

## Commercial shellfish



### Key message

Fishing mortality for *Nephrops* has declined on both the east and west coasts and stock abundance is healthy. East of Scotland scallop stocks are declining whilst to the west, stocks are stable or increasing. Most crab and lobster stocks are fully exploited or overexploited. For other shellfish, stock status is unknown.



### Background

Most shellfish species are relatively sedentary and live on the sea bed. Different species have different habitat requirements and species distribution is dependent on the availability of suitable substrates. The geographical distribution of different habitats around Scotland is highly complex, especially on the west coast, and as a consequence shellfish species populations are distributed patchily but in discrete aggregations. For many species numerous populations can be identified and where possible these are assessed separately.

Shellfish fisheries are of key economic importance in Scottish waters and fishing is likely to be the main pressure on the populations of these species.



Figure 1:  
*Nephrops* in burrow. © Marine Scotland

However, given their sedentary nature, other activities (such as pollution, gravel extraction, pipelines and wind farm development) which disturb the sea bed or have detrimental consequences for larval ecology and settlement could affect populations.

Shellfish stock assessments are carried out in order to inform sustainable fisheries management. Assessments of the state of the stock typically consist of estimating fishing pressure and stock size, and judging whether the fishery is sustainable and the stock healthy by comparing these measures to pre-defined reference points. Assessments are carried out for the main shellfish species: *Nephrops norvegicus* (often referred to as Nephrops, Norway lobster, langoustine, scampi or prawns), king scallops, brown and velvet crabs and lobsters. In general, the [International Council for the Exploration of the Seas \(ICES\)](#) and Marine Scotland shellfish stock assessment areas do not correspond to the Scottish Marine Regions.

## Results

*Nephrops* results are based on stock assessments conducted by ICES which are published annually. The latest (2019 published) presenting fishing mortality to 2018 and stock size to 2019. Results for crab, lobster and scallops are based on Marine Scotland triennial assessments, the latest available being up to 2015.

### *Nephrops*

In the North Sea, the fishing mortality in the Moray Firth and Firth of Forth has declined since the 2011 Marine Atlas (Baxter *et al.*, 2011), and all *Nephrops* stocks are fished below  $F_{MSY}$  (the fishing mortality that results in the largest yield that can be taken from a stock in the long term) (Table 1). To the west of Scotland, fishing mortality has also declined, and stocks in this area are also fished below  $F_{MSY}$  (Table 2). In all areas, the level of stock abundance is considered healthy.

Table 1: *Nephrops* stocks in the North Sea. Summary of the stocks relative to MSY reference points.

	Fishing Mortality ( $F_{MSY}$ )			Stock size ( $MSY B_{trigger}$ )		
	2016	2017	2018	2017	2018	2019
Fladen	✓	✓	✓	✓	✓	✓
Moray Firth	✗	✓	✓	✓	✓	✓
Firth of Forth	✓	✗	✓	✓	✓	✓

Table 2: *Nephrops* stocks to the West of Scotland. Summary of the stocks relative to MSY reference points.

	Fishing Mortality ( $F_{MSY}$ )			Stock size ( $MSY B_{trigger}$ )		
	2016	2017	2018	2017	2018	2019
Firth of Clyde	✗	✗	✓	✓	✓	✓
Sound of Jura	⊖	⊖	⊖	✓	✓	✓
South Minch	✓	✓	✓	✓	✓	✓
North Minch	✓	✓	✓	✓	✓	✓

## Scallops

To the east of Scotland stocks are declining from a high level and exploitation has increased. To the west, stocks are stable or increasing and fishing mortality is relatively low.

### Brown crab

In the most recent assessments, nine of the ten assessed areas were fished above  $F_{MSY}$  for either males, females or both. Papa was the only

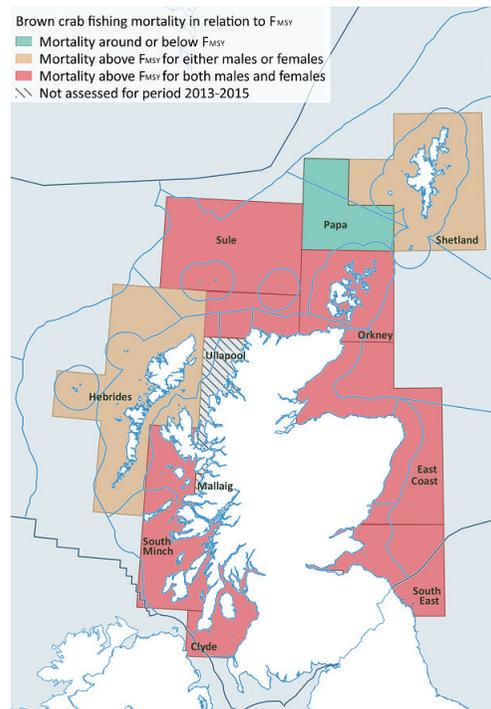


Figure 2: Brown crab stock assessment units and estimated fishing mortality in relation to  $F_{MSY}$ , 2013-15.

Green - fishing mortality around or below  $F_{MSY}$ , orange - fishing mortality above  $F_{MSY}$  for either males or females, red - fishing mortality above  $F_{MSY}$  for both males and females, grey hatch - not assessed for the period 2013-2015.

assessment area for which recent fishing mortality was estimated at around  $F_{MSY}$  or lower for both male and female brown crab.

### Velvet crab

In the Clyde, East Coast, Orkney and South Minch both males and females were fished at levels above  $F_{MSY}$ . There were no assessment areas in which both males and females were estimated to be fished at around or below  $F_{MSY}$ .

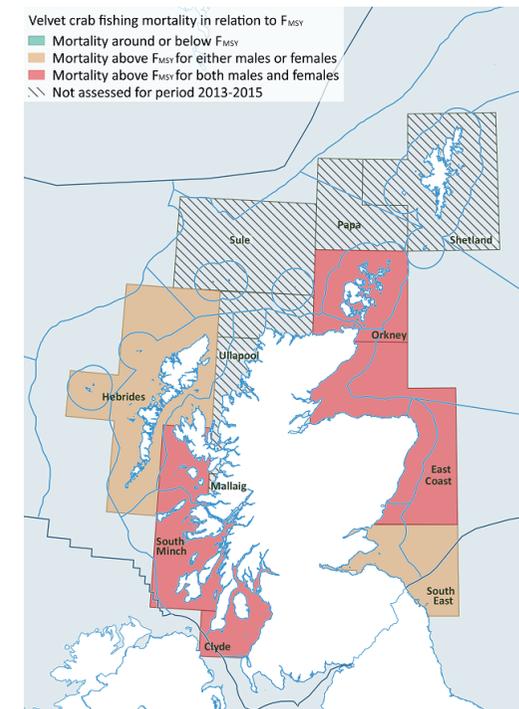


Figure 3: Velvet crab stock assessment units and estimated fishing mortality in relation to  $F_{MSY}$ , 2013-15.

Green - fishing mortality around or below  $F_{MSY}$ , orange - fishing mortality above  $F_{MSY}$  for either males or females, red - fishing mortality above  $F_{MSY}$  for both males and females, grey hatch - not assessed for the period 2013-2015.

In most areas there are no changes in stock status since the previously published assessments.

## Lobster

In all the assessed areas, fished mortality was estimated to be above  $F_{MSY}$  for either males or females or both. In most areas there are no changes in stock status since the previously published assessments.

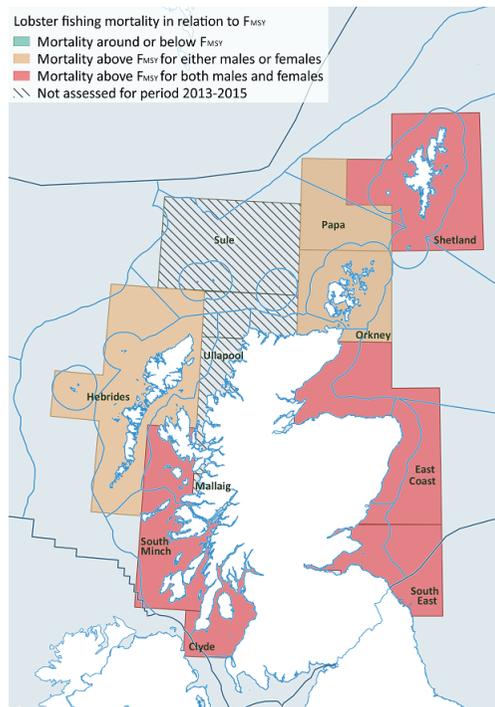


Figure 4:

Lobster stock assessment units and estimated fishing mortality in relation to  $F_{MSY}$ , 2013-15.

Green – fishing mortality around or below  $F_{MSY}$ , orange – fishing mortality above  $F_{MSY}$  for either males or females, red – fishing mortality above  $F_{MSY}$  for both males and females, grey hatch – not assessed for the period 2013-2015.

## Conclusion

No changes have been made to the assessment methods for any of the stocks since 2011. Current stock assessments can be compared to previously published shellfish stock assessments.

## Nephrops

In the North Sea, the fishing mortality on Moray Firth and Firth of Forth has declined since the last Marine Atlas publication, and all *Nephrops* stocks are fished below  $F_{MSY}$ . To the west of Scotland, fishing mortality has also declined and stocks in this area are also fished below  $F_{MSY}$ . In all areas, the level of stock abundance is considered healthy.

## Scallops

To the east of Scotland stocks are declining from a high level and exploitation has increased. To the west, stocks are stable or increasing and fishing mortality is relatively low.

## Crabs and lobster

Most stocks are fully exploited or overexploited.

## Knowledge gaps

For some shellfish stocks there are insufficient data (either fishery sampling and/or survey data) to conduct assessments.

The other main uncertainties are associated with limitations in biological knowledge or stock structure.

## Status and trend assessment

### Overall assessment

	Overall status with confidence	Overall trend with confidence
All commercial shellfish	Blue circle with two stars	Four arrows pointing outwards with two stars
<i>Nephrops</i>	Green square with two stars	
Scallops	Blue circle with two stars	
Crabs and lobster	Red triangle with two stars	
Others	Grey pentagon with two stars	

In general the shellfish stock assessment areas do not correspond to the Scottish Marine Regions. In order to provide assessments at the SMR/OMR level, an approximate matching of SMR/OMR to shellfish assessment areas was done (possible for some, but not all SMR/OMRs).

## Nephrops

SMR assessed	Status with confidence	Trend with confidence - fishing mortality (2014 onwards)	Trend with confidence - stock size (2014 onwards)	Comment
Clyde				Based on the assessment for Firth of Clyde
Argyll				Based on the assessments of North Minch and South Minch <i>Nephrops</i> - 2 stocks
Outer Hebrides				
West Highlands				
Moray Firth				Based on the assessment for Moray Firth
Forth and Tay				Based on the assessment for Firth of Forth
Fladen and Moray Firth Offshore (OMR)				Based on the assessment for Fladen

## Scallops

SMR assessed	Status with confidence	Trend with confidence - fishing mortality (2014 onwards)	Trend with confidence - stock size (2014 onwards)	Comment
Forth and Tay, East Coast				Based on the assessment for East Coast
Moray Firth, Fladen and Moray Firth Offshore				Based on the assessment for North East
West Highland, Outer Hebrides				Based on the assessment for North West
Shetland				Based on the assessment for Shetland
Argyll				Based on the assessment for West of Kintyre

All other SMRs have unknown status.

## Brown crab

SMR assessed	Status with confidence	Trend with confidence - fishing mortality, assessments conducted on 2013-15 data compared with previous assessments of 2009-2012 data	Comment (there are no estimates of stock size)
Clyde		NA	Based on the assessment for Clyde
Argyll			Based on the assessments for South Minch
Outer Hebrides			Based on assessment for Hebrides
West Highlands			Multiple stock assessment areas with differing status
North Coast, North and West Shetland Shelf (OMR)			Based on assessment for North Coast and Sule
Shetland Isles			Based on assessment for Shetland
Orkney Islands			Based on assessment for Orkney
Moray Firth			Based on assessment of South East and East Coast stocks
North East			
Forth and Tay			
Fladen and Moray Firth Offshore (OMR)			
Long Forties (OMR)			

## Velvet crab

SMR assessed	Status with confidence	Trend with confidence - fishing mortality, assessments conducted on 2013-15 data compared with previous assessments of 2009-2012 data	Comment (there are no estimates of stock size)
Clyde			
Argyll			Based on the assessments for South Minch
Outer Hebrides			Based on assessment for Hebrides
West Highlands			
North Coast, North and West Shetland Shelf (OMR)			
Shetland Isles			
Orkney Islands			Based on assessment for Orkney
Moray Firth			Based on assessment of South East and East Coast stocks
North East			
Forth and Tay		NA	Based on assessment for South East

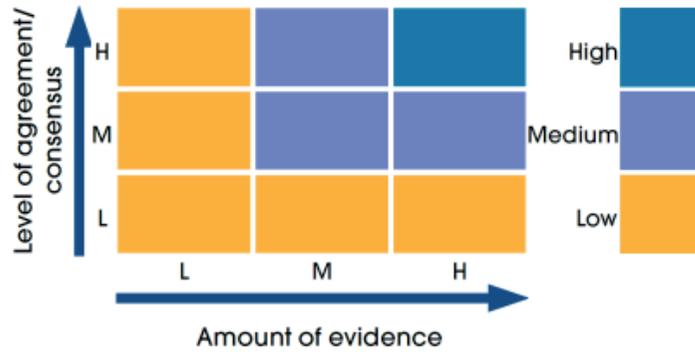
## Lobster

SMR assessed	Status with confidence	Trend with confidence - fishing mortality, assessments conducted on 2013-15 data compared with previous assessments of 2009-2012 data	Comment (there are no estimates of stock size)
Clyde			
Argyll			Based on the assessments for South Minch
Outer Hebrides			Based on assessment for Hebrides
West Highlands			
North Coast, North and West Shetland Shelf (OMR)			
Shetland Isles			Based on assessment for Shetland
Orkney Islands			Based on assessment for Orkney
Moray Firth			Based on assessment of South East and East Coast stocks
North East			
Forth and Tay			Based on assessment for South East

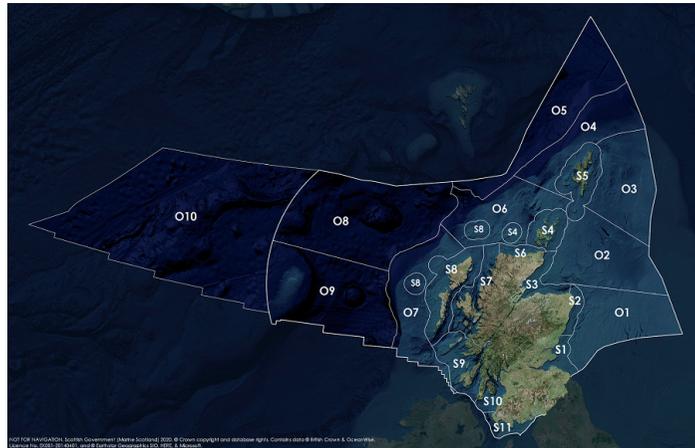
## Status and trend assessment legend

Status assessment (for Clean and safe, Healthy and biologically diverse assessments)		Trend assessment (for Clean and safe, Healthy and biologically diverse and Productive assessments)	
	Many concerns		No / little change
	Some concerns		Increasing
	Few or no concerns		Decreasing
	Few or no concerns, but some local concerns		No trend discernible
	Few or no concerns, but many local concerns		All trends
	Some concerns, but many local concerns	<b>Confidence assessment</b>	
	Lack of evidence / robust assessment criteria		
	Lack of regional evidence / robust assessment criteria, but no or few concerns for some local areas	<b>Symbol</b>	<b>Confidence rating</b>
	Lack of regional evidence / robust assessment criteria, but some concerns for some local areas	★	Low
	Lack of regional evidence / robust assessment criteria, but many concerns for some local areas	★★	Medium
	Lack of regional evidence / robust assessment criteria, but many concerns for some local areas	★★★	High

## Overall confidence



## Assessment regions

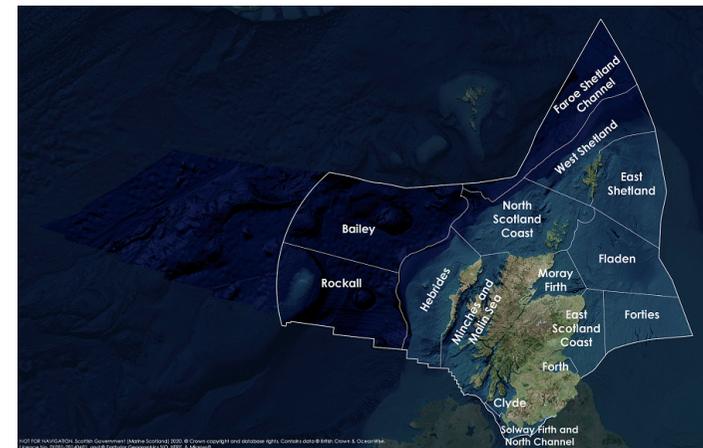


The Scottish Marine Regions (SMRs; S1 - S11) and the Scottish Offshore Marine Regions (OMRs, O1 - O10)

Key: S1, Forth and Tay; S2, North East; S3, Moray Firth; S4 Orkney Islands, S5, Shetland Isles; S6, North Coast; S7, West Highlands; S8, Outer Hebrides; S9, Argyll; S10, Clyde; S11, Solway; O1, Long Forties, O2, Fladen and Moray Firth Offshore; O3, East Shetland Shelf; O4, North and West Shetland Shelf; O5, Faroe-Shetland Channel; O6, North Scotland Shelf; O7, Hebrides Shelf; O8, Bailey; O9, Rockall; O10, Hatton.



Biogeographic, Charting Progress 2 (CP2) Regions. These have been used as the assessment areas for hazardous substances.



Scottish Sea Areas as used in Scotland's Marine Atlas 2011. These are sub divisions of the biogeographic, or Charting Progress 2 (CP2), Regions.