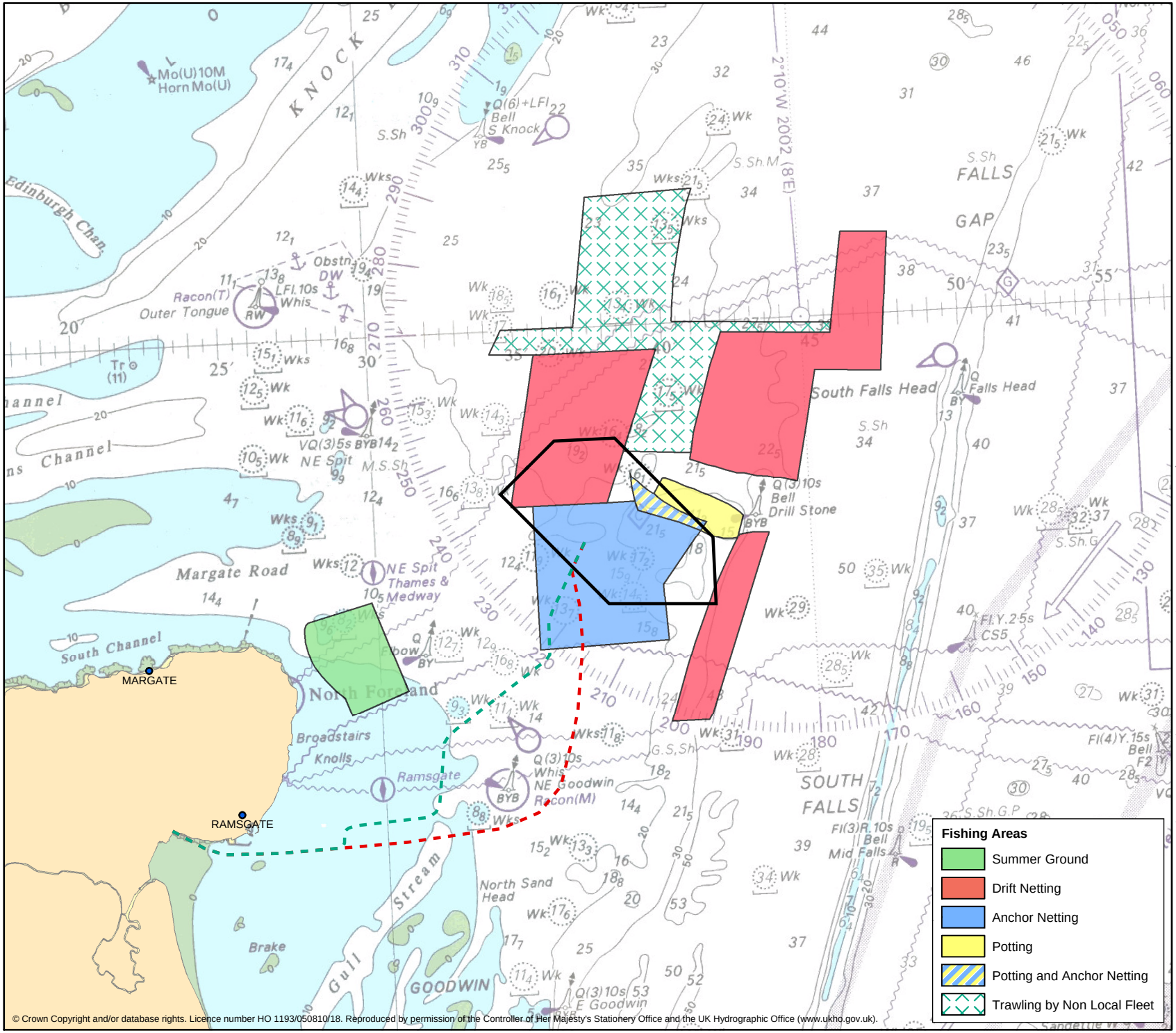
Figure 12.15 illustrates the main fishing areas targeted by the Ramsgate fleet. This information was obtained through local consultation, where fishermen were presented with copies of the appropriate section of an Admiralty Chart (1460) and asked to mark the areas fished by gear and species caught. This was also ground-truthed during the eight observer trips.

The area fished is within 25nm of Ramsgate, stretching from within the Thames Estuary, as far east as the South Falls, north to Kentish Knock and south to Folkestone.

Individual skippers have certain areas that they traditionally fish, which are informally agreed amongst the netters, based on experience and a first come first served basis. This works as a gentlemen's agreement, with little overlap on grounds, although some fishermen operate immediately adjacent to one another.

A proportion of fishermen will operate in more than one area when using different gear set ups. Those that operate drift netting and anchor netting have specific areas for each, dependant on tides. Grounds suitable for anchor netting (shown as blue in **Figure 12.15**) can be worked by a number of fishermen, while grounds for drift netting (shown as red in **Figure 12.15**) are more precisely allocated between fishermen. Some fishermen focus only on drift netting, in such instances, they solely operate in one specific area.

Other fishing areas depicted in **Figure 12.15** include the potting area (shown in yellow) adjacent to Drill Stone Reef and the summer fishing ground (shown in green). The summer ground is an area fished, in addition to those indicated, for five to six weeks during the summer months. All other areas depicted in **Figure 12.15** are fished throughout the year. Anchor netters who target the area for sole fish the summer grounds. The Goodwin grounds, which lie to the south of the Thanet site, are targeted for bass by drift netters.



Legend:

- Wind Farm Site Location
- Proposed Cable Route 1
- Proposed Cable Route 2

Title:

MAIN FISHING AREAS TARGETED BY THE RAMSGATE FLEET

Project:

THANET OFFSHORE WIND FARM

Source: Main Chart - Not to be used for navigation.
© Haskoning UK Ltd.
Inset Map -
Derived from MiniScale by Ordnance Survey.
Crown Copyright. All rights reserved.
Licence number AL 100017728

Client:

THANET OFFSHORE WIND LTD

Drawn by:	Checked:	Drawing No:
SMG	SDG	9P5164/06/500
Date: 20/10/2005		Figure: 12.15
Scale: 0 1 2 3 4 Kilometres		Revision No: 003

ROYAL HASKONING

More specifically, the areas fished are dependent upon the tide during a given season. On slack tides, the vessels tend not to fish further north than the Drill Stone Reef (51º 26.5 N), as this is when static gill nets are used. On stronger tides, drift nets are used above 51º 26.5N, as some areas of ground are sufficiently clear of obstructions to permit the use of drift netting gear without it being snagged.

Figure 12.16 illustrates fishing boat tracks observed during June 2005 and August 2005, taken from the navigation traffic survey data (Marico Marine, 2005). Steaming routes to and from grounds, as well as the fishing areas are depicted. The general fishing areas mirror those shown in **Figure 12.15**, however the local fleet concentrate efforts on netting in these areas and not beam trawling as indicated in **Figure 12.16**. If these are indeed beam trawlers, it is most likely that they form the Belgian fleet (see **Section 12.3.7**).

Figures 12.17 and **12.18** illustrate results from a series of observer trips carried out on local vessels by Brown & May Marine and Royal Haskoning. The full report by Brown & May Marine is available in **Appendix 12.1**.

The primary objectives for undertaking the trips were to obtain information on the location of fishing grounds and gain insight into the operating practices of the vessels undertaking typical trips to these grounds within and adjacent to the Thanet site.

The selection of the vessels was undertaken in consultation with the Thanet Fishermen's Association (TFA). Trips were repeated on the T Rex and Anna Louise, as the TFA stated that these were the vessels that principally fished within the Thanet site.

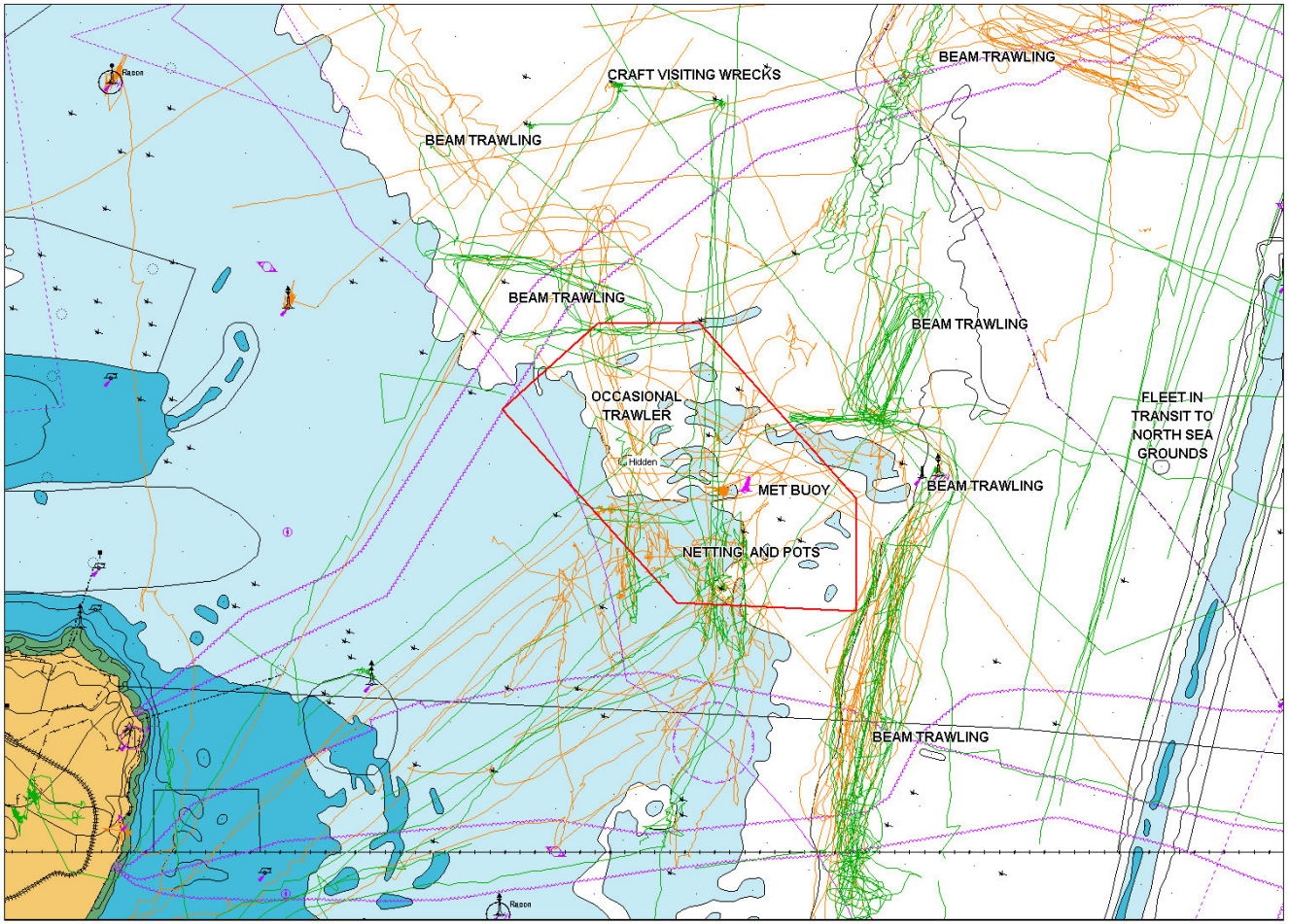
The steaming tracks of six vessels are shown in **Figure 12.17**, indicating that each vessel crosses the Thanet site during travel to and from fishing grounds and that four vessels cross both export cable routes.

Figure 12.18 gives an overview of the areas fished and the gear types used. Fixed / anchor netting and potting trips took place on neap tides and drift netting trips on spring tides. These areas fished reflect those displayed by the fishermen during consultation, shown in **Figure 12.15**.

Socio-economics

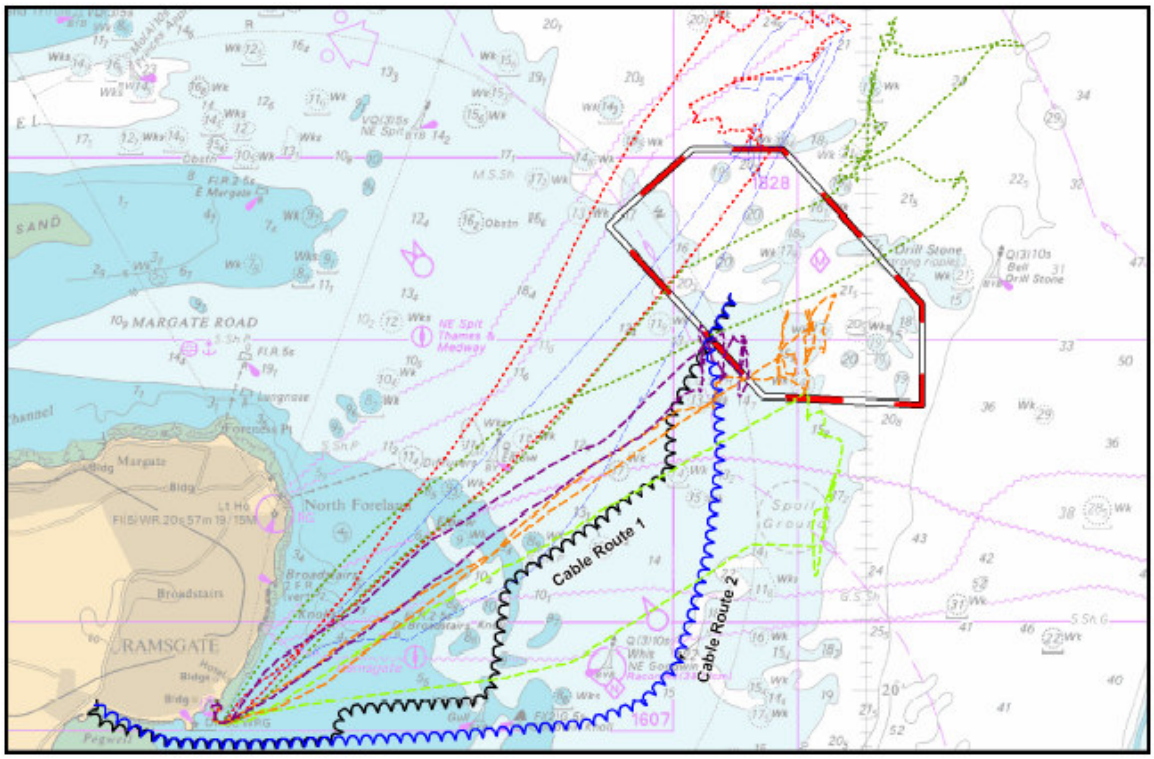
It is estimated that the Ramsgate fleet employs around thirty full time equivalent (fte) fishermen, many of who are owner/operators, and lands in the region of £1.5m worth of fish per annum. Crew are paid as share fishermen, receiving 25% to 27% of gross vessel earnings. This arrangement has altered in recent years in favour of the crew, as previously various operating costs were removed before shares were calculated. As seen in the wider UK fishing industry, this reflects a growing demand for experienced crew that are properly qualified in first aid, sea survival etc, as well as competition with other marine and non-marine sectors (Nautilus Consultants, 2004).

Figure 12.16 Tracks of fishing boats operating in the area, including steaming to and from grounds, for June 2005 and August 2005



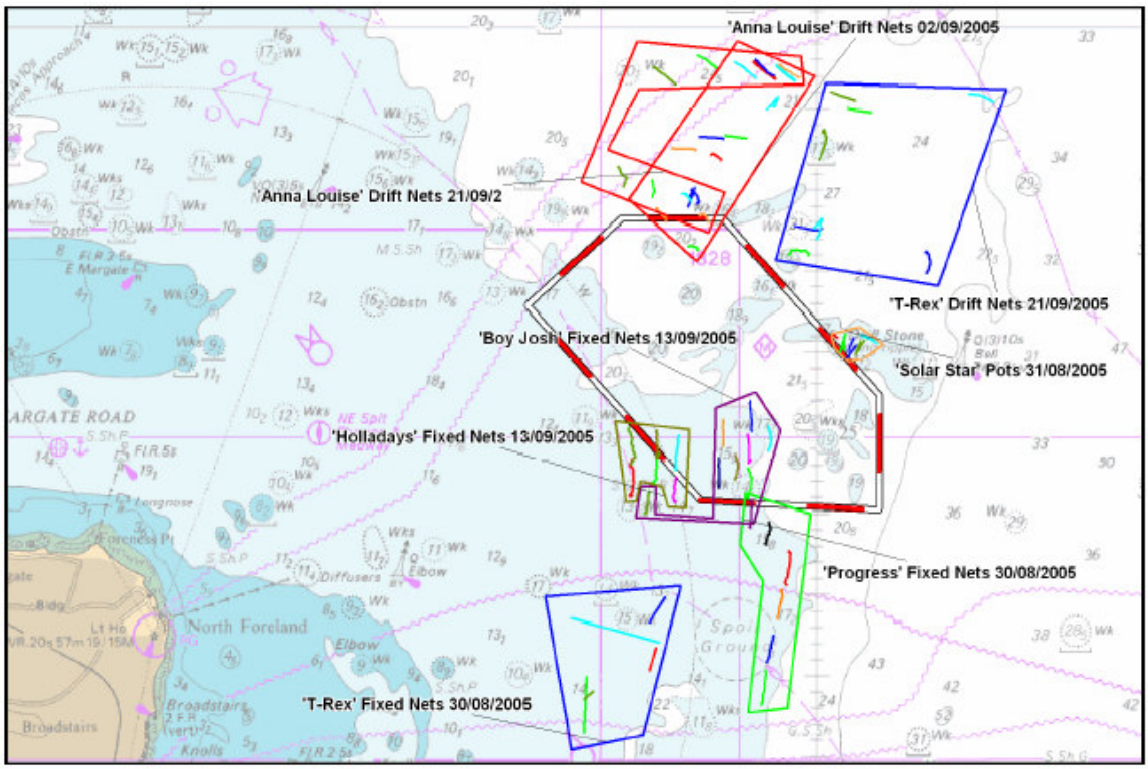
Source: Marico Marine Navigation Traffic Data

Figure 12.17 Recorded plots of steaming tracks on six trips using GPS receiver-plotters



Source: Brown & May Marine Ltd, 2005

Figure 12.18 Overview of areas fished and gear type during each observer trip



Source: Brown & May Marine Ltd, 2005

The catching sector supports a wide number of associated upstream industries such as gear and vessel provision and maintenance services, and downstream industries such as processing, transport and marketing. Although landings to Ramsgate have not declined in recent years, overall fishing in the southeast has reduced in scale. Consequently, some ancillary services have been lost, as has been seen in the wider UK fishing industry. Those remaining have reduced their presence in many ports and the sector as a whole has made efficiencies (Nautilus Consultants, 2002).

There has been very little investment in new vessels in recent years and any such purchases are likely to be direct from manufacturers throughout Europe. Other major expenditure, such as gear, is also likely to be direct from manufacturers. Smaller items may be purchased locally from chandlers, whose main business is from the recreational boating sector.

Fuel is purchased on a collective basis by the Thanet Fishermen's Association (TFA) and purchased individually from a recently installed fuel pump facility administered by the TFA. The Ramsgate vessels still require mechanical and electrical engineering expertise, enough to support one or two full time positions.

There is no local auction market for fish landed at Ramsgate and no nearby auction market where the fish can be sold. Similarly, there is no local processing capacity, as most landings comprise whole prime fish, which is sold unprocessed, shellfish, which is sold live, or roundfish and dogfish, which is gutted at sea before sale. The large majority (90%) of fish landed is destined for the continent, with the remainder going to London. Six vessels have formed a company, Foreland Fish, to jointly market their fish, as this better ensures sufficient volume to supply customer demands and reduces transport costs.

Overall, while the Ramsgate fleet itself does not support many additional full time positions in ancillary industries, it is an important part of the fisheries sector in the South East, which in turn supports a number of ancillary services.

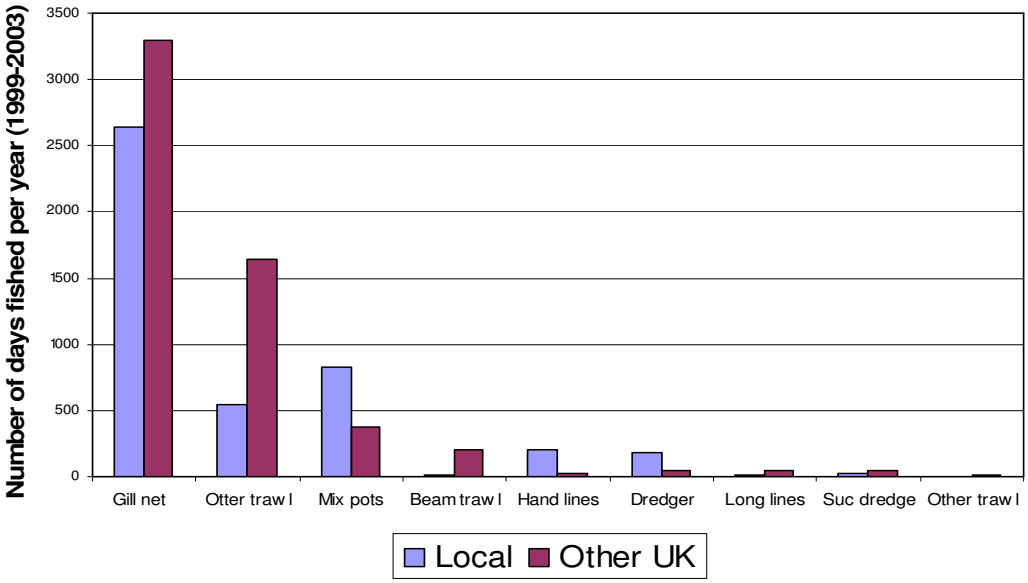
12.3.7 Other Fishing Activity in the Area

Other UK vessels

In the past, the local fleet would be joined on the fishing grounds by several larger UK trawlers venturing from Lowestoft, Plymouth, Brixham, Shoreham, Newlyn, Milford Haven and elsewhere. Previous years have seen the amount of fish taken in the area and landed elsewhere in the UK to be approximately twice as much as that landed to local ports (see **Table 12.4**). Other UK vessels would primarily target sole, cod and skates and rays using otter and beam trawls (**Figure 12.19**).

This situation has changed considerably in the last few years, with few other UK vessels now operating in the area, since the number of over 10m vessels has reduced and days at sea limits have been introduced. The once considerable beam trawler fleet at Lowestoft no longer exists, with the last Anglo-Dutch vessels having returned to the Netherlands, while still using UK track records and quotas. Recent fuel price increases also mean that vessels based in the channel ports, such as Shoreham, are unlikely to steam to this area, particularly as fishing has been good elsewhere.

Figure 12.19 Number of days fished per year (averaged over 1999-2003) by local and other UK vessels in ICES rectangle 31F1



Source: Defra Sea Fisheries Statistics.

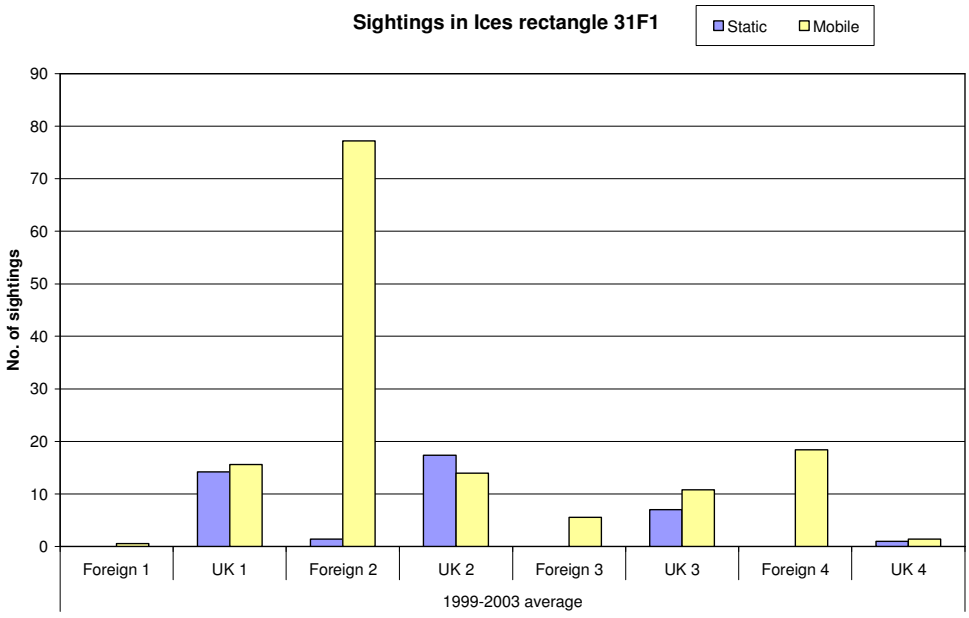
EU Member States vessels

All EU member states have the right to fish seaward of the UK's 12nm territorial sea limit. Historical fishing agreements allow Belgian and French fishing vessels limited rights to fish up to the 6nm fisheries jurisdictional boundary. The Dutch fleet of beam trawlers are the largest to operate in the southern North Sea. However, they are not permitted to fish landward of the 12nm sea limit, therefore, Dutch vessels should not operate within the Thanet site. Air surveillance records from Defra (**Figure 12.2**) indicate that non-UK mobile vessels dominate the area seaward of the 6nm fisheries limit.

The non-UK fleet that fish within the Thanet area, in ICES rectangle 31F1, sub-square 2, are primarily vessels operating mobile gear (**Figure 12.20**). The Belgian fishing fleet currently consists of approximately 40 active beam trawlers, of which at least a third concentrate efforts in the Irish Sea. Others engage in beam trawling in the southern North Sea and the English Channel. These vessels typically make trips of 6-7 days duration, allowing four days fishing and two days steaming to and from the area. Local fishermen report 10 to 12 Belgian beam trawlers have operated in the Thanet area in recent years. These vessels primarily target sole and plaice, with effort of the fleet being limited by numbers of days-at-sea. The effort is seasonal (**Figure 12.21**), peaking in April and May.

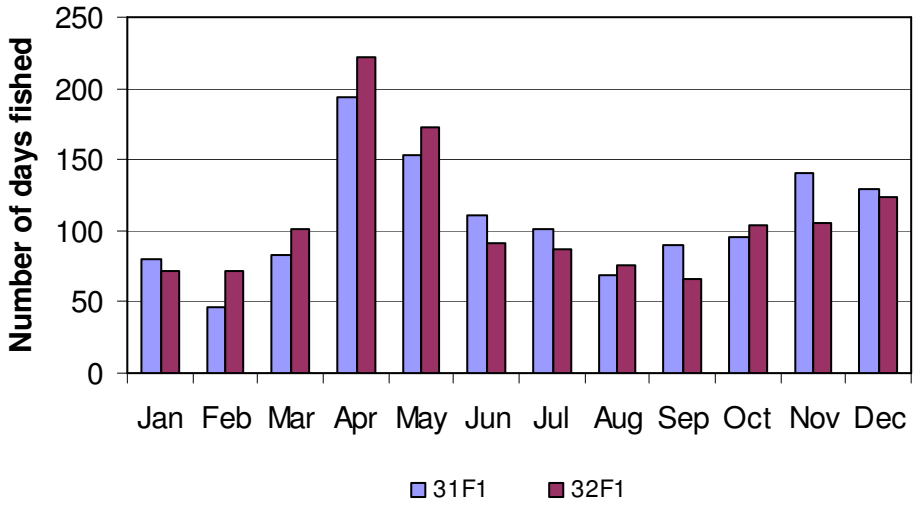
The French fleet, which is primarily comprised of large otter trawlers, also has rights to fish inside the UK's territorial limit. However, the majority of the French effort is currently concentrated outside the 12nm limit.

Figure 12.20 Number of vessels sighted in ICES rectangle 31F1 by rectangle sub-squares, gear category and vessel nationality



Source: Defra surveillance records.

Figure 12.21 Number of days fished by Belgian vessels within ICES rectangles 31F1 and 32F1 by month, averaged over 2003-2004



Source: Belgian Sea Fisheries Directorate

At the request of the UK Sea Fisheries Inspectorate, contact has been made with the following organisations to advise them of the Thanet project and seek their comments:

Netherlands:

- H.A. Vonk, Aid Headquarters Head Office, Ae Kerkrade; and
- Secretariat, Vissersbond.

Belgium:

- Jean-Francois Verhegghen, Ministerie Vande Vlaamse Gemeenshap, Oostende; and
- Rederscentrale, Oostende.

Germany:

- Uwe Link, Bundesamt Fur Ernahrung Und, Hamburg.

France:

- Jean Philippe Quitot, Boulogne sur Mer;
- Jean Pierre Grandidier, Cooperatives Maritimes Etaploises, Boulogne sur Mer; and
- Philippe du Couedic de Kergoaler, Boulogne sur Mer.

Despite several attempts to make contact, there has been limited response from these organisations to date, although it has been confirmed by Jean Philippe Quitot that the French fleet does not actively fish the Thanet area. Similarly, Jean-Francois Verhegghen has advised that although 59 Belgian registered vessels have active rights to fish within the area, it is very difficult to quantify how many currently do so.

It has been confirmed, through dialogue with the Thanet fishermen, that the Belgian fleet is aware of the Thanet project, as it has been discussed between the two groups.

12.4 Impacts during Construction

12.4.1 Access to fishing grounds

Given an assumed 500m Safety Zone would be employed around all offshore structures during the construction phase, access to the fishing areas of several vessels would be reduced at various times throughout the construction phase of the wind farm (see **Section 14**).

The larger UK trawlers and those from elsewhere in Europe are expected to be in a position to avoid construction areas if given adequate notification. Construction is, therefore, not expected to significantly impact upon the fishing area available to these larger vessels.

As **Figure 12.15** illustrates, the Ramsgate vessels operate in clearly defined areas for netting and potting. Reduced access to these areas is, therefore, expected to have negative impacts upon the fishing operations of the small number of vessels with historic fishing areas that overlap with the Thanet site and export cable routes.

Several vessels anchor net during the four to five days of slack tides a month in an area that partly overlaps with the wind farm site. These vessels would be expected to be able to continue this activity, but in a smaller available fishing area, which would result in a **minimal adverse** impact on catch levels.

One full-time drift netting vessel would be impacted. As observed during one of the observer trips, one fleet of nets deployed to the north of the site, did drift a short distance into the Thanet site. Consequently, usual fishing operations in this area may be impacted for a significant part of the construction phase, which could be for one or two summer seasons.

Other drift netting vessels operating beyond the wind farm site may be inconvenienced by the need to avoid construction areas, causing longer steaming times with up to an additional hour each way. This would result in higher fuel bills and additions to the working day for the few drift netting vessels.

Construction in the eastern part of the wind farm around Drill Stone Reef is expected to impact on one full-time potting vessel. The vessel would have a smaller area available within which to fish for lobster and crab. As displacement of these resources is expected to be less pronounced than for more mobile target resources, this may result in reduced catch levels during construction in this area, as the harvestable resource available is reduced.

Some fishermen may be impacted by slightly increased steaming times and the resulting increased fuel bills, as a consequence of the requested Safety Zones during construction, but this is only likely to be of short term duration.

The export cable route runs through an area that is also prosecuted by local fishing vessels on an occasional basis. Subject to observing any Safety Zones around the cable lay vessel, it is expected that this fishing activity would be able to continue on either side of the cable laying area and so the impact on fishing operations is expected to be **negligible**, i.e. it is not expected to impact on revenue or costs for the commercial fishing sector.

The longevity of the impacts resulting from reduced access would depend upon the length of the construction phase and the pattern of installation i.e. on which part of the site turbines would be installed first. Communication will be important in minimising impacts to the local fishing fleet including:

- Advance warning of construction operations and associated Safety Zones;
- Ongoing liaison with the fishing community;
- Accurate details of location of construction operations; and
- Pattern of construction to minimise disruption to fishing activities wherever practicable.

The above mitigation measures would enable the static gear vessels that have historically fished in the area to continue whenever it is safe to do so. Advanced warning is required to avoid the setting of nets by fishermen in construction areas and the subsequent damage or removal of gear by construction operations.

Table 12.9 summarises the variable significance of impacts regarding access to fishing grounds for fishing vessels operating in the area.

Table 12.9 Impact of restricted access to fishing area during construction

Type of vessel	Level of activity	Estimated number	Duration of impact*	Extent of impact
Over 10m trawlers	Full time	10+	throughout	**negligible**
Under 10m drift and anchor netters	Full time	5	throughout	**minor adverse**
Under 10m anchor netters	Seasonal (tidal restricted)	12	part	**minor adverse**
Under 10m drift netter	Full time	1	part	**moderate adverse**
Under 10m potter	Full time	1	part	**moderate adverse**

* based on pattern of turbine installation that minimises disruption: 'throughout' construction phase or for 'part' of construction phase.

12.4.2 Availability of target resources

As described in **Section 10**, it is anticipated that there would be short term movement of fish away from construction activities due to the following:

- Noise and disturbance;
- Seabed habitat damaged or disturbed; and
- Turbidity of water.

The above would impact upon commercially important species as part of the wider natural fisheries resource. As a consequence, it is anticipated that the target resource would be displaced away from areas of construction activity.

Anecdotal evidence of construction impacts at other wind farm sites, such as North Hoyle, indicate that changes in fish abundance are not significant when compared with natural inter-annual variation. This inter-annual variation is evident in the variable catch levels from the boats fishing around the site. It is also understood that areas of abundance for key target resources, such as sole, will also vary from year to year, as seabed sediments inhabited by feed species are prone to move.

In addition, fishing impacts during construction were investigated as part of the North Hoyle development (RWE Group, 2005) based on CEFAS trawl surveys and anecdotal

information from fishing interests. This suggests that there is negligible impact on fishing activities "*even when foundation pile drivers were in operation, these net-boat skippers followed established practice and fished within two miles of the North Hoyle site at the start and end of their netting season of April to September*". The only adverse reports received related to interaction between construction vessels and fishing vessels, as fishing vessels were instructed to keep clear for safety reasons.

The possibility of positive impacts on commercial fisheries due to displacement of the resource is unlikely given experience at other wind farm sites, as target resources may be displaced to unknown or unfamiliar grounds.

Seabed habitat

Seabed habitat damage is assumed to occur throughout the construction phase and is limited to the immediate area of wind turbine and cable construction. This area amounts to approximately 0.2km^2 (see **Section 2**), accounting for less than 1% of the site area and a far smaller proportion of the total area fished by the fleet and is, therefore, deemed to be of **negligible** impact overall.

As illustrated in **Figure 12.15**, the construction area overlaps with some current fishing areas for the local Ramsgate fleet. An area used for anchor netting would be partially affected during construction. While static fishing is feasible in an area immediately before and after a recently installed turbine, seabed disturbance and damage is likely to have a temporary negative affect on the availability of the fish resource. These vessels would be temporarily displaced into a smaller fishing area with **negligible** impact on fishing activity.

Monitoring of existing wind farms such as Horns Rev, Nysted and North Hoyle, has shown the return of fish to a site soon after installation and this may partly be as a result of the aggregating effect of offshore structures on fish species. Flatfish species such as sole and plaice are expected to return to a temporarily disturbed area relatively quickly as feed areas are expected to remain (see **Section 9**).

Seabed habitat alterations are likely to be of most significance to the drift netter and the potter. The extent of this impact is, therefore, likely to depend on when construction begins in the areas overlapping with existing fishing activity. As drift netting is dependent on smooth ground, construction operations are likely to prevent drifting in the affected area once they have commenced even when taking into account access issues, as discussed above. A short term **moderate adverse** impact on the drift netting operation by this vessel during construction is expected. The vessel would have to concentrate operations in its area north of the site, which is likely to result in reduced fishing capacity and catch levels.

Around 40% of the area currently fished by the potter would be affected by the construction of the wind farm. The crustacean species targeted by the potter are less mobile than fish species and, therefore, less able to migrate away from a construction area. This may affect availability of the resource in an area directly affected by the introduction of construction materials, but have comparatively less effect on surrounding areas. This is likely to cause a temporary **moderate adverse** impact on potting activity during the construction phase, as the vessel would be forced to operate in a smaller area.

Noise and disturbance

A short term displacement of commercial fisheries resources due to noise and disturbance is likely over several hundred metres (see **Section 10**). With the 500m Safety Zone proposed during construction, fishing is unlikely to be undertaken in much of the Thanet site. This temporary displacement of the fleet is, therefore, similar to the anticipated displacement of the resource and, therefore, of **negligible** impact.

The impact on the availability of target resources to the fishing fleet is assessed as being localised and temporary in nature with regard to noise and water turbidity and so deemed to be **negligible** to commercial fishing operations.

Water turbidity

Water turbidity is expected to increase during the construction phase. This has the potential to create adverse effects on fishing activity if sediments settle on the monofilament gill nets. In the time period that nets are in the water, settlement is not expected to be substantial and any increased visibility of the nets in that time is likely to be counteracted by reduced visibility in the surrounding water. The existing environment is known to be highly dynamic with shifting seabed sediments and hence the associated resources are adapted to cope with the existence of suspended sediment and sporadic settlement of sediment. The impact of this temporary and localised increase in water turbidity resulting from piling and cable laying is assessed as **negligible**.

Mitigation measures will include:

- Use of best engineering practices to minimise the range and longevity of disturbance to the fisheries resource, including:
    - Effective back-filling during cable laying operations; and
    - Soft starts during piling to allow avoidance by mobile organisms.
- Monitoring and regular communication with fishermen to help minimise the impacts of construction operations.
- Medium to long term creation of additional cryptic hard substrate suitable for colonisation by crustacean species of commercial value.

Table 12.10 summarises the variable significance of impacts regarding the availability of target resources to fishing vessels operating in the area resulting from seabed habitat disturbance.

Table 12.10 Impact of changes to availability of target resources through seabed habitat disturbance during construction

Type of vessel	Level of activity	Estimated number	Extent of impact
Over 10m trawlers	Full time	10+	**negligible**
Under 10m drift netter	Full time	1	**moderate adverse**
Under 10m potter	Full time	1	**moderate adverse**
Under 10m drift and anchor netters	Full time	5	**minor adverse**
Under 10m anchor netters	Seasonal (tidal restricted)	12	**minor adverse**

The impact of noise and disturbance on commercial fisheries during the construction phase is assessed as being of **negligible** significance.

The impact of increased water turbidity on commercial fisheries resulting from piling and cable laying is assessed as of **negligible** significance.

12.5 Impacts during Operation

12.5.1 Access to fishing grounds

Access to the fishing grounds would be reduced through the presence of the wind farm by the creation of physical obstacles such as the turbines themselves and by the requested establishment of Safety Zones around those structures. Access to areas where cables are present should not be altered during normal operation.

Certain fishing methods namely drift nets, trawls and dredges are unlikely to be permitted within the wind farm for safety reasons (see **Section 14**). Dredgers are not known to operate in the area and hence no impact is suggested. The lack of access for the larger trawlers to the area of the Thanet site is not expected to significantly affect their fishing operations.

The displacement of trawlers from the area and the potential function of the Thanet site as a trawl refuge for fish (see **Section 12.5.3**) may result in the large non-UK trawlers increasingly fishing at the eastern edge of the wind farm site.

Access may be permitted during normal operation for static fishing methods, such as potting and anchor netting, and therefore, impacts on these fishing activities are expected to be **negligible**.

The main impact is likely to be on the small number of vessels operating from Ramsgate that currently use drift netting as their preferred fishing method on the site. Within this small fleet, a current gentlemen's agreement would be put under pressure, as the netters are displaced into other areas or undertake other fishing methods. This would be most noticeable for the one drift netter who operates to the north of the site and the impact is, therefore, considered to be **moderate adverse** for this individual.

Some fishermen may be impacted by slightly increased steaming times and the resulting increased fuel bills, as a consequence of the requested Safety Zones during operation, however, these would not stop them from being able to steam through the wind farm. The significance of this impact is, therefore, considered to be **negligible**.

Table 12.11 summarises the expected level of impact of restricted access to fishing area during operation by fishing method.

Table 12.11 Impact of restricted access to fishing area during operation

Type of vessel	Level of activity	Estimated number	Extent of impact
Over 10m trawlers	Full time	10+	**negligible**
Under 10m drift netter	Full time	1	**moderate adverse**
Under 10m potter	Full time	1	**negligible**
Under 10m drift and anchor netters	Full time	5	**minor adverse**
Under 10m anchor netters	Seasonal (tidal restricted)	12	**negligible**

12.5.2 Increased probability of seabed debris

Some increase in seabed debris is expected as a result of wind farm construction and cable laying operations, despite efforts to minimise this through good operational practice. Pre- and post-construction surveys will be undertaken to ensure that all significant items of construction introduced debris are removed from the seabed.

The increased probability of seabed debris is unlikely to have a significant adverse impact on the fishing operations that would be permitted within the wind farm during operation. These are likely to include anchor netting and potting, where gear is positioned on top of seabed structures. As with working any piece of new ground, the likelihood of snagging gear is increased until the characteristics of the seabed structures is known.

Good engineering practice will ensure the long term stability and integrity of seabed structures minimising seabed debris and, therefore, the likelihood of increased seabed debris impacting on commercial fisheries is assessed as being **negligible.**

12.5.3 Alteration of seabed habitat

Fishermen have expressed concern that sandbanks would be reshaped and may shift the available food resource of lugworm and shellfish beds. Geophysical investigations of sediment types and proposed impacts (see **Section 6, Hydrodynamics and Geomorphology**) suggest that only localised impacts on currents and hence sediment movement around the foundation structures would occur.

The alteration of seabed habitat is expected, through the presence of the wind turbine foundation structures to amount to no more than 0.2km^2 of seabed, accounting for less than 1% of the total site area and a far smaller proportion of the total area fished by the fleet, and is therefore deemed to be of **negligible** impact overall.

The laying of cables is expected to be by backfilling plough. The interturbine cables and main export cables are, therefore, not anticipated to significantly alter the seabed habitat, except in the case of the crossing of the two in service telecommunications cables (see **Section 2**), where concrete mattresses or rock would be used to protect the cable crossing at the seabed surface. Provided adequate charting of this area, it is anticipated that fishermen would be able to avoid the area.

The greater variation in seabed habitat created by the structures is expected to result in the attraction of a wider variety of fish species, some of which would be of commercial interest (SEAS, 2002 and Bio/consult, 2004). These are potentially positive impacts of seabed habitat alteration, but are expected to have **negligible** impact on some commercial fishing operations such as trawling and drift netting, due to restricted access in the site.

Alteration of the seabed is considered to be of potential net benefit when assessed over the 40 year operating period of the project. The aggregating effect of the offshore structures is expected to create a de facto trawl refuge. Hiscock *et al* (2002) explored potential gains for the local environment stating, *"wind farms will enhance the biodiversity of areas, could act as refuge for fish, and could be developed in a way that encourages enhancement of fish stocks including shellfish".*

When considering the current emergency measures to conserve cod stocks and the continuing pressure on other stocks such as bass, the function of the wind farm as a trawl refuge could contribute positively to future fisheries management and be of some long term benefit to the commercial sector, particularly for those vessels able to operate within the site.

The increase in hard cryptic substrate is anticipated to have moderate positive impacts for shellfish fisheries and hence on potting operations if available substrate is currently a limiting factor. Given the limited fishing effort for shellfish currently, an expansion of suitable habitat may distribute the resource more widely and encourage more potting effort by local vessels.

For anchor netting operations, the expected aggregating effect of the structures is unlikely to have a significant effect on productivity of the resource, but it may have a positive effect on catch per unit effort (CPUE) of some species such as cod and bass. This is positive for individual fishing operations, but the increased availability of a resource makes it more vulnerable to over-exploitation.

Overall the impact of alteration of the seabed habitat within the wind farm on commercial fisheries is considered to be **minor beneficial**.

12.5.4 Collision risk

There is increased risk of collision by fishing vessels both with wind farm infrastructure and with other vessels carrying out wind farm maintenance within the wind farm site.

Risk of collision with the structures can be minimised with the establishment of adequate Safety Zones and adequate marking and lighting.

The displacement of vessels from the wind farm area would lead to some additional vessel movements and hence collision risk outside the wind farm site, although existing shipping lanes have been avoided and the shape of the wind farm site has been altered to minimise this risk (see **Section 14**).

There is anecdotal evidence that vessels experiencing radar interference from the wind farm would reduce receptivity of their instruments to minimise this effect. A consequence is that the ability of these vessels to recognise small fishing vessels on radar may be reduced. This action, therefore, increases collision risk for fishing vessels operating in an area around the wind farm site. This is discussed in more detail in **Section 14**.

There is concern amongst the fishing community in Ramsgate that insurance premiums would be increased as a result of the assumed increased risk of operating within the wind farm site. It is understood, however, that UK fishing vessel insurance levels are not dictated by fishing area, but by size and age of vessel, state of repair and fishing method. Communication with a major vessel insurance company has confirmed that no specific consideration of operation within wind farm sites is mentioned and that standard operating conditions would apply (Sunderland Marine, pers. comm.). Claims to the insurance companies by the Ramsgate fleet, over and above normal levels, would however result in higher premiums. This potential additional cost is, therefore, dependent upon the likelihood of collision, which is assessed as low (see **Section 14**).

Collision risk with the offshore structures is expected to reduce over time as the position of the turbines is well known and experience of operating in and around the array increases.

The following mitigation measures will include:

- Adequate navigational markers including lighting;
- Notification of all offshore and seabed structures;
- Communication of maintenance activity to fishing sector; and
- Monitoring of adherence to any designated Safety Zones.

The impact of increased collision risk on commercial fisheries is assessed as being **negligible.**

12.5.5 Pollution incidents

In addition to the consequences for commercial fisheries of any damage to the biological resource by pollution incidents (see **Section 10**), there is a possibility that the presence of pollution such as oil slicks will prevent fishing operations in the affected area. Regular maintenance and monitoring of structural integrity will minimise the likelihood of a pollution incident. Contingency planning will be in place to minimise the impact should an incident occur. Appropriate contingency planning will recognise the dependence of the fishing industry on an unpolluted seabed and plan for clean-up methods that

minimise possible impact on the seabed. The risk of this impact to the fishing sector is, therefore, assumed to be **negligible**.

Mitigation measures will include:

- Appropriate maintenance, monitoring and contingency planning; and
- Early communication of any incident to the fishing sector.

The impact of pollution incidents on commercial fisheries is therefore assessed as being **negligible**.

12.5.6 Electromagnetic Fields (EMF) effect on fish

The EMF effects identified by scientific research to date (see **Section 10**), range from the possible localised displacement for teleost (bony) fish, to more profound effects such as behavioural changes seen in elasmobranchs (cartilaginous) fish. A comprehensive review by Gill *et al* (2005) revealed that there are very few studies that have considered the interactions between electrosensitive fish and anthropogenic sources of electric fields.

The major group of fish that are known to be electroreceptive are the elasmobranchs, which possess a series of pores on the surface of the skin called Ampullae of Lorenzini (AoL). The AoL enable elasmobranchs to detect very weak voltage gradients, down to 0.5µV/cm in the surrounding environment (Kalmijn, 1971; Murray, 1974; Boord and Campbell, 1997, as cited in Gill *et al,* 2005). Species that are electroreceptive are also able to detect magnetic fields through induced electric field detection.

Other electrosensitive fish species such as cod and plaice lack electroreceptors, but detect induced voltage gradients associated with water movement and geomagnetic emissions (Gill *et al,* 2005).

Cod has reduced in commercial importance in recent years and the recovery of stocks to exploitable levels is not guaranteed, whilst the local fleet does not currently target herring. The impact of localised displacement of these species away from cables is assessed as **negligible**. The effect of EMF on key commercial species in the area such as sole, bass and plaice is also expected to be highly localised and, therefore, assessed as being of **negligible** impact to commercial teleost fisheries.

Important commercial elasmobranch species in the area of the wind farm and export cable route include skates, rays, dogfish, tope and smoothhound. These species inhabit the water column immediately above the seabed and, therefore, are likely to experience EMF effects from the cables. Fishermen are concerned that these species may be prevented from crossing cable areas, as a result of their reaction to EMF. The localised reaction to EMF by elasmobranchs has been investigated to a limited extent (Gill and Taylor, 2001). These investigations found a differential effect in terms of the behavioural response of dogfish to simulated electric fields emitted by prey and those from undersea electricity cables. The reaction of lesser spotted dogfish to EMF within an experimental situation was found to be highly localised and variable between individuals.

More recent research undertaken for COWRIE (2005) does not provide any evidence to contradict the earlier findings. When assessing the impact of electromagnetic fields, the

recent COWRIE report states, "*that there is currently no evidence that either attraction or repulsion due to anthropogenic electric fields will have an effect on fish or other receptor species*". Furthermore, the report identifies the lack of information available on magnetic fields, but suggests that "*potential interactions between magnetic fields, of the order likely to be associated with wind farm cables, and coastal organisms could occur from the cellular through to the behavioural level*". It is identified that further research is required on the impact of electromagnetic fields on marine organisms. Commercially important species, identified as being priority species for further investigation into significance of electromagnetic fields are the thornback ray *R. clavata,* which is sensitive to electric and magnetic fields, cod *G. morhua,* which is sensitive to electric fields, and decapod crustacean, which is sensitive to magnetic fields.

Any wider impacts relating to distribution have not been recorded to date. The most comprehensive monitoring of the effects on fisheries by wind farm cables in situ is associated with the longer-established European developments at Horns Rev and Nysted. Elasmobranchs are not recorded as being abundant in the areas of these other European wind farms and so effects specific to these species are not quantified in monitoring reports.

Based on the research to date the residual impact of EMF on commercial fisheries is assessed as being **negligible**.

12.6 Impacts during Decommissioning

12.6.1 Disturbance of seabed habitat

As the potential effects of the additional habitat and the trawl refuge are assessed as positive during operation, their removal during decommissioning could be viewed as negative. The most beneficial option to commercial fisheries may be the removal of the majority of the above seabed structures with the retention of rock material, if this can be done without causing damage to the hard substrate habitat created. Additionally, leaving buried cables in situ may be more beneficial to fisheries than their removal. The residual impact of decommissioning on seabed habitat is anticipated as **negligible**.

12.6.2 Increased risk of seabed obstruction

When compared to pre-construction, there is likely to be an increased risk of seabed obstruction following decommissioning. These obstructions should relate to structures present during the 40 year operational life of the project and, therefore, well known to those fishing the area. Negative effects are, therefore, expected to be **negligible**.

12.7 Cumulative Effects

The Scoping Report on cumulative effects assessment for the proposed Thames Estuary area offshore wind farms (PMSS, 2004) identifies relevant past and existing projects, as well as developments in progress in the Thames Estuary region. The Thanet project is the most southerly located wind farm development in the Thames Estuary area.

The Scoping Report states that cumulative effects relating to commercial fisheries should be considered for the Thanet project in association with impacts on the Greater Gabbard, Kentish Flats and London Array wind farm sites.

The Ramsgate fleet mainly operates in an area to the northeast of Ramsgate. This is more easterly than other Thames Estuary fleets. They also venture to more southerly areas such as Goodwin Sands on occasion. The Ramsgate fleet do not currently overlap to any great extent with fleets from other Kent or Essex ports that may be affected by the other wind farm developments mentioned. Kent and Essex fleets are unlikely to be displaced from other developments into the Thanet site. Effort in the Thanet area from these fishermen is considered to be minimal (RPS, 2005).

With the very limited overlap of current fishing operations at the sites and the minimal impacts suggested for those fleets, cumulative impacts are not expected to be significant. Displacement of vessels out of the areas is not expected to the extent that additional gear conflict would be significant. It is, therefore, suggested that assuming simultaneous construction, operation and decommissioning of the developments there would be **no cumulative impact** on commercial fisheries.

12.8 Ongoing Fisheries Liaison

TOW is committed to building on the productive working relationship established with the fishing industry. As part of this ongoing relationship, TOW intends to work with the industry to investigate providing appropriate assistance to those fishermen that may legitimately sustain a degree of displacement by the development of the Thanet project.

Furthermore, TOW confirms that it will work towards the principles outlined in the 'Draft Framework for assessing the value of fishery and approaches to mitigation of possible wind farm impacts through dialogue' (FLOW, 2005), which was jointly produced by the fishing and wind industries.

12.9 Monitoring Proposals

A detailed monitoring programme covering a suite of environmental parameters will be developed and implemented following consultation with the appropriate authorities. This is further described in **Section 10**. For monitoring commercial fish resources, monitoring of commercial catch levels and species mix will take place through official statistics and anecdotal information.

12.10 Summary

The existing environment and potential impacts associated with the commercial fisheries in the Thanet area were determined by collating information from a number of sources, including Defra Sea Fisheries, observation and vessel statistics, fisheries observation trips, consultation with fishermen and regulators. The assessment considers commercially important fish resources in the area, their landed volume and value, seasonality and the types of vessel targeting them.

Currently, the most valuable and widely targeted species in the area is sole, *Solea solea*. Other species of commercial importance include bass *Dicentrarchus labrax*, cod

Gadus morhua, thornback ray *Raja clavata*, smoothhound *Mustelus mustelus*, edible crab *Cancer pagarus* and lobster *Hommarus gammarus*.

Many vessels traditionally target a succession of species throughout the year, using different techniques on a seasonal basis. This seasonal shift is presently less pronounced as a result of the declining winter cod fishery. Vessels continue to target sole into December and target other species from January to March, as landing sole is not permitted in these months. Bass is also targeted from late spring through to autumn, as are smoothhound and rays. Lobster and crab are landed throughout the year.

Fishing activity at the Thanet site involves coastal vessels operating from the local Thanet port of Ramsgate and larger UK vessels from ports further a field and by EU member state vessels. The larger UK vessels primarily operate trawling gear to target sole, bass and cod. The majority of the non-UK fleet are made up of Belgian vessels operating trawling gear to target sole and plaice.

Approximately ten vessels operate full time from Ramsgate, with a further 17 fishing on a more seasonal, part-time to occasional basis. All vessels from Thanet ports are less than 10m in length, with an average length of 8.9m and an average age of 16 years.

The majority of the Ramsgate fleet undertakes drift netting, where nets are set to drift with the tide, and static gill netting, where nets are anchored to the seabed. Areas suitable for drift netting are informally allocated amongst skippers to minimise gear conflict, which enables individual vessels to fish specific areas with drift nets.

One vessel's current drift netting area overlaps with the Thanet site and several vessels set anchor nets within part of the site on an occasional basis. Additionally, one full-time potter primarily operates in the area around Drill Stone Reef targeting crab and lobster. Vessels also fish areas encompassing the export cable route and wind farm area when travelling to and from fishing grounds.

It is expected that fishing activity would be able to continue either side of the cable laying area during construction of the export cable route, subject to the necessary Safety Zone around the cable lay vessel. The impact of cable laying on fishing operations is expected to be **negligible**, i.e. it is not expected to impact on revenue or costs for the commercial fishing sector.

The impact associated with construction of the wind farm site, specific to fishing vessel type, is indicated in **Table 12.12**.

Table 12.12 Impact of construction activities on access to commercial fisheries

Type of vessel	Level of activity	Estimated number	Extent of impact
Over 10m trawlers	Full time	10+	**negligible**
Under 10m drift netter	Full time	1	**moderate adverse**
Under 10m potter	Full time	1	**negligible**
Under 10m drift and anchor netters	Full time	5	**minor adverse**
Under 10m anchor netters	Seasonal	12	**negligible**

It is anticipated that there would be a short term displacement of fish away from construction activity due to noise and disturbance, turbidity of water and seabed habitat damage or disturbance. The impact on the availability of target resources to the fishing fleet is, therefore, assessed as being localised and temporary in nature and so deemed to be **negligible** to commercial fishing operations.

The impact of seabed habitat disturbance on availability of target resources, specific to fishing vessel type is shown in **Table 12.13**.

Table 12.13 Impact of seabed habitat disturbance on availability of target resources to commercial fisheries

Type of vessel	Level of activity	Estimated number	Extent of impact
Over 10m trawlers	Full time	10+	**negligible**
Under 10m drift netter	Full time	1	**moderate adverse**
Under 10m potter	Full time	1	**moderate adverse**
Under 10m drift and anchor netters	Full time	5	**minor adverse**
Under 10m anchor netters	Seasonal	12	**minor adverse**

Access to the fishing grounds during operation of the wind farm would be reduced by the presence of the wind farm turbines creating physical obstacles and through the likely establishment of Safety Zones around the offshore structures. The impact on fishing operations would vary depending on the fishing method employed. Access to areas where cables are present would not be altered during normal operation.

The expected level of impact of restricted access to fishing area by current fishing method employed is shown in **Table 12.14**.

Table 12.14 Impact of operation activities on access to target resources for commercial fisheries

Type of vessel	Level of activity	Estimated number	Extent of impact
Over 10m trawlers	Full time	10+	**negligible**
Under 10m drift netter	Full time	1	**moderate adverse**
Under 10m potter	Full time	1	**negligible**
Under 10m drift and anchor netters	Full time	5	**minor adverse**
Under 10m anchor netters	Seasonal	12	**negligible**

Good engineering practice will ensure the long-term stability and integrity of seabed structures, minimising seabed debris and, therefore, the likelihood of increased seabed debris impacting on commercial fisheries is assessed as being **negligible.**

The major group of fish known to be electro receptive are the elasmobranchs, which include rays, dogfish and smoothhound. The localised reaction to electromagnetic fields (EMF) by elasmobranchs has been investigated to a limited extent. Investigations found a differential effect in terms of the behavioural response of dogfish to simulated electric fields emitted by prey and those from undersea electricity cables. Current research, therefore, suggests that even if a behavioural reaction were observable, it would be localised.

Based on the research to date the residual impact of EMF on commercial fisheries is assessed as being **negligible**.

The Ramsgate fleet do not currently overlap to any great extent with fleets from other Kent or Essex ports that may be affected by the other wind farm developments in the Thames Estuary area. Displacement of vessels out of the development areas is not expected to the extent that additional gear conflict would be significant. Assuming simultaneous construction, operation and decommissioning of the developments, there would therefore be **no cumulative impact** on commercial fisheries.

No additional impacts are predicted during decommissioning over and above those experienced during construction. There is likely to be an increased risk of seabed obstruction following decommissioning compared to pre-construction, however, given mitigation measures to negate this, the impacts on the fishing sector are expected to be **negligible**.