

Towards a National Development
Strategy for Shellfish in England
Executive Report



A summarised version of a report prepared for the Sea Fish Industry Authority

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Executive Report

This document is The Executive Report, which provides a slimmed down version of the Main Report. The Executive Report is in the same format as the Main Report and summarises the main facts and key points. It comes with the same boxes, tables and figures issued with the Main Report. It includes the individual recommendations and action points in their appropriate sections, but it does not enumerate all the arguments

and justifications for these. Readers who require the full benefit of the analyses and the arguments, or who wish to work with the detailed summaries for the main species in the stock section, must use a copy of the Main Report. The organisation of the Executive Report is shown on the next page. The Tasks are presented in order of their utility, rather than in strict numerical order.

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FINANCIAL INSTRUMENT
FOR FISHERIES GUIDANCE



Shellfish Association
of Great Britain

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Introduction

The Cabinet Office Strategy Unit report 'Net Benefits: A sustainable & profitable future for UK fishing' (Prime Minister's Strategy Unit of the Cabinet Office, London, March 2004) recognised the importance of the inshore fisheries and the shellfish industry, and it pledged support for the development of the shellfish industry (Recommendation 6) and for the reform of inshore fisheries management (Recommendation 15).

In order to formulate a National Development Strategy for the Shellfish Industry in England, the Defra Inshore Fisheries Working Group and the Sea Fish Industry Authority (Seafish) commissioned a preparatory Work Programme of 12 tasks. This report describes the results for six tasks (shown overleaf) that were assigned to the consultant, Dr R C A Bannister, an expert on the management of the capture shellfisheries and their stocks. Information was supplied by Dr N C H Lake, who has extensive knowledge of the UK shellfish industry and who also interviewed the Sea Fisheries Committees (SFCs) and various members of the industry.

The work was funded for a total of 105 man days in the period 1 October 2005 to 30 April 2006 by FIG Projects 05/ENG/44/03 and 05/ENG/44/30.

The Main Report of this work comprises 11 chapters allocated into the appropriate sections for each task, plus separate sections for the 38 figures, 21 tables and 2 appendices. A large amount of additional material in the form of spreadsheets, pivot tables, maps, documents, and PowerPoint presentations, will be archived at Seafish, CEFAS Lowestoft, and the Shellfish Association of Great Britain.

The current document is the Executive Report, a cut-down version of the Main Report, which simplifies the presentation of the main points.



The tasks and their scope

Task 1: Data on current production

There is need for an accurate description of the true nature and value of the shellfish industry. This would act as a baseline for development, and to ensure that the industry is not undervalued compared to other industries competing for resources and space.

Task 2: Identification of development opportunities

Task 2 should identify species/areas where there is opportunity for the sustainable development of the capture and cultivation industries. The task will also consider the factors needed to achieve development, or that threaten it, and in the case of the capture sector will review the state of the stocks and the scientific advice available on their management.

Task 3: Market development

Consider how current and future retail and marketing efforts could determine, constrain, or enhance the opportunities identified under Task 2.

Task 4: Creation of guidance to shellfish industry on best practice

Best practice based on guidance to the exploitation, cultivation, handling, transport and processing sectors could all improve the quality and value of shellfish products, and hence increase profitability and efficiency of resource utilisation. This was mainly assigned to Seafish.

Task 5: Local development and management

Sustaining and developing shellfisheries requires effective management. This task should identify the scope for improving current management and jurisdictional arrangements, based on either modernising or rebuilding the powers and jurisdiction of shellfish and inshore managers.

Task 11: Workforce training

Sustaining and developing shellfishing and cultivation will require a combination of improved existing practices, or new practices, and hence require the development of skills through training within practical timescales.

The nature of the shellfish industry

The two sectors of the shellfish industry are the capture fisheries, and the cultivation industry.

The capture fisheries exploit a large number of naturally reproducing wild stocks of crustacea and molluscs. Many of these occupy a variety of habitats in estuaries and coastal waters out to 12 miles or more, but several spread into community waters out to 40 miles or more off the east coast, or to the mid-line as in the Channel. The various species are caught by pots, dredges, trawls, beam trawls, set nets, and by hand. Some shellfish are sold through local merchants, but most are sold through the live trade to the continent, or for processing. Many shellfisheries are highly seasonal. Official statistics on quantity, value, and fishing effort for the capture shellfisheries are collected by Defra, and by some Sea Fisheries Committees under permit schemes.

The capture fisheries are regulated by a mix of EU regulations, national legislation, Sea Fisheries Committee byelaws, and Regulating Orders. Regulating Orders are issued by Defra to allow a public body, usually a Sea Fisheries Committee, to manage the fisheries for prescribed species in prescribed areas for a specified period.

The cultivation industry utilises specific beds or adjacent structures to on-grow mollusc seed or half-grown stock that has either been reared in hatcheries, or sourced from naturally reproducing stocks and then re-laid. Shellfish cultivation in England occurs mainly on estuarine or foreshore beds that are leased either from the Crown or operated under Several Fishery Orders issued by Defra, but some cultivation also occurs on private beds. Cultivated shellfish are exported to the continent, or sold through specialist niche markets in the UK. The technique for rearing juvenile lobsters in the hatchery for stock enhancement is also available, and is noted in the relevant section. Official statistics for cultivation are collected by Defra from registered shellfish farms and from the annual returns of Several and Regulating Orders.

Task 1: Current production

The investigations

The size and structure of the shellfish industry have been described by investigating official Defra statistics for the value and quantity landed at first sale for a three year reference period 2002 - 2004 (Chapter 1), and then evaluating these for accuracy against other sources (Chapter 2). An attempt has also been made to estimate the total number of businesses in the English industry (Chapter 3).

The data sources

The capture industry is described using data on the landings and fishing effort of shellfish vessels that is extracted from official Defra databases (accessed through CEFAS Lowestoft). The cultivation industry has been described using data summarised from the farmed shellfish database and from the returns for Several and Regulating Orders, (accessed through CEFAS Weymouth). The accuracy of Defra shellfish capture statistics has been assessed using data from shellfish permit schemes, kindly provided by several Sea Fishery Committees. Estimates of the number of fishing days and national shellfish licences issued have also been extracted from Defra data sources. The help of CEFAS and the SFCs in accessing these data for analysis is gratefully acknowledged. As a courtesy, senior members of the Defra Marine Fisheries Agency and the Defra statistics branch have had a sight of these analyses, but any errors of fact and interpretation are the sole responsibility of the shellfisheries consultant.

Task 1: Current production

Chapter 1: Size and structure of the shellfish industry in England

This chapter describes the shellfish industry using the official Defra data as it is, without amendment. The evaluation of their accuracy is carried out in Chapter 2.

Total supplies of shellfish and fish

Total recorded supplies were compared for shellfish, demersal and pelagic fisheries in the UK and in England for the reference period. The data comprised UK/English landings into UK/England and abroad, foreign landings into UK/England, and shellfish from capture and cultivation sources. Using 2003 as an example, and considering value only (millions of pounds), the results are shown below (sourced from Box 2 and Table 1):

United Kingdom 2003					
Sector	Capture, UK and abroad	Cultivation	Sub total	Foreign into UK	Total
Shellfish	£192.1m	£18m	£210.1m	£3.2m	£213.3m
Demersal	£218.6m		£218.6m	£81.2m	£299.8m
Pelagic	£115.2m		£115.2m	£6.5m	£121.7m
Total	£525.9m		£543.9m	£90.0m	£634.8m
Shellf.%	37%		39%		34%
England 2003					
Sector	Capture, into England and abroad	Cultivation	Sub total	Foreign into England	Total
Shellfish	£74.0m*	£2.9m	£76.9m	£2.6m	£79.5m
Demersal	£95.7m		£95.7m	£25.5m	£121.2m
Pelagic	£30.7m		£30.7m	£0.2m	£30.9m
Total	£200.4m		£203.3m	£28.3m	£231.6m
Shellf.%	37%		38%		34%

* based on £66.2m from English vessels plus £7.8m from other UK vessels

Key points:

- In both UK and England, the value of capture shellfish landings at home and abroad has almost caught up with the value of demersal landings, and considerably exceeds the value of pelagic landings.
- Shellfish now contribute 37% of the total capture value, and 39% of the value if shellfish cultivation is included.
- If foreign landings into UK/England are also included, the shellfish contribution is reduced to 34% due to the relatively high foreign landings of demersal fish.
- The value of landings from the capture shellfisheries greatly exceeds the value from cultivation.
- Year to year changes in the reference period are minor.

Task 1: Current production

Chapter 1: Size and structure of the shellfish industry in England

The capture shellfisheries

(This section contains cross referencing to boxes and tables that are in the annexes, and are more fully described in the Main Report).

Regional contribution to total shellfish value (Tables 2 & 3):

- The national regions contribute the following percentages to the total value landed into UK and abroad: Scotland 50-57%, England 30-35%, Wales 5.4-9.4%, Northern Ireland 5.0-6.3%, Channel Islands 0.6-1.1%, and Isle of Man 0.1-0.2%. Scotland plus England contribute 80-90%. The range is the spread over the reference period.
- Scotland (50-57%) lands more of the value than England (30-35%) because of *Nephrops*, but England (42-49%) lands more weight than Scotland (36-42%), because of mollusc landings.
- As in England, the value of shellfish in Scotland is approaching that of demersal fish, and exceeds that of pelagic fish, whilst in the rest of the UK the value of shellfish exceeds the value of all fish landings. (These results are sourced from Tables 2 & 3.)

Shellfish species composition (Tables 4,5,7,8):

- Defra data contain entries for at least 23 shellfish species or groups of species.
- Of the value landed into UK by UK vessels (Tables 4 & 5) five species contribute 75-80% of the total, with annual values ranging from £10-£70m each. They are *Nephrops*, scallop, brown crab, lobster and cockle.
- Eight intermediate species contribute 15-20% of the UK value, with annual values ranging from £1-£10m each, and ten minor species or species groups contribute 1-2% of the value, with annual values below £1m each.
- Of the value landed by England and Wales vessels, four species contribute 60-72% of the value based on annual values of £10-13m each. They are brown crab, scallop, lobster, and cockle.
- Seven intermediate species contribute 17-30% of the value based on annual values of £1-£10m each. They are *Nephrops*, whelk, cuttlefish, squid, mussel, brown shrimp and queen scallop.
- Ten minor species or species groups contributing 2% of the value are spider crab, native oyster, other crustacea, crawfish, velvet crab, other cephalopods, other clams, Pacific oyster, winkle and green crab, based on annual values of <£1m each.

Task 1: Current production

Chapter 1: Size and structure of the shellfish industry in England

Species differences between the regions:

Species composition differs markedly between the different national regions, due to geographical differences in the distribution of habitats and species. Each region is therefore important to the shellfish supply scene in some way.

Ranking the 20 species of fish and shellfish (Box 3):

- The top shellfish species now contribute higher individual annual values than species such as sole, haddock and cod which receive most attention from departmental resources.
- For the UK, *Nephrops* ranked 1, scallop ranked 3 (above haddock), crab ranked 5 (above cod), and cockle ranked 9 (above sole). In England and Wales, cockle and crab ranked 1 and 2 (above sole), scallop and lobster ranked 4 and 7 (above cod, ranked 8).

Average value per kilo:

- Average value per kilo has been calculated as the quotient of total first sale value and the total quantity landed (Table 6). This is an average over all the sources in the capture fishery database.
- The highest valued species are crawfish and lobster at over £10 per kilo.
- Some 12 species have values from £1-£3 per kilo, including squid, razor clams, *Nephrops*, brown shrimp, velvet crab, oysters, scallop and brown crab.
- A further eight species have values below £1 per kilo, including winkle, spider crab, green crab, whelk, cockle and mussel.
- The values per kilo for some species seem to be lower than expected, especially that for mussels.

The contribution by <10 metre vessels (Table 9):

- Defra data estimate that <10 metre vessels contribute 5-7% of the total value and 3-4% of the total weight of all capture shellfish species landed in England and Wales, although the contribution for individual species is up to 20% in some cases.
- It is shown later that these figures are a substantial underestimate.

Gear type (Table 10):

- Capture shellfish landings are split roughly three ways between pots, dredge (all types), and other gears (comprising trawl, beam trawl, whelk pot, nets, traps, and other minor gears).

The distribution of fisheries between SFC districts:

- To help evaluate the data and assess future priorities, Defra data for value, quantity and fishing effort were summed for all vessel sizes and ports within each SFC district, to give SFC district totals for each species and gear. Examples for the Northumberland and North eastern SFC districts for 2003 are in Table 11 of the Main Report. Excel tables for each SFC will be located in the archive, as a resource for future use.
- To describe where the shellfisheries occur, the landed value for each species for 2003 has been plotted for each SFC district in Figure 6, and colour coded to indicate relative magnitude. The results are consistent with where we know each species to occur by observation, and the colours identify the priority districts. (In the Main Report, Figure 6 is supported by text and by Figures 7-9 showing the schematic diagrams of the main fisheries used in the 1999 Walne Memorial Lecture 'A Review of Shellfish Resources and their Management' by Dr R C A Bannister.)

Task 1: Current production

Chapter 1: Size and structure of the shellfish industry in England

Shellfish cultivation

Cultivation data are collected from registered shellfish farms by the CEFAS Fish Health Inspectorate, Weymouth, and from the returns of Fishery Orders [Several Orders (SOs), Regulating Orders (ROs), and Hybrid orders (HOs)] made to Defra. To preserve business confidentiality, the farmed data are aggregated. Individual farms within Fishery Order areas are registered (in England and Wales) and as a result this has led to overlap in data. In addition, because Regulating Orders manage wild populations, some data for managed fisheries, such as for native oysters and cockles, may appear in both the cultivation and the capture statistics. It has not been possible to resolve this overlap here, but it is recommended that this should be done in the future.

- There are 118 registered shellfish farm sites (run by 96 businesses), 12 Several Orders, 5 Regulating Orders and 2 Hybrid Orders in England and a further 7 Several Orders and 2 Regulating Orders in Wales. The English Fishery Orders are listed in Box 4 of the Main Report, where they are ranked geographically, and by expiry date and size. The total area is currently 213411 hectares.
- Shellfish cultivation in England (Table 13A) produces about 2,000-4,000t per annum, worth £1.3-3.3m. This is mainly mussel (1,400-3,260t), with small quantities of Pacific oyster (380-446t), native oyster (106-120t), and very small quantities of hard clam, Manila clam, palourde, and cockle (Table 13B). Production is similar in Scotland, but with slightly more mussels, including those from ropes and rafts.
- In Wales, the production is almost entirely mussels (10,000-15,000t) derived from re-laying and on-growing in the Menai Straits, which is recorded in the Several Order category in the Fishery Orders table (Table 14). This boosts the UK total to £12.7-£22.7m. The Regulating Order totals for cockles in England and Wales include the data for the Burry Inlet and the Wash that are also included in the capture statistics.
- Hatchery production is mainly Pacific oyster and Manila clam, with very small quantities of native oyster.
- The cultivation contribution to total shellfish production is 3.5-5.3% of the value, and 7-11% of the quantity, for the UK, and 2-4.7% of the value and 3-5.5% of the quantity, for England.
- The average values per kilo calculated from the farmed data (Table 13A) and the Fishery Order data (Table 14) are higher than the corresponding values calculated from the capture fishery database (Table 6), especially for mussels.

Imports and exports (Box 5):

It has not been possible to assemble shellfish import and export data from original sources, but an approximate compilation of data from Seafish and Defra for 2004 shows approximate balances for the UK.

- *Nephrops* and crab are mainly exported, but lobster exports (European lobster) and imports (Canadian lobster) are in balance. The crustacean balance of trade is dominated by the imports of shrimp and prawn. The cockle and mussel trade shows significant exports with a considerable proportion re-imported. Scallop, oyster, squid and 'other molluscs' are exported but there are limited imports into the UK of fresh products.
- The total trade amounts to £336m of exports, and £409m of imports.

Task 1: Current production

Chapter 2: Evaluation of the available shellfish data

Comparing Defra capture data to SFC permit scheme data

The report has addressed the long standing issue of whether or not official shellfish statistics are under-recorded. This was done by comparing landings and effort data for 2002-2004 collected by four SFC potting permit schemes to the data aggregated from the Defra database for the same districts. Comments have also been made by SFC officers and members of the shellfish industry about the landings of *Nephrops*, cockles and winkles. Although an attempt at comparing potting effort was made, this was handicapped by inconsistencies detected in the way that the Defra database records the number of pots used, and by problems in retrieving the number of landings. In the Main Report, the SFC - Defra data comparisons are included in Appendix 2.

Northumberland SFC district:

Defra landings ranged from 22-62% of the SFC records for brown crab and lobster, and 13-39% of the SFC records for velvet crab. Pot landings recorded by the SFC were three times the Defra estimate of pot fishing days. The latter was used as a proxy for the number of landings, assuming most potters land daily, but this may not be a wholly valid comparison.

Defra data therefore seriously underestimate the landings and fishing effort of the potting fleet in this district, where most of the shellfish effort is by <10 metre vessels, indicating that Defra data for vessels <10 metres are not comprehensive.

North eastern SFC district:

Defra data underestimate lobster landings by 10-25%, and velvet crab landings by 7-60%, but are two to three times the SFC estimate for brown crab, presumably because much more crab fishing is carried on outside 6 miles. SFC effort data appear to be twice the Defra estimate. In this district Defra data therefore underestimate data for lobster and velvet crab, but do better for the brown crab fishery.

Eastern SFC district:

There is fairly good agreement between SFC and Defra data for brown crab, lobster, velvet crab and brown shrimp landings, whilst Defra data for fishing days appear to be higher than the SFC data.

Cornwall SFC district:

Defra data underestimate lobster and brown crab landings by 35-50%, and spider crab landings by 64-74%. Defra estimates of vessel number are substantially lower than the SFC permit scheme number, but the number of shellfish licence applications under the new shellfish licensing scheme is closer, but still below the number of SFC permits.

Other SFC districts:

Other SFCs were given the opportunity to comment on the Defra data for their district, irrespective of whether permit data were available or not, and some have done so, including Sussex SFC, which felt that the Defra data for the <10 metre sector are seriously low, and South Wales SFC where differences also occur. It seems reasonable to suggest that similar conclusions would apply in other districts had sufficient permit data been available.

Reasons for the discrepancies:

This is the first hard evidence that the Defra database has under-recorded shellfish statistics. The problem is more prevalent in areas where there is a high level of activity by <10 metre vessels. This is because vessels under <10 metre were previously not required to complete a log book or an official landings declaration. In January 2006, this changed with the advent of the new shellfish licensing scheme, which requires all sizes of vessel to complete a landings declaration. It remains to be seen how effective this will be, but the Marine Fisheries Agency believes that accurate reporting will also be assisted by the registration of buyers and sellers (although this will not necessarily help to quantify itinerant hand gathering operations, for example).

Task 1: Current production

Chapter 2: Evaluation of the available shellfish data

Information from the industry:

It has been rumoured for some years that *Nephrops* landings have been seriously under-reported nationally, and industry sources have indicated that this could be by as much as 40% for the UK as a whole.

Cockle landings are difficult to estimate in years such as 2003, when substantial itinerant fishing on public beds occurred in Morecambe Bay. The processing industry suggests that annual UK cockle production at the current high market price is likely to be 50,000t.

Hand gathering of winkles is seriously under-recorded. As an example, the Devon SFC reports that 40t of winkles worth £40,000 were landed in the Devon district alone, whereas Defra reported no winkle landings for this district, and only 60t for the whole of the UK in 2004.

Cultivation data:

Data on cultivation should be fairly accurate because they are collected from shellfish farm records, and from the Fishery Order returns sent to Defra. As noted earlier, however, problems of overlap need to be resolved where data from Several Orders and farmed production overlap, and where some Regulating Order data may also appear in the capture database.

Value per kilo:

For several species, discrepancies have been noted between the average value per kilo calculated from the capture fishery database and that from the cultivation database. This could partly be due to differences in the product between the capture and cultivation segments. This does not account for the discrepancy found for dredged mussels, however, which are included in both databases, and whose overall value in the capture database could be underestimated by at least £3 million a year. This raises questions about the validity of some of the data for value in the capture fishery database, which cannot be resolved without a much more detailed investigation.

Amending total shellfish landings:

The discrepancies in landings noted above for *Nephrops*, cockles, winkles, and the four SFC districts add up to an additional component of value of £43m and 33,000t, increasing the shellfish total for the UK from £213m to £256m, and 173,000t to 206,300t (Table 18). Clearly, if the true discrepancies were known for all species and all areas the adjustment would be substantially greater.

Task 1: Current production

Chapter 2: Evaluation of the available shellfish data

Recommendations

- Misreporting of *Nephrops* landings data under the TAC system affects the quality of *Nephrops* assessments, and accurate recording of *Nephrops* landings should be given a higher priority in the future, using information from registered buyers and sellers.
- The implementation of data reporting under the national shellfish licensing is a priority for the shellfisheries, and the effectiveness of data collection under the scheme should be monitored actively over the first year or two. It would be helpful if SFC permit schemes could be left in place for an interim period in case of teething problems, and to provide independent data for testing the effectiveness of the national scheme.
- Effective and consistent input of pot fishing effort to the Defra database is required. This requires cooperation between CEFAS Lowestoft and the Marine Fisheries Agency, and the consultant can advise if required.
- In the future, precautionary management for secondary and developing fisheries is likely to depend heavily on analysing trends in landings and effort because of resource constraints on more detailed assessments. In that case the accuracy of the data is paramount. With this in mind, Defra, SFCs and CEFAS should seriously consider whether there are other deserving shellfish species to which data collection should be extended by amending the shellfish licensing scheme. This would require cooperation between Marine Fisheries Agency, CEFAS, and the SFCs, plus acceptance by Defra of the importance of the shellfish capture industry demonstrated by the data presented in Chapter 1.
- It would be helpful to clarify and resolve the problem of overlap between the farmed database, the Fishery Order database, and the capture database. This requires liaison between CEFAS Weymouth, CEFAS Lowestoft, and the Marine Fisheries Agency.
- The problem of cockle gathering in unregulated fisheries poses data collection and management issues that need to be addressed together. The regulated Burry Inlet and Thames Cockle fisheries provide excellent examples of the benefits of limited-entry harvesting, in conjunction with effective data collection and stock surveys. Serious consideration should be given to the benefits of extending this approach to large unregulated cockle resources.

Task 1: Current production

Chapter 3: Businesses

The report has addressed the issue of estimating the number of shellfish businesses using a variety of sources. These include the number of vessels (estimated from permit data, Defra data, verbal SFC estimates); crew numbers and shore-side staff (a notional multiplier was used); shellfish farm sites and personnel (CEFAS shellfish farm database); Fishery Order sites; the number of onshore facilities such as storage, depuration and processing facilities (data from SFCs); buyers, and merchants (internet search), plus business members of SAGB, and their estimated personnel. The detailed sources and assumptions are enumerated in Chapter 3 of the Main Report, and in Table 19.

- The combined number of businesses and personnel is 10,000. This is an approximate figure based on some facts and several assumptions, and must be regarded as a ranging shot.
- The underlying components are: 2,000-2,325 vessels and other catching units; 6,380 crew and hand workers (notional 2.5 per vessel); 108 shellfish farm businesses and 216 staff; 7 Fishery Order sites; 287 other businesses (based on 126 merchants, 147 facilities, 158 SAGB business members, but reduced by a third to allow for overlaps from the different sources) and 861 other-business personnel.
- This estimate will require adjustment once more extensive feedback has been obtained from the industry.

Task 2: The scope for development

This task investigates the development opportunities for the capture shellfisheries and the cultivation industry, as described in the following chapters:

- Chapter 4: Principal capture species
- Chapter 5: Secondary capture species
- Chapter 6: Species with development issues
- Chapter 7: Status and development of the cultivation industry
- Chapter 8: Summary of chapters 4-7. (These are not included here as the material is used in the body of the Executive Report).

For the capture shellfisheries, the shellfisheries consultant has reviewed in detail the available knowledge on biology, assessment, and stock status for each species in turn in order to assess the scope for new fisheries, or the expansion of existing fisheries, and to address known or anticipated development issues. For the well known species, the reviews in the Main Report are very detailed and are as up to date as possible given the time constraints, but for some of the lesser species much less material is available, although guidance is still given. Some development sections contain practical suggestions to help plan the future.

For the cultivation industry, the cultivation consultant has reviewed the numerous serious factors that threaten the continuation of cultivation, and has addressed other factors considered to be relevant for the future. This is a general overview. Detailed appraisals have not been made for individual species, although some key points are made at the end of the chapter.

The summaries presented here for many of the species are considerably reduced, and readers with particular species interests are urged to consult the Main Report.

Task 2: The scope for development

Chapter 4: Principal capture species

The following sections contain thumbnail sketches of the much more detailed material contained in Chapter 4 of the Main Report for brown crab, scallop, lobster, cockle and *Nephrops*. This summary does not refer to, or show, the trends in landings statistics described in detail in the Main Report.

A principal part of the presentation for the main species is an overview table.

A list of key points is provided for each species, plus bold bullet points that describe the action points or recommendations.

Brown crab

Fishery	Fishery trends	Knowledge	Assessment	Status
Main pot fisheries in W and E Channel; E and NE coast; S Wales; Other small fisheries in Essex and Cumbria.	Channel offshore developed in '70s; S Wales developed in '90s; NE and E coast offshore developing since '90s; Slow decline in Northumberland.	Basic biology, growth maturity, migration, some larval info, some genetic info, prelim. age info. behaviour and catchability around traps, escape gaps.	CEFAS, mainly for Channel 1970s (tag recap rate) F=30-40% 1983/5 length cohort analysis: male F=30%, female F=40-63% 2000/02 length cohort analysis male F=20%, female F=33-55% Similar results for N Sea stock. But catch curves and VPA give lower F values.	Close to or beyond max of yield per recruit curve. Spawner per recruit at 40-50% of virgin level. Fully exploited, tending to growth overfishing. F is higher on females, but no evidence yet of recruitment problems.
Management	Sustainability	Scope for growth	Enhancement	Threats
EU and UK regional min. sizes; Limit on crab claws; No landing of berried or soft; No crab for bait (some SFCs) SFC permit schemes; National shellfish licensing; Channel gear zones; Channel proposals to cap effort.	Northumberland in decline. Most other fisheries probably sustainable. Concern over increased pot numbers in the Channel and off NE and E coast, but no sign yet of recruitment decline.	None expected in Channel, or inshore along NE and E coast. Expansion on NE and E coast offshore areas and in S Wales is probably close to peak. May be limited scope off NW coast. More effort will not benefit yield in long term and will reduce LPUE and possibly spawning stock.	N/A	Science gaps on stock structure, recruitment mechanisms, and assessment methodology. Conflicts with mobile gear: Gill net by-catches. Scallop dredge by-catch. Conflicts with gravel dredging in E Channel. Live market may decline in medium term.

Key points:

Expansion has already occurred in the western Channel and off the north-east and east coast. Most grounds accessible to the fisheries are known and fully utilised. The stocks are assessed, and appear to be fully exploited, tending towards growth overfishing. Females dominate the catches, but there is no evidence of recruitment overfishing. The stocks are managed by regional technical measures and the new national licensing scheme.

- It is not recommended to intensify the fishery.
- There is a steady rise in the number of pots being set in the Channel and off the north east coast. A meeting at SAGB in 2005 agreed that crab fishing effort should be capped on a precautionary basis.
- Seafish has identified a long term threat to the live market, and it is recommended that steps should be taken to develop value added products.
- Brown crab fishing in the Channel is threatened by mobile gear in the east and west Channel, and by gravel dredging in the eastern Channel.
- Knowledge of stock structure is incomplete, and stock assessment methods are still under development.

Task 2: The scope for development

Chapter 4: Principal capture species

Scallop

Fishery	Fishery trends	Knowledge	Assessment	Status
Dredging in: W Channel and Approaches (Vlle-h) East Channnel (Vlld) Irish Sea (Vlla) (Isle of Man) other small areas eg Farn Isles, Cardigan Bay.	Inshore fisheries stable or fluctuating. Landings have increased due to the deveopment of offshore fishing in western Channel and Western Approaches since 1990.	Basic biology, Long term Manx study; Some English studies on ageing/growth; prelim studies on dredge efficiency, spatial patterns, settlement substrates. Poor knowledge of stock structure, or the sources and sinks for scallop larvae.	Manx studies of depleted sizeand age structure; Scottish VPA and dredge surveys. English landings and log books but no routine surveys or formal assessments. Channel LPUE stable as catch and effort vary in proportion to beds with available settlement. Is this self-regulating?	Scottish and English stocks fluctuating. Status of English fisheries is difficult to determine but in effect fully exploited. Manx stock overfished and depleted.
Management	Sustainability	Scope for growth	Enhancement	Threats
Over 10 metre fleet licensed. Regional min. sizes. Manx legislation. No French dredges. Max 8 spring loaded dredges a side within 6 miles.	Scottish and English landings vary due to periodic pulses in recruitment, but within these limits the stocks are probably stable at present effort levels. Manx stock is depleted but still supports a fishery.	Most beds are known. Production depends on episodic settlement patterns. Increasing effort is unlikely to benefit yield in the long term.	France has techniques and carried out trials in coastal St Brieuc. Probably only suitable at small coastal sites with a containment circulation and local fishery management. Uncertain if scale and cost-benefit are favourable.	Major science gaps on stock structure, assessment techniques, and recruitment mechanisms. Insufficient resources for regular surveys. It is uncertain which beds are the main sources of spatfall. Conflicts between large and small scallopers, and with static gear: Algal toxins Dredge impacts.

Key points:

- Scallop is the most valuable mollusc fishery in years when cockle stocks are on a downturn. The fishery has already expanded in the western Channel and Western Approaches, and most scallop grounds are known and utilised.
- Scallop stocks in England are not assessed, and resources have been insufficient to undertake comprehensive surveys of the main stocks in the western Channel and Western Approaches, so there is no estimate of stock size for calculating a catch limit. The number of scallop vessels >10 metres is limited by licensing, but not their fishing power, and the only other significant management measure is the minimum size.
- On a precautionary basis the Channel stocks are considered to be fully exploited (whilst the Manx stocks are depleted).
- There is market opportunity, but because of the uncertain stock status it is not recommended to fish harder. Existing management measures should be retained. The formulation of scallop management plans is handicapped by the lack of stock estimates and limited knowledge about recruitment processes. Given the economic importance of scallop landings, it is desirable to review how the absence of a scallop assessment could be addressed, and whether current management measures are sufficient.
- The threats to scallop fishing are the lack of knowledge about the stocks, conflicts between large and small scallopers on inshore grounds, nature conservation issues, and the problems caused by algal toxins.

Task 2: The scope for development

Chapter 4: Principal capture species

Lobster

Fishery	Fishery trends	Knowledge	Assessment	Status
<p>Seasonal potting occurs in all coastal districts where suitable shelter habitat occurs.</p> <p>Several key fisheries occur along NE and E coast E and W Channel N Cornwall and S Wales.</p>	<p>Total production has been rising since 1980, to reach the highest level ever in 2004/5.</p> <p>Northumberland and N Wales are in decline but landings are increasing in Yorkshire and E Anglia (mainly offshore), Sussex-Dorset, Cornwall, and S Wales.</p>	<p>Basic biology, growth, maturity, migration, eggs and larvae, habitat choice, trap behaviour and efficiency, escape gaps, hatchery rearing and enhancement, age determination.</p>	<p>CEFAS has assessed all areas by length cohort analysis. F is generally 50% or more in all areas, and the fishery depends heavily on recruiting lobsters close to the minimum size.</p> <p>Medium and large sized lobsters are scarce, except in offshore refugia.</p>	<p>F is close to or beyond the the maximum of the yield per recruit curve. SSB < 20% of virgin level.</p> <p>Stocks are either fully exploited or tending to overexploited.</p> <p>There is generally no sign of reduced recruitment but stocks are depleted in Northumberland and N Wales.</p>
Management	Sustainability	Scope for growth	Enhancement	Threat
<p>National MLS of 87mm CL. Some SFC's have 90mm MLS. No landing of V-notched. No landing berried female in some SFCs.</p> <p>SFC permit schemes</p> <p>National shellfish licensing.</p>	<p>Effort and F are high, and LPUE is generally low, but no sign of recruit failure yet, so fisheries probably sustainable but sub-optimal.</p>	<p>Inshore grounds are fully exploited. Most offshore grounds are known, and the full effect of exploiting them is still uncertain.</p> <p>Increasing effort will not increase yield per recruit and could be detrimental to spawning biomass.</p>	<p>UK has pioneered the techniques and hatchery juveniles have survived in the wild to reach maturity at three UK sites. Not clear if this is enhancement or substitution.</p> <p>There may be scope in areas with habitat but low juveniles. Cornwall SFC is releasing juveniles reared at the National Lobster Hatchery at Padstow.</p>	<p>Science gap on stock and recruitment processes. Concern about offshore harvest of large lobsters (refuge spawners?)</p> <p>Competition from Canadian imports.</p>

Key points:

The fisheries are predominantly inshore, but there has been significant offshore expansion off the north east and east coasts. Known grounds are fully utilised. Assessments show that the stocks are heavily exploited and tending towards overfishing. There is potential for recruitment overfishing, but recruitment has recently been good. The stocks are managed by technical measures and the new national licensing scheme.

It is feasible to rear juvenile lobsters in the hatchery for release onto lobster habitat, but this approach is only likely to be successful if releases are large scale, and are carried out in areas with very low natural stocks.

- There is concern about the increase in pot numbers in the major lobster fisheries, and about the potential for recruitment overfishing, despite the recent good recruitment, which is why the berried lobster ban was proposed. Expansion in the fishery is not recommended, and further conservation measures may yet become necessary.

Task 2: The scope for development

Chapter 4: Principal capture species

Cockle

Fishery	Fishery trends	Knowledge	Assessment	Status
Hand raking or dredging on intertidal flats in large estuaries. Main sources are Thames, Wash (both suction dredge fisheries) and the Burry Inlet (hand working). Pulses of fishing occur periodically in the Dee and Morecambe Bay. Cockles occur elsewhere on a smaller scale e.g English Solway, Humber, Poole.	The Wash was a major source in the '70s, but recruitment failed in the 1990s. The main source is now the Thames which expanded in the late '80s but has been tightly controlled since 1994 by limiting entry. The Burry Inlet has sustained moderate landings throughout. Periodic pulses occur in the Dee, Morecambe Bay, Poole and English Solway. The latter was from 1993-2003. The Humber beds are not open.	Basic biology, growth, maturity, condition, detailed MAFF/CEFAS studies on effects of suction dredging in Thames and Wash, tractor dredging in Morecambe Bay, cockle-bird interactions in Wash and Burry Inlet, population dynamics in all three fisheries, stock & recruitment in the Wash.	Long time series of survey biomass and age structure for Wash (CEFAS, then SFC), Thames (SFC), and Burry (SFC+CEFAS). EA surveys Dee NW NW SFC surveys its area. Cumbria SFC surveys English Solway. (FRS Aberdeen surveys Scottish Solway). Southampton University made appropriate assessment in Poole Harbour.	Burry Inlet is exploited at a moderate rate and there is stock most years. Thames is now exploited at moderate rate and there is stock most years. The Wash was fished down in the 70s-90s and recruitment failed, but the stock is slowly rebuilding. Pulses of stock that occurred in Dee in '82 and '88, and Morecambe Bay in 2003, were rapidly depleted. Status of other small stocks is very variable.
Management	Sustainability	Scope for growth	Enhancement	Threats
The Wash, Thames and Burry Inlet fisheries are all managed under a Fishery Order by each SFC, which can prescribe minimum size, number of licences, fishing days, catch limits, and bed closures. The Dee is managed by the Environment Agency. Beds in English Solway are in an SAC (E Nature), and two private estates have rights.	Burry Inlet (hand raking) is sustainable and certificated by Marine Stewardship Council. The Thames (suction dredging) is sustainable. The Wash fishery collapsed in 1990s due to poor recruitment but is recovering slowly. Dee, Morecambe, Solway are very variable and support pulse fisheries only. Waders eat cockles smaller than those that are marketable so if harvestable stocks are maintained, there should be no conflicts over bird food.	Despite the strong market it is not recommended to intensify present fisheries where stability requires a moderate harvest rate. Development will require discovery of new large beds, or a more sustainable use of the smaller pulse fisheries. Boom and bust fisheries on public beds need to be regulated to become more sustainable.	Kent and Essex SFC is experimenting with relaying undersized cockles from dense beds. Dutch scientists are studying the scope for relaying hatchery spat.	Recruit failure due to overfishing in suction dredge fisheries when stocks are low. Boom and bust fisheries on unregulated public beds. Appropriate assessments of dredge fisheries. DSP/PSP outbreaks. Climate change (cockle spat better in cold winters, and can suffer heat exhaustion at low tide under hot conditions).

Task 2: The scope for development

Chapter 4: Principal capture species

Key points:

Cockle stocks vary considerably from year to year due to variations in spatfall, and require careful management to achieve sustainable fisheries. The large natural stocks in the main estuaries are surveyed and managed under Regulating Orders. At present there is a considerable market opportunity for cockles, but there is no scope for expanding the Regulating Order fisheries, which are strongly managed (and are examples of best practice). Although the threat of a natural failure of recruitment (as occurred in the Wash in the 1990s) can never be removed, sustainability is being achieved in the Burry Inlet and the Thames Estuary, and the Wash stock is rebuilding. It is important to retain sustainability to alleviate nature conservation concerns about food for wading birds.

- It is strongly recommended that in order to minimise the risk of recruitment failure in stocks with variable recruitment, the existing fisheries should not be intensified.
- It may be possible to make better use of pulse stocks in the Dee and Morecambe Bay. It is not known if there are unutilised small secondary stocks that could be exploited by hand, but they would need to be tightly managed to take only 30% of the harvestable stock.
- Cockle cultivation trials are in progress (relaying cockles from dense beds onto new sites). The question has also been raised whether there could be a live market for cockles to enhance value.
- The cockle fisheries are potentially vulnerable to changes in the market, DSP/ASP incidents, problems with Appropriate Assessments, and possibly to future climate change effects.

Task 2: The scope for development

Chapter 4: Principal capture species

Nephrops

Fishery	Fishery trends	Relevant knowledge	Assessment	Status
<p>Caught by trawl when they emerge from burrows in clay/mud substrates.</p> <p>There are eight stocks in the N Sea managed by one TAC and two stocks in Irish Sea managed by one TAC.</p> <p>English vessels fish the Farn Deep stock in the N Sea, and the East Irish Sea stock.</p> <p>Other stocks occur west of Scotland, Ireland and Iberia.</p>	<p>The main English source is the Farn Deep, fished 94% by England. This fishery has varied over the years but effort is reportedly at the lowest level since 1984. The E Irish Sea is fished by England and N Ireland (70%) and Ireland.</p> <p>Fishing has varied but effort has fallen due to decommissioning in N Ireland.</p> <p>True landings are uncertain due to misreporting.</p>	<p>Basic biology, habitat, gear selectivity, growth, maturity, emergence patterns, larval retention in Irish Sea, spatial variation in density, predation by cod, lower catchability of females that stay in burrows during egg carrying phase.</p>	<p>ICES assesses each stock using VPA based on age-sliced length distributions; trends in mean size and LPUE; estimates of biomass from counting burrows on TV surveys (not all stocks). Recent assessments also use the ratio of landings/TV biomass (harvest ratio)n.</p> <p>Results are affected by the misreporting issue putting more reliance on the mean size and LPUE indicators.</p>	<p>In Farn Deep, F'03 was 40% on males, and 10% on females. Harvest ratio is 15%. LPUE is stable then increasing. In E Irish Sea, F'03 was 45% on male, and 40% on female (high!). LPUE is lower than in the '70s/'80s. These stocks are at max. of yield per recruit curve, so are considered fully exploited. Since 1992 ICES has advised TACs to stop effort rising. The 2006 advice is to limit effort, and start mandatory reporting of LPUE.</p>
Management	Sustainability	Scope for development	Enhancement	Threats
<p>EU TACs are for whole of N Sea and whole of Irish Sea. N Sea TAC sequence is 12,000t ('92); 21,350t ('04); 28,417t ('06).</p> <p>Irish Sea TAC sequence is 20,000t ('92), 23,000t ('96), 17,790t ('02); 21,498t ('06).</p> <p><i>Nephrops</i> vessels have UK effort restrictions for cod recovery reasons, and fish under complex EU/UK rules on landing size, mesh and twine size, net structure and use of multi-rigs. N.B. A single regional TAC does not control each stock individually.</p>	<p>The Farn Deep stock is stable or slightly increasing, and the fishery is sustainable. LPUE in the eastern Irish Sea is lower than in 1970s/80s, but ICES still considers this fishery to be sustainable. Scottish stocks in Minch, Clyde, Moray Firth and Firth of Forth are increasing. Except off Iberia, where some stocks are seriously depleted, there are no signs of recruit problems in <i>Nephrops</i>, and earlier disease problems have decreased.</p>	<p>All stocks are known and there is little chance of ICES relaxing the precautionary advice for existing stocks.</p> <p>ICES and the EU have already allowed more harvesting on the Fladen portion of the North Sea because the stock is lightly exploited (harvest ratio 7.5%). They have also raised the 2006 N Sea and I Sea TACs substantially. Any further rise seems unlikely.</p>	<p>N/A</p>	<p>The small-meshed <i>Nephrops</i> fisheries catch cod, so they will continue to attract scrutiny for cod recovery reasons. This might lead to more control in the future. Cod predate on <i>Nephrops</i>. It is possible that <i>Nephrops</i> stocks have benefited from the decline in cod, and this might reverse if cod stocks start to recover. The impact of climate change has not been assessed.</p>

Key points:

The two English fisheries are assessed by ICES and managed by TAC, although TAC management may be undermined by substantial misreporting. ICES advises that the stocks are fully exploited, and the aim of the TAC is to prevent effort from increasing. In fact effort in both fisheries is at its lowest level, and the stocks appear to be stable or slightly increasing. For the Farn Deep stocks, the harvest ratio (the ratio of TAC /stock biomass derived from TV surveys) is about 15%. It would be helpful to verify the accuracy of this estimate, which implies quite a low rate of exploitation.

- There is considerable market opportunity for *Nephrops*, but this scope cannot be utilised because of the catch restrictions on these managed fisheries.
- *Nephrops* stocks may have benefited from reduced predation due to declining cod stocks, so their future abundance could be reduced in the medium term if cod stocks recover.

Task 2: The scope for development

Chapter 4: Principal capture species

Summary

This chapter shows that there is no opportunity to further develop or intensify the fisheries on these principal species and stocks. Individual action points have been identified that require attention, especially the issue of scallop assessment, rising pot numbers in the brown crab and lobster fisheries, and the live market issue in brown crab.

Given the critical contribution of these species to shellfish revenue, the main priority for the future is to ensure that these stocks are managed effectively to prevent their status deteriorating.

An application for MSC accreditation of the NE coast lobster fishery was unsuccessful, it is not because the stock is overfished, but because of a lack of formal management objectives, precautionary reference points, and effective input/output controls. These comments could apply to many other shellfish stocks, and it is important to address them, as discussed in more detail in Chapter 9.

Adding value:

If the landings of these principal species are restricted by fishing opportunities and by management policies, but fishing costs rise, profit margins will be squeezed. Thought should therefore be given to ways of obtaining better prices for the same product through improved handling and storage, or by developing a higher proportion of value added products. Catchers will need incentives to do this.

Task 2: The scope for development

Chapter 5: Secondary capture species

The following sections are thumbnail sketches of the detailed material contained in Chapter 5 for whelk; cuttlefish; squid; octopus; mussel; native oyster; brown shrimp and crawfish. Bold bullet points identify action points and recommendations.

Whelk

Whelk fisheries have been developing regionally, and there may be some areas where further development could occur. The stocks are not assessed or monitored routinely, which limits the ability to evaluate the effects of fishing, and to assess development potential. There is concern that local stocks are vulnerable to overfishing for biological reasons (absence of larval drift, and low adult mobility limit the chance of depleted areas being re-colonised). The EU minimum size is too small to be effective in most areas.

- **The conservation problem raised by the whelk fishery needs to be considered. It could be addressed by setting more appropriate regional minimum sizes, and by considering a) how to assess stocks and stock potential, or b) deciding whether some form of precautionary limitation is needed to prevent over-development. It would be helpful to re-assess the market for whelks in order to identify the priority for these issues.**

Cuttlefish

The main fishery is in the Channel, where cuttlefish spawned in coastal waters move back and forth between inshore feeding grounds and offshore wintering areas, before returning inshore in their third summer to attach their eggs to the seabed before they die. Based on this life cycle, cuttlefish are an important seasonal by-catch in the summer and winter trawl, beam trawl, pot and net fisheries. The Channel stock has been assessed by French scientists but is not assessed routinely. It is not managed individually, and there is no biological monitoring at English ports. Catch rates vary considerably due to large variations in recruitment. Fishing mortality is high on spawning adults, but recruitment is not yet declining. More needs to be known about the long term effects of the spawning fishery.

- **There is no ICES or national scientific advice but the published assessment recommends that exploitation should not increase. Information is needed about the distribution of spawning sites, and whether they need protection. There is no information about the potential for cuttlefish fisheries in the North Sea or the Irish Sea, but the stocks are believed to be smaller than in the Channel.**

Squid

The main fishery is in the Channel, where squid is a by-catch of the trawl and seine net fisheries. The stock has recently been assessed by French scientists, but it is not assessed routinely. It is not managed, and is not monitored in England. Catch rates, which peak in winter, vary considerably due to large variations in recruitment. Fishing mortality is high but has not so far affected recruitment. A problem for the Channel stock is that recruitment appears to be lower in warm years, so that increased temperatures could depress stocks.

- **There is no ICES or national scientific advice, but it is clear that there is no scope for expansion in the Channel without increasing the risk of recruitment failure, especially if temperature is increasing. There is no information about the potential for squid fisheries in the North Sea or the Irish Sea.**

Octopus

English catches are a by-catch in the pot fishery, and are trivial compared to the substantial landings in Portugal and Spain, which is the region where the main stocks occur. There is no scientific information or programme on the stocks in England. Given the large volume of landings in Iberia the chance of limited-volume pot by-catches contributing to the overseas market seems rather low. The scope for increasing sales at the local level needs to be investigated.

Task 2: The scope for development

Chapter 5: Secondary capture species

Mussel

The main fisheries for mussels in England and Wales are dredge fisheries based on the relaying and on-growing of seed mussel, mainly for export, as in the Menai Straits, the Wash, and some smaller areas. There is a substantial market opportunity for export, and for home consumption of high quality mussels, but the scope for expansion is affected by the availability of sites, by limited supplies of seed mussel, and by the capricious nature of natural recruitment of mussels in some large estuaries (eg the Wash, where recruitment failed completely in the 1990s).

- **New seed supplies are urgently needed. This requires active searching for new estuarine supplies, or sub-littoral supplies. Sub-littoral mussels usually occur on ephemeral beds, and need to be utilised as soon as they become available, which requires a rapid response to dredging licence applications. To rebuild and make best use of estuarine stocks requires active management, and the key factors for this have been presented in Chapter 5 of the Main Report. Mussel re-laying and on-growing are threatened by the water-quality, nature conservation, recreational, and possibly climate change issues listed in Chapter 5, and strategies are required for dealing with these.**

Native oyster

Despite all the problems with oysters in the past there are some glimmers of hope for the native oyster industry. Since the advent of *Bonamia* in 1981, which caused such serious problems in the R Fal and in Essex, the main source of naturally settled native oysters in England for relaying has been the eastern Solent. Fishable stock there has declined progressively for a number of years, but it is now hoped that young oysters from the 2004 spatfall will survive to reverse this trend in the next year or two. The R Fal may also benefit from oysters spawned in 2004. Stock in the R Blackwater has also gradually increased in the last decade.

- **The threat from *Bonamia* remains, but growers can limit this by using a strategy of short-term relaying followed by careful clearing of the beds. The Native Oyster Biodiversity Action Plan is under discussion, and to assist with this and with the management of wild stocks generally, Chapter 5 of the Main Report lists key action points for oyster management. Oyster stocks and cultivation remain under threat from water quality issues, and loss of ground due to marinas, harbour works, and siltation. The market price for the native oyster is becoming more variable, and new markets may have to be developed.**

Brown shrimp

Although some brown shrimp fishing occurs in the north-west, the main fishery is the autumn fishery in the Wash and along the coast of Lincolnshire, which produces shrimp for export to Holland. CEFAS studies show that abundance of fishable shrimp in the Wash has fluctuated considerably, but shows no overall trend. The brood strength of shrimp varies in relation to nutrients (positive effect), temperature (negative effect) and whiting abundance (negative effect). Brown shrimp landings from continental fleets fishing in the southern North Sea have nearly doubled during the last decade, so there is considerable competition in the market.

- **There is no management framework for the Wash stock, but it is probably fully exploited, and expansion is not recommended. There may be increased opportunity for brown shrimp fishing along the coasts of Lancashire and Cumbria, but this would require an evaluation of the stocks, and an assessment of the market in that area.**

Task 2: The scope for development

Chapter 6: Species with development issues

Crawfish

Crawfish landings have been declining in the south west over a very long period beginning in the 1920s, and more recently also in Ireland. The stock is not assessed or monitored, and it is not known if the decline is due to overfishing or to other causes. It is alleged that netting is a key factor; but the decline set in long before the net fishery started.

- **The high price of crawfish could justify an initial scoping study to identify the steps that would be required to investigate the causes of decline, with a view to assessing whether there is scope for rehabilitating the stock.**

Summary of key points

- The need to maintain or increase mussel seed supplies.
- The need to evaluate if the whelk fishery needs regional minimum sizes and precautionary limits to prevent local overfishing.
- Cuttlefish and squid in the Channel, and brown shrimp in the Wash, are fully exploited and expansion of the fishery is not recommended.
- It would be helpful to map the distribution of cuttlefish spawning grounds in the Channel in case they require protection in the future.
- Information is lacking about cuttlefish and squid off other coasts.
- There is hope of a slightly better supply position for native oysters in the next year or two.
- It could be beneficial to undertake a short scoping study to assess the feasibility of determining if the prolonged decline in crawfish is due to fishing or non-fishing reasons.
- Chapter 5 of the Main Report gives guidance on the management of mussel and oyster fisheries.
- Threats linked to water quality issues need addressing to improve wild shellfisheries.

Task 2: The scope for development

Chapter 6: Species with development issues

The following section contains sketches of the more detailed material in Chapter 6 of the Main Report on velvet crab; spider crab; razor clam; surf clams and carpet shell; green crab; winkle and miscellaneous species (mitten crab, squat lobster, quahog, pink shrimp, prickly cockle and queen scallops). Bold bullet points indicate action points and recommendations.

Velvet crab

The fishery is developing rapidly, especially at Bridlington, where most crabs enter the live trade for France and Spain. If the market holds there seems to be scope for more development, since fishers feel that stocks are increasing and becoming more widespread. The stocks are not assessed, and the science needs to be developed, but a Fishery Science Partnership survey will commence off the Holderness coast this summer. The only management tool is a minimum size. Chapter 6 of the Main Report evaluates the needs of the velvet crab fishery in detail.

- **There must still be considerable market opportunity, but it would be helpful to determine whether this is still with the live trade, or with other products. The well-known mortality problems that occur during handling, storage and transport affect profitability and should be reviewed and addressed, and a route for this has been suggested in the Main Report. Catchers would benefit from help with business development (marketing, product development), and loans for storage facilities, vivier lorries, etc. At Bridlington, overall efficiency would benefit from improved infrastructure and access. There is a need to identify what scientific and management issues require attention.**

Spider crab

Landings in the Channel are fluctuating without trend. English landings are less than the catching opportunity because they are generally below the quality demanded by the continental live trade, so prices are low. The stock is not assessed or monitored routinely, and is managed only by a minimum size. Stock fluctuations may be due to population mechanisms or the effect of temperature on survival, as described in the Main Report.

- **If an upturn in stock occurs in the near future it is unlikely to be utilised unless steps are taken to develop another market or other products, and the scope for this should be investigated. When an upturn occurs it would be valuable to monitor it biologically to determine whether it is caused by stock dynamics, or some other cause. There is a need to identify what the future scientific/management priorities are for the spider crab stock.**

Task 2: The scope for development

Chapter 6: Species with development issues

Razor clams

Razor clam fishing has developed in Ireland, but in England development trials were curtailed in 1998/99 because of concerns about the environmental impact of dredges in the Wash and South Wales. As a result, exploratory fishing, gear development, and the opportunity to learn about the dynamics and sustainability of stocks all lapsed. If Defra were to allow a limited and managed experimental fishery to take place in the Wash, however, interest might be renewed in razor clam fishing generally.

- To avoid a repeat of the 1998/99 hiatus, a list of seven detailed actions is proposed in the Main Report to pre-review a range of issues before large funds are committed. The plan comprises: re-evaluation of the market (ie is further development justified?); fact-finding for local information about available sites, preferably high in razor clams but low on nature conservation issues; identification of the scope for improved gear-designs to meet the needs of individual sites; a site-by-site preview of the required appropriate assessments, to identify measures for managing environmental impact (physical and biological) and managing the harvesting regime to achieve sustainability. A perspective is also given on the principles of site-by-site evaluation of gear impacts.

Spisula spp and *Tapes* spp

Information is available about the harvesting of *Spisula* (surf clam) beds in Ireland, where stocks appear to be dense but relatively small and easily depleted, but there is little rigorous information about sites, stocks, biology, or market potential in England. There is little rigorous information about the distribution and potential for harvesting *Tapes* (palourde) in England.

- To prepare a development plan a dedicated scoping study will be required along the line of the seven-point plan for razor clams, coupled with the collection of biological data.

Green crab

Green crabs are widely regarded as being abundant on muddy estuaries and foreshores. In the past they disrupted mussel cultivation by consuming spat and seed mussel at foreshore sites, and therefore at Conwy they were trapped repeatedly, but seemingly without affecting abundance. The species is not assessed or monitored by CEFAS. Green crab support a major bait fishery in Devon and Cornwall, where carrying capacity for traps, tubes and tiles is probably saturated. There is some concern about disturbance to muddy habitat when the traps are serviced.

- There has been insufficient time to determine where the most suitable green crab locations are outside the south west, or to investigate the scope for selling green crab for purposes other than bait. Development of a green crab fishery would require relatively low cost because of the simplicity of the gear, but would require an initial scoping study to identify markets, products, sites, and environmental impact issues such as disturbance when the traps are being emptied.

Winkles

Hand picking is widespread, and significantly under-recorded. The stocks are not studied by fisheries scientists although the biological background is well researched in the zoological literature.

- A short scoping study is required to identify further market potential and additional site opportunities.

Task 2: The scope for development

Chapter 6: Species with development issues

Miscellaneous species

SFCs have suggested that there is potential interest in the following species and locations, but individual scoping studies are required to follow up on these suggestions.

- Mitten crab (Yorkshire, Kent and Essex).
- Squat lobsters (Northumberland, Yorkshire, local market for Chinese restaurants?).
- Quahog (Dorset and Cornwall).
- Pink shrimps in the Wash (available seasonally in summer, but no market).
- Prickly cockles (Essex).
- Periodic beds of queen scallops (Yorkshire, Devon, Cornwall, mid-Wales, Cumbria).

Summary

- Significant development is taking place in the north east coast velvet crab fishery and there is scope for more. There are handling, business development, infrastructure, and market needs that should be addressed. Scientific and management objectives also need to be identified. The implications of development in other coastal areas need to be considered.
- There is scope for more spider crab landings, but an alternative market to the live trade is required. There is a need to understand more about the causes of stock fluctuations.
- In case razor clam fishing is permitted in the future, an outline seven-point plan has been proposed for pre-viewing the market, identifying fishing sites, gear design, appropriate assessments, and managing the fisheries for sustainability.
- There is little hard information about the scope for developing fisheries for *Spisula* and *Tapes*, but the same seven-point plan could be followed.
- Green crab are considered to be abundant in suitable habitats, and are heavily fished for bait in the south west, but to evaluate the scope for other uses and other areas requires a separate study.
- Owing to the absence of stock and market information, separate scoping studies will be required to identify the market potential, and fishing opportunities for winkle, mitten crab, squat lobster, quahog, prickly cockle, and queen scallop. It is already known that there is no market for pink shrimp.