Marine Management Organisation

Spatial models of essential fish habitat (South Inshore and Offshore marine plan areas): Stakeholder validation annex

December 2013

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Spatial models of essential fish habitat (South Inshore and Offshore marine plan areas)

Stakeholder validation annex

MMO Project No: 1044

Project funded by: The Marine Management Organisation

Project contractor: Institute of Estuarine and Coastal Studies, University of Hull

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1. Validation Approach

As part of the EFH spatial modelling, the validation of the outputs is important to decide whether the relationships between the occurrence of fish life stages and the environmental variables, hence the resulting spatial predictions are acceptable as descriptions of the data.

The validation approach adopted in this project was based on the consultation with relevant stakeholders in order to highlight possible areas of mismatch between the model predictions and the knowledge and data held by the stakeholders. This approach follows the rationale of a cross-validation, i.e. the process of assessing how the results of a statistical analysis can generalise to an independent data set.

The consultation with stakeholders was aimed also at highlighting any gaps in the source data that have been used to derive the outputs and which filling would improve the understanding of EFH in the South Coast.

The consultation with stakeholders was carried out during the last phase of the project in order to collate any comment and additional information that would allow to integrate the information on the confidence in the existing EFH outputs and to possibly improve them by strengthening the data base for the modelling process. It was agreed that the MMO will deal with validation and data strengthening post project close.

A number of useful comments were received, mostly highlighting gaps and limitations in the data and suggesting potential additional sources of data. This information was integrated in the relevant section in the main report (Final Report), as well as considerations on the outputs validation.

This Annex reports on the methods adopted for this consultation process.

1.1 Stakeholders

The list of stakeholders to be contacted for consultation was selected by the MMO based on suggestions provided by IECS.

In developing a stakeholder group to fulfil the aims above, considerations on key organisations to be included, key skill sets to be represented and possible sources of informal expert advice were addressed.

There are significant benefits in populating the stakeholder group for this project using individuals already known to have key insight, knowledge or expertise and who have a favourable track record in contributing positively in other stakeholder group environments. Accordingly, it was recommended to build the membership of the stakeholder group for this project on work already undertaken by the MMO in respect of the consultation surrounding the marine planning for the South Inshore and Offshore Marine Plan areas (areas 6 and 7). In addition, it was devised as appropriate to identify certain members of the Regional Stakeholder Groups for the

Balanced Seas and Finding Sanctuary MCZ projects as potential sources of key expertise for this project.

As a result, 17 organisations were identified, with 42 of their representatives contacted.

1.2 Consultation method

In order to speed up the consultation process, as well as to avoid potential fatigue to stakeholders that are already engaged in consultation with the MMO on other fisheries issues, an online questionnaire was devised as the best approach for this phase of the project.

The online questionnaire was created within the SurveyMonkey online survey tools (www.surveymonkey.net). Stakeholders were first approached by email and then sent the link to the online questionnaire. A pdf version of the questionnaire (Appendix 1) was also created for those stakeholders expressing a preference for this type of format.

Through the online survey where stakeholders were asked to:

- Review the map outputs and comment on their validity (taking into account the confidence scores attributed to these data)
- Highlight any gaps in the list of source data that have been used to derive the outputs and which filling would improve the understanding of EFH in the South Coast
- Suggest any potential additional sources of these data and provide summary metadata or data source contacts which can be followed up by the MMO data team.

Stakeholders responses and suggestions were collated and resulting areas of concern (e.g., needing further investigation or additional data) were highlighted. This information was used to integrate the assessment of the spatial confidence of the model predictions obtained with the project and to further inform on gaps and limitations that might be useful to address future studies.

Appendix 1: Online questionnaire (pdf version)

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1. Introduction

Thank you for agreeing to contribute to the validation of the spatial outputs obtained in the project to develop spatial models of essential fish habitats for the MMO's South Coast Inshore and Offshore Marine Plan Areas.

The main spatial outputs of the project are presented in the following pages, together with a series of brief questions. We are interested in knowing if the model outputs agree with your experience or with data that you have.

We will also show you the list of data we took into account to create these models and would like to know if there are any additional datasets that may be of value to us in validating or improving the models.

We would appreciate it if you could complete this survey by Friday 13th September.

2. An explanation of model outputs

Ten fish species were selected for mapping of essential fish habitats (EFH), with different life stages taken into account (see table below). Species selection was based on a number of criteria, including:
• relevance of the species for commercial exploitation or conservation
• confidence that the data available for the species adequately represented their occurrence/abundance in the area
• availability of data across different life stages to provide appropriate information on specific fish habitats.

Existing literature/projects were used to inform the species selection and life history staging.

Species	Life stage	Size and stage criterion
Plaice	Juveniles	40-180mm (0-group)
	Adults	190-640mm
	Eggs	1.75-2.28mm (early stage, EG1)
Sole	Juveniles	40-200mm
	Adults	210-470mm
Lemon Sole	Juveniles	50-200mm
	Adults	210-400mm
Dab	Juveniles	20-80mm (0-group)
	Adults	90-380mm
Red gurnard	Juveniles	50-170mm (0-group)
	Adults	180-420mm
Dragonet	Juveniles	10-95mm
	Adults	100-290mm
Solenette	Juveniles	10-70mm (immature)
	Adults	80-290mm
Thickback sole	Juveniles	30-200mm
Thornback ray	Juveniles	100-280mm
	Adults	290-800mm
Herring	Larvae	<11mm (early stage)

Statistical models were calibrated to identify the relationship between the presence of these fish species/life stages and a series of relevant environmental characteristics. The potential distribution of the species life stages was then mapped (at a spatial resolution of 5km x 5km) based on the combination of environmental characteristics identified by the models.

For each species, two types of outputs are provided:
An output showing the predicted distribution of the species, considering both adult foraging habitats and juvenile (nursery) habitats; and
A more detailed output on the distribution of nursery habitat of the species showing the probability of presence of juveniles in the study area. Where data for egg or larval stages were used, the output shows the distribution of potential spawning habitat of the species.

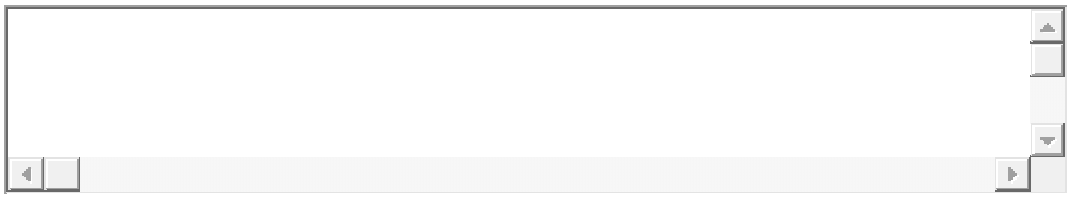
A confidence assessment is attached to each output in the form of:
• A qualitative assessment of the overall level of confidence associated with the output
• A map showing the spatial distribution of the relative confidence in the predicted EFH distribution.

The confidence assessment was based on the combination of confidence ratings and maps (where available) and takes into account the different elements contributing to the final output (including the predictive ability of the statistical model, the fish survey data used to calibrate the model, the environmental data layers used by the model and their importance in determining the final output).

Output validation: The main spatial outputs of the project are presented in the following pages, together with a series of brief questions.

3. Respondent details

Before starting the survey, we would like you to tell us who you are. Please provide your name and/or the name of your organisation



4. Questionnaire

4.1 Project outputs

You will now be asked to comment on the outputs from the project (provided in Section 5 of this document). If you do not feel that you have sufficient knowledge or experience to comment on a particular output you are able to skip to the next set of maps. Please note that you will have the opportunity to provide general feedback at the end of the questionnaire.
Please provide answer to the following questions for each of the outputs of the project:

a) Allowing for the uncertainty in the underlying models (as shown by the 'confidence' map) does the information on the distribution of the essential fish habitat shown by the first map agree with your personal experience, knowledge or data?

- ☐ Yes
- ☐ No
- ☐ I do not feel that I have sufficient knowledge to comment - skip this species

If Your answer is No, please provide the following information:
b) You indicated that the information on the distribution of the essential fish habitat for the species, as shown by the first map, does not agree with your personal experience, knowledge or data. Please use the column and row headings to locate any specific areas of the mapped distributions that DO NOT agree with your personal experience or knowledge, and indicate the nature of the discrepancy.
For example, you might write: '4D - I know of data that suggests that this area is important for this species but this is not shown on the map'; or 'the map shows area 7C as being important for this species but in my experience this is not the case'.

c) We would appreciate it if you could provide empirical evidence in support of your comments above. Empirical evidence could be, for example, in the form of information on the abundance, occurrence or frequency of observation of a

species in a certain area.
In order to compare any such information with the outputs from the work undertaken so far we would need access to the relevant supporting data. Note that, in addition to information on the nature of the data itself, we would also need you to provide a summary of the metadata associated with these additional sources of data, including information on:
- the type of data involved;
- the fish species and life stage(s) covered by the data;
- a spatial reference for the data (lat/long coordinates);
- a date reference for the data (at least the year and month of the data collation); and
- an indication of the methods used to obtain the data,
together with contact details for whoever would be able to provide the data. Please provide a summary of these metadata.

4.2 Input data

We would also like to ask if you are able to highlight any gaps in the source data we have used, and to suggest potential additional sources of data that you think would be useful to integrate/improve the model output (provided they fulfil the identified data requirements).
The data sources that we used, or took into account, to obtain the outputs that have been presented are summarised in Section 6. These include the source of fish survey data as well as sources of environmental data.

d) If you know of any other fish or environmental data or information that you think may be of use to this project (data that you have not already identified as part of your responses to the preceding questions) then please use the space below to provide relevant details.

4.3 General feedback

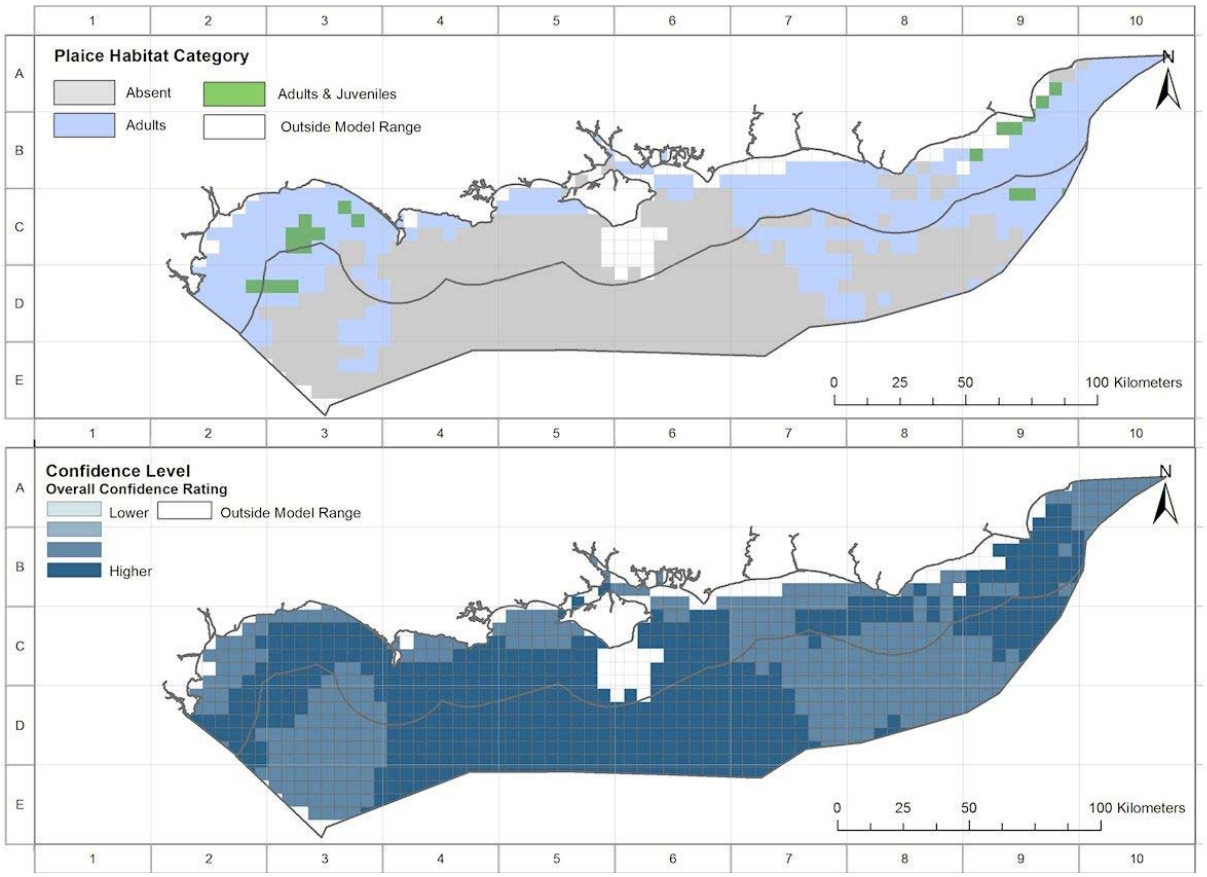
e) Finally, if you have any further information or comments that you think may be useful to us please record these in the box below.

Thank you for completing this questionnaire.

5. Project outputs

5.1 Plaice (*Pleuronectes platessa*) adult foraging habitat

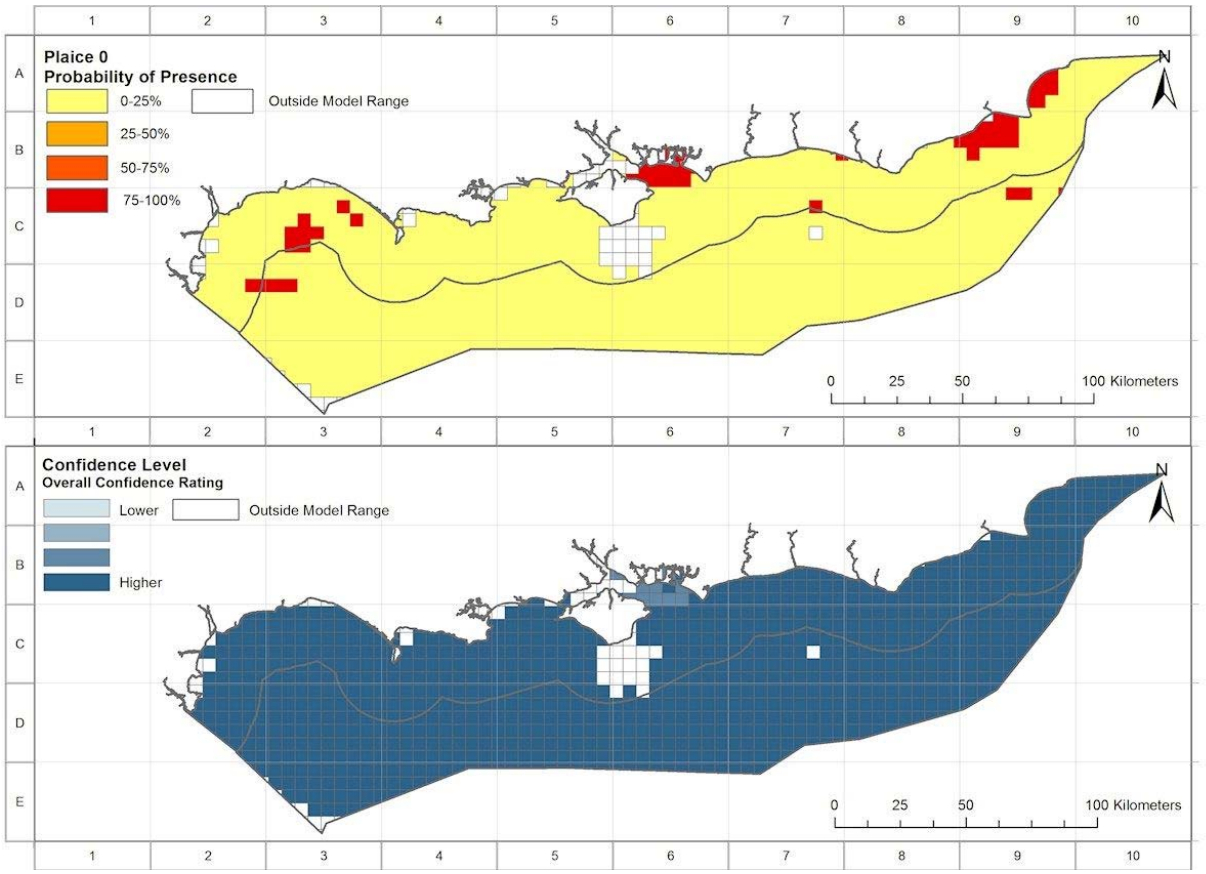
Predicted distribution of adult plaice foraging habitat



Overall confidence in the model outputs for plaice adult foraging habitat is 'Moderate'.

5.2 Plaice (*Pleuronectes platessa*) nursery habitat

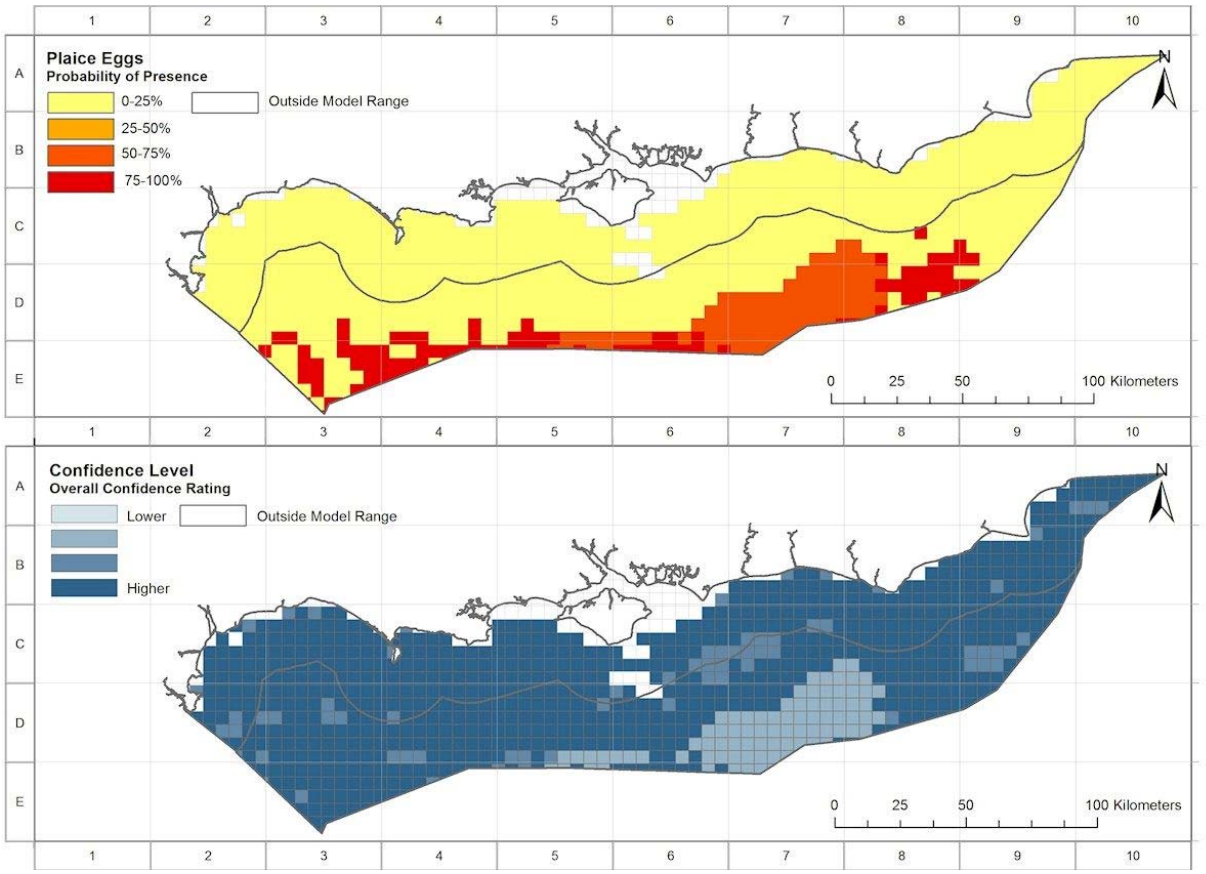
Predicted distribution of plaice nursery habitat (probability of presence of suitable habitat)



Overall confidence in the model outputs for plaice nursery habitat is 'Low'

5.3 Plaice (*Pleuronectes platessa*) spawning habitat

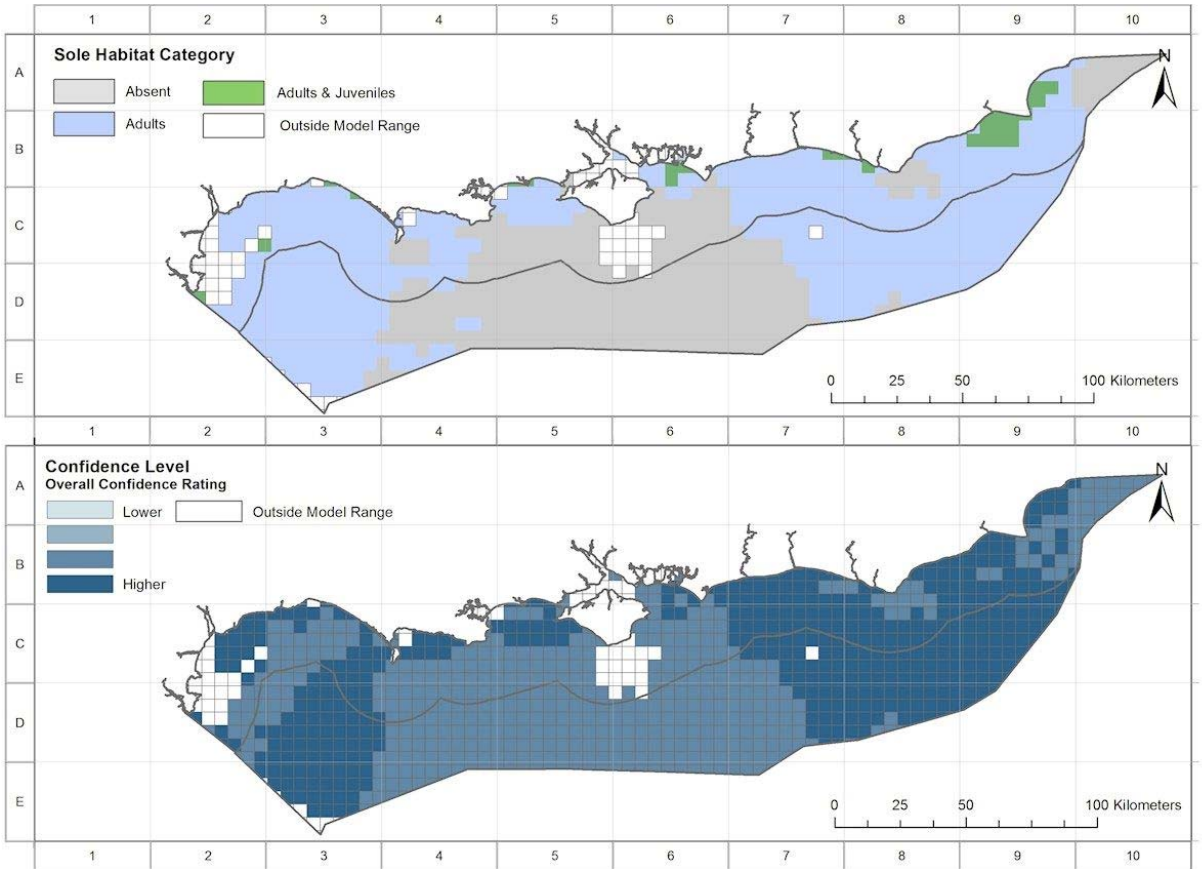
Predicted distribution of plaice spawning habitat (probability of presence of suitable habitat)



Overall confidence in the model outputs for plaice spawning habitat is 'Moderate-Low'.

5.4 Sole (*Solea solea*) adult foraging habitat

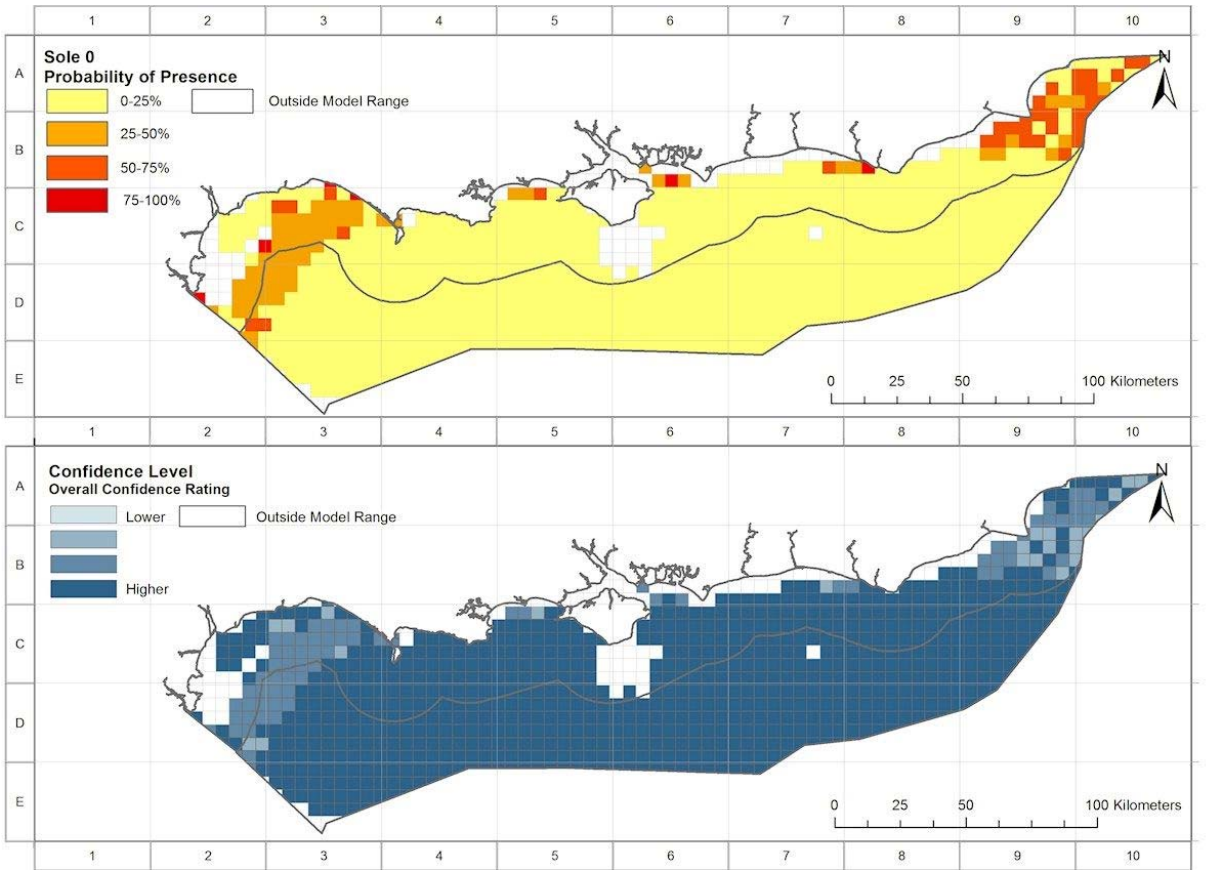
Predicted distribution of adult sole foraging habitat



Overall confidence in the model outputs for sole adult foraging habitat is 'Low'.

5.5 Sole (*Solea solea*) nursery habitat

Predicted distribution of sole nursery habitat (probability of presence of suitable habitat)



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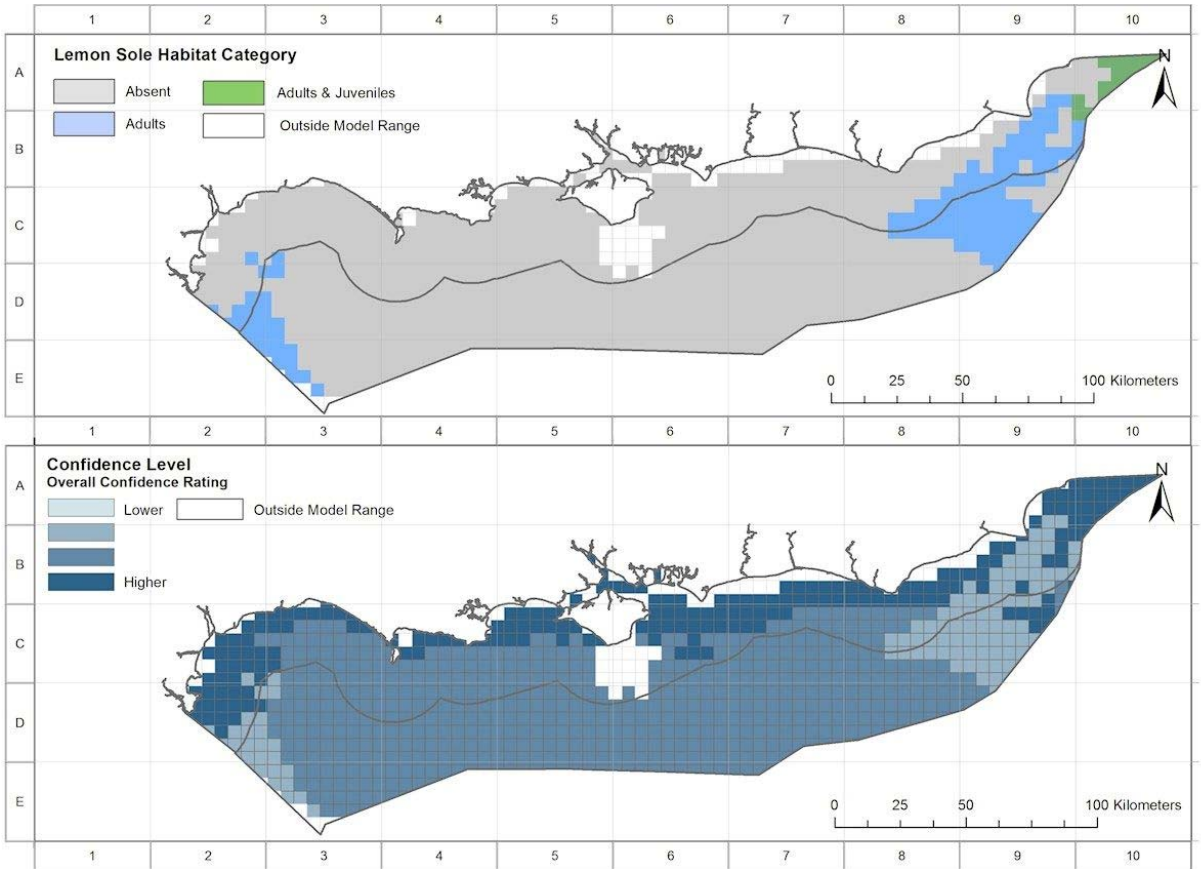
Overall confidence in the model outputs for sole nursery habitat is 'Low'.

5.6 Lemon sole (*Microstomus kitt*) adult foraging habitat

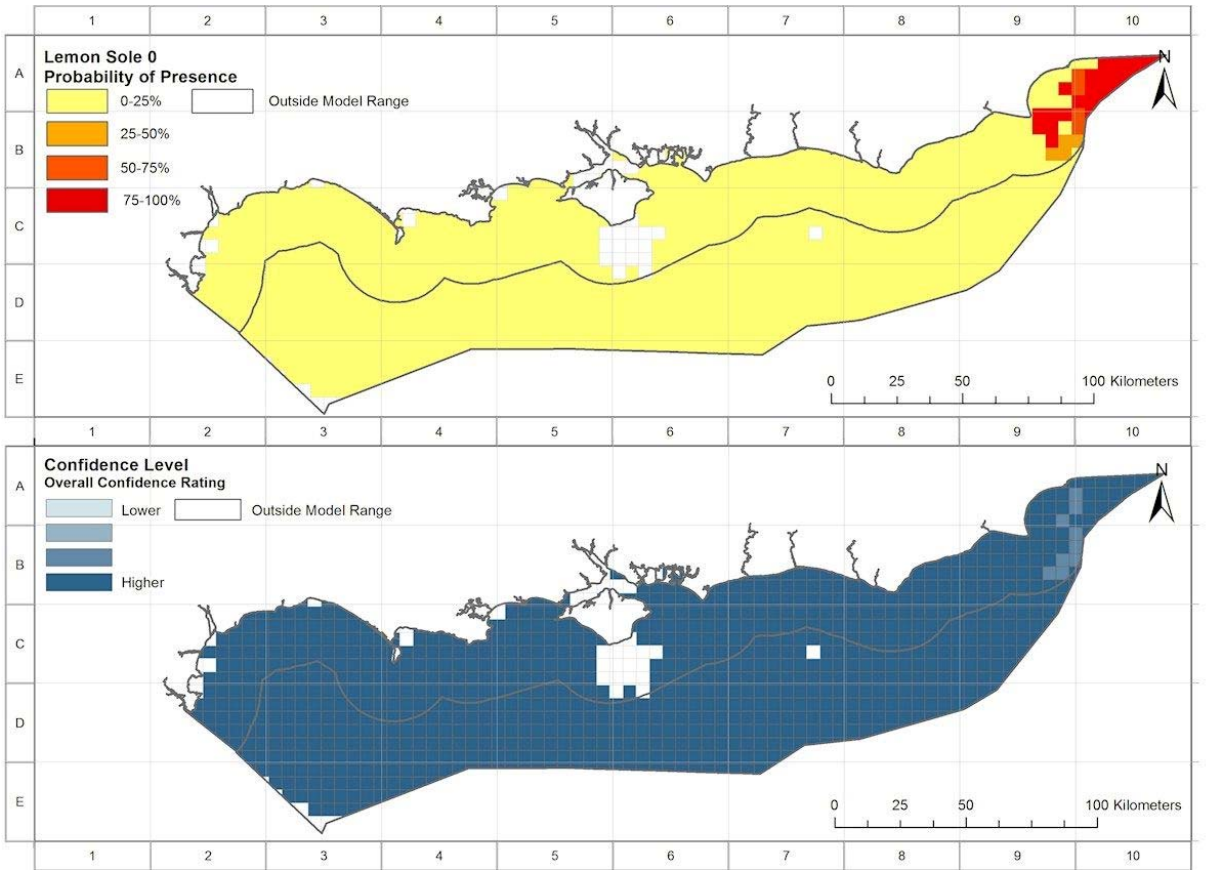
Predicted distribution of adult lemon sole foraging habitat



Overall confidence in the model outputs for lemon sole foraging habitat is 'Moderate'.

5.7 Lemon sole (*Microstomus kitt*) nursery habitat

Predicted distribution of lemon sole nursery habitat (probability of presence of suitable habitat)



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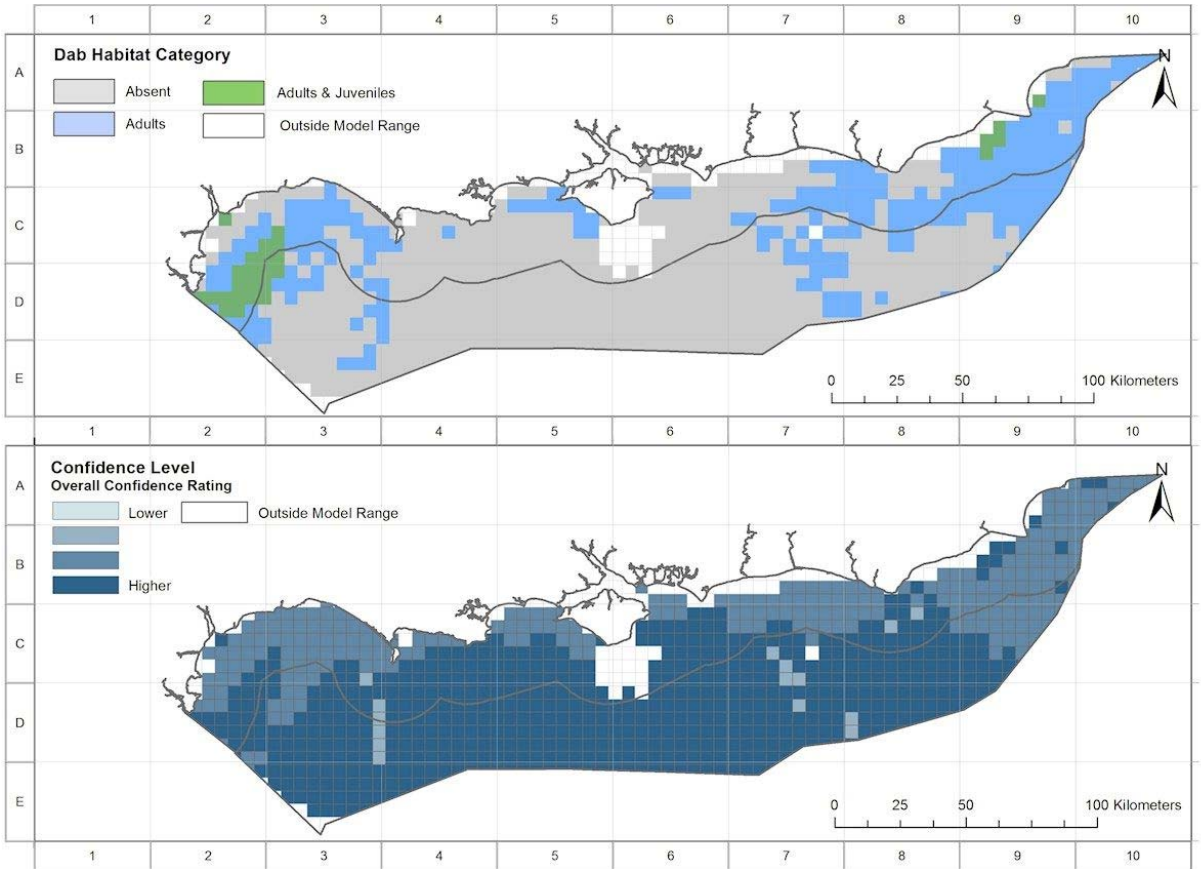
Overall confidence in the model outputs for lemon sole nursery habitat is 'Low'.

5.8 Dab (*Limanda limanda*) adult foraging habitat

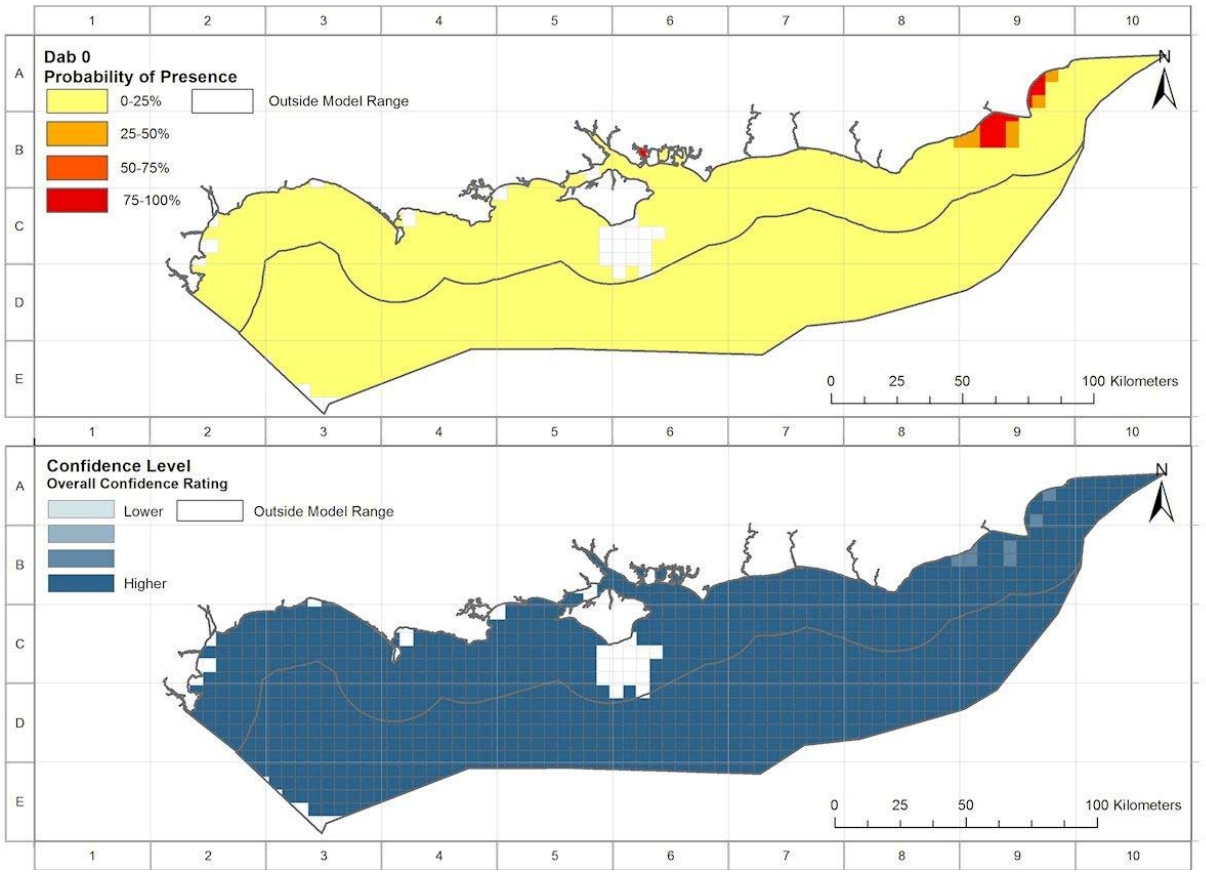
Predicted distribution of adult dab foraging habitat



Overall confidence in the model outputs for dab foraging habitat is 'Moderate'.

5.9 Dab (*Limanda limanda*) nursery habitat

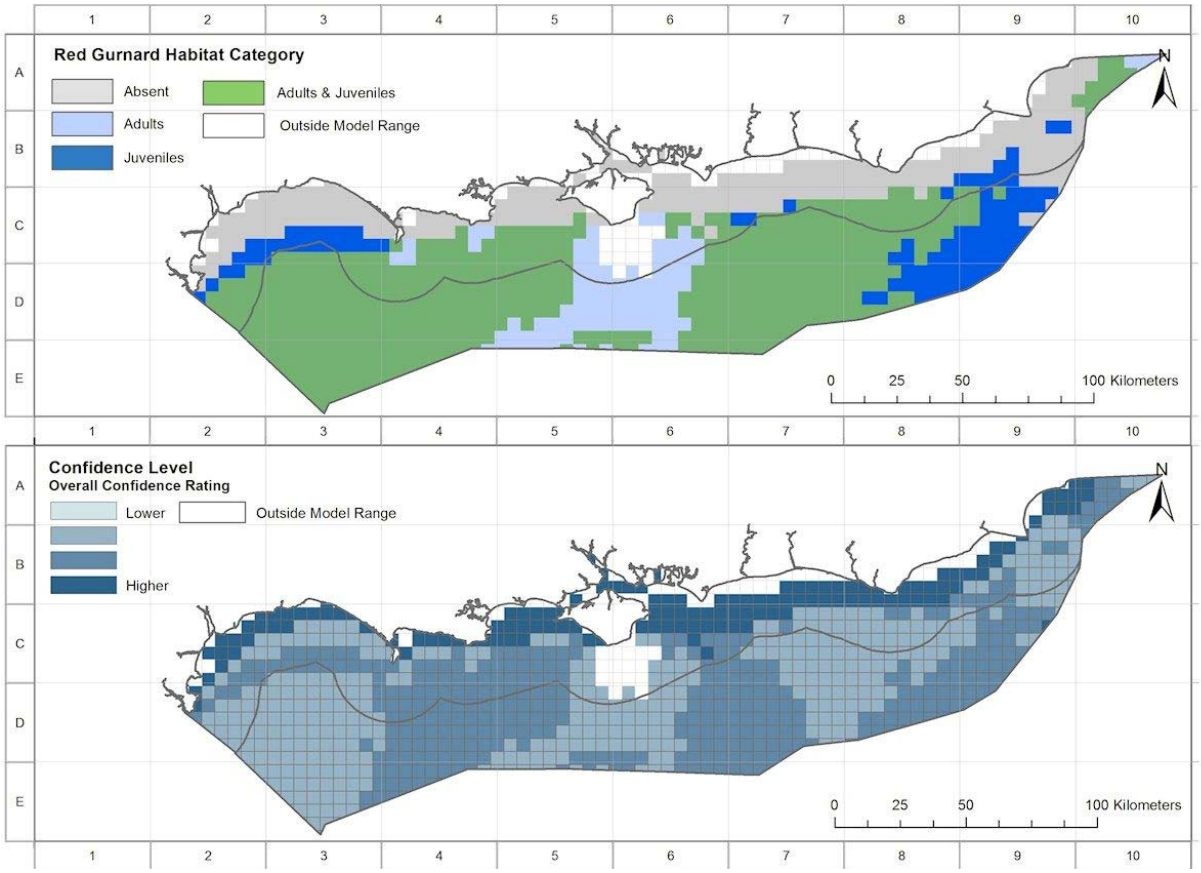
Predicted distribution of dab nursery habitat (probability of presence of suitable habitat)



Overall confidence in the model outputs for dab nursery habitat is 'Low'.

5.10 Red gurnard (*Chelidonichthys cuculus*) adult foraging habitat

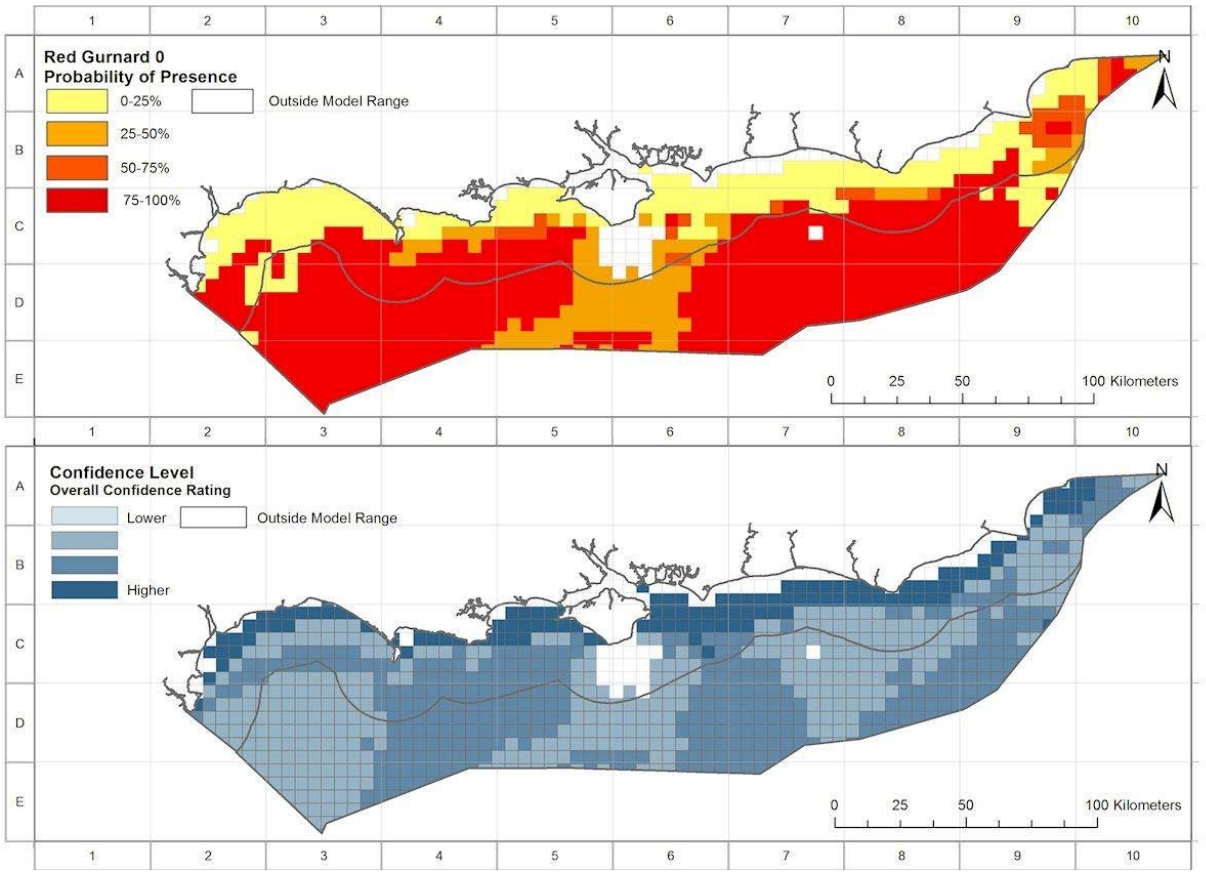
Predicted distribution of adult red gurnard foraging habitat



Overall confidence in the model outputs for red gurnard foraging habitat is 'Moderate-Low'.

5.11 Red gurnard (*Chelidonichthys cuculus*) nursery habitat

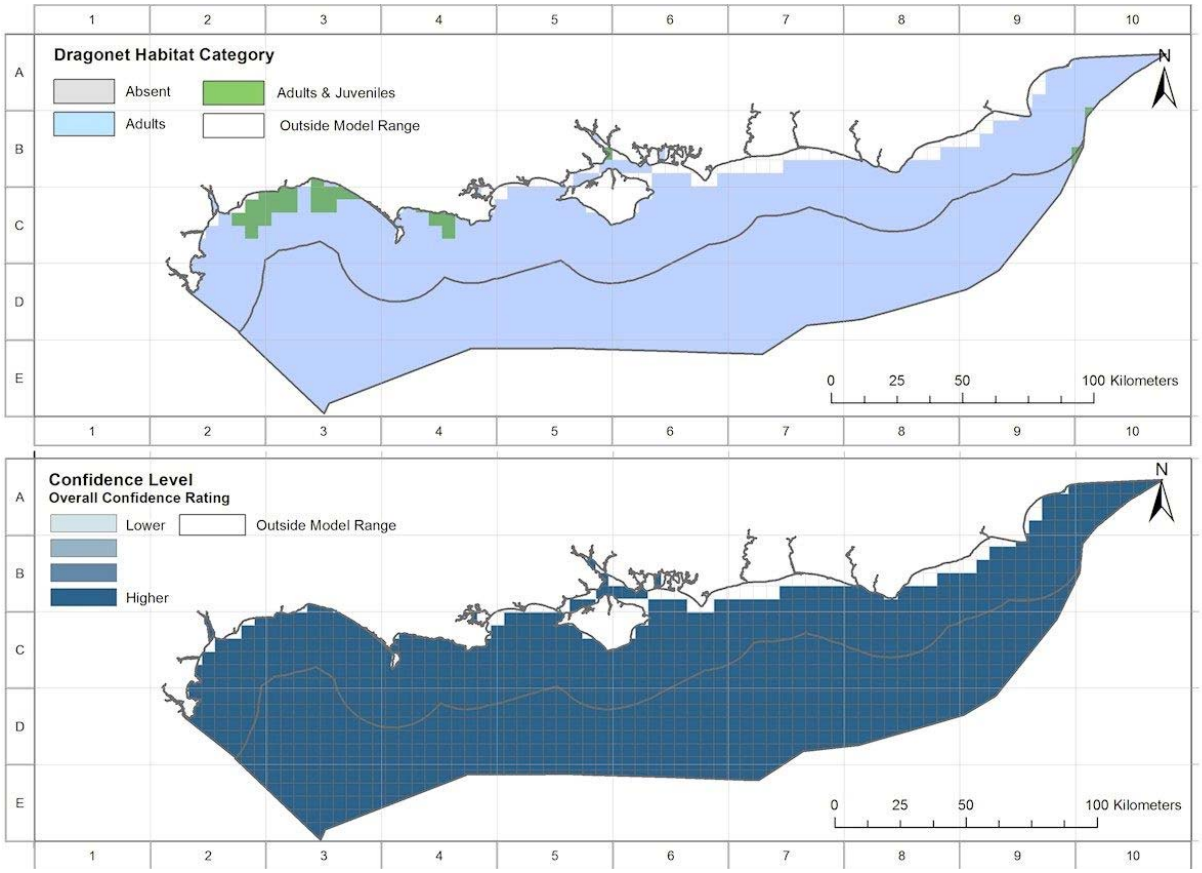
Predicted distribution of red gurnard nursery habitat (probability of presence of suitable habitat)



Overall confidence in the model outputs for red gurnard nursery habitat is 'Moderate-Low'.

5.12 Common dragonet (*Callionymus lyra*) adult foraging habitat

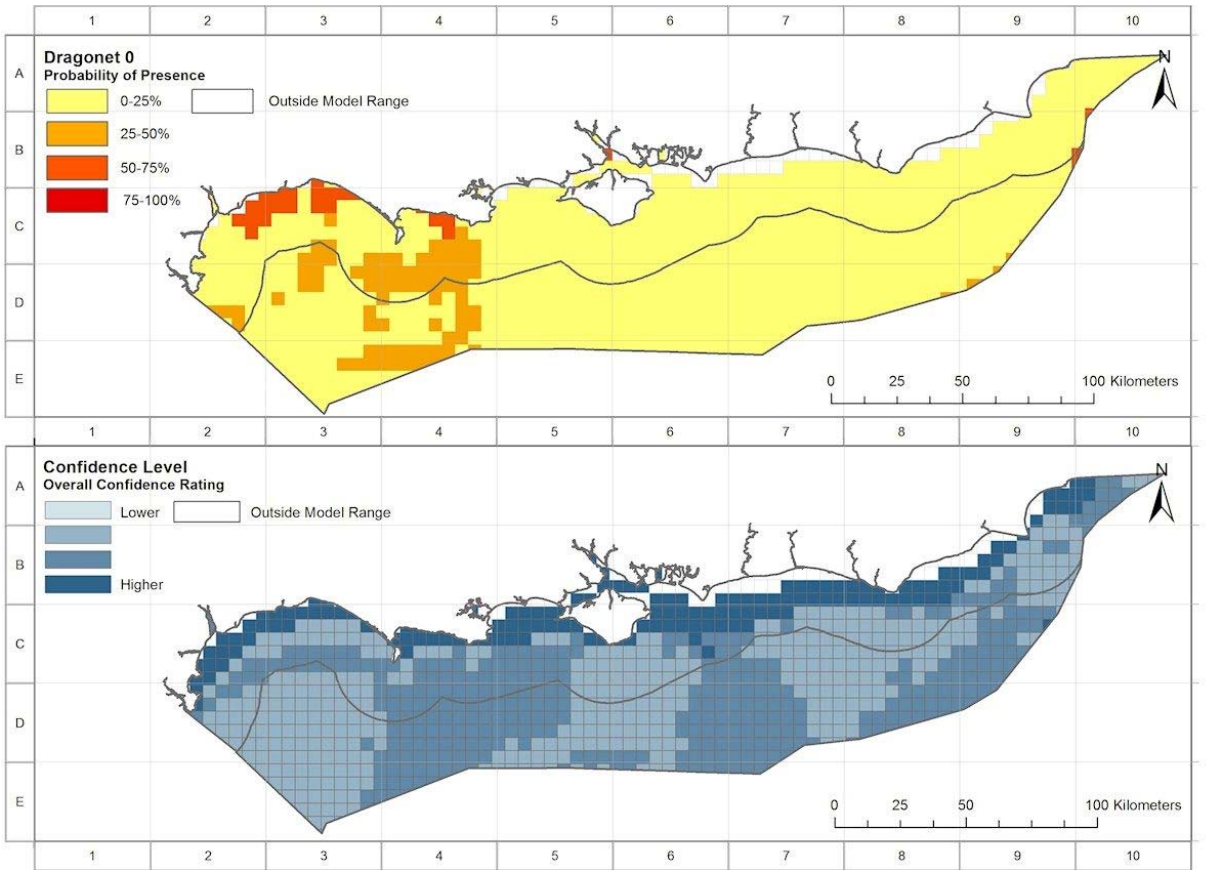
Predicted distribution of adult common dragonet foraging habitat



Overall confidence in the model outputs for common dragonet foraging habitat is 'Low'.

5.13 Common dragonet (*Callionymus lyra*) nursery habitat

Predicted distribution of common dragonet nursery habitat (probability of presence of suitable habitat)



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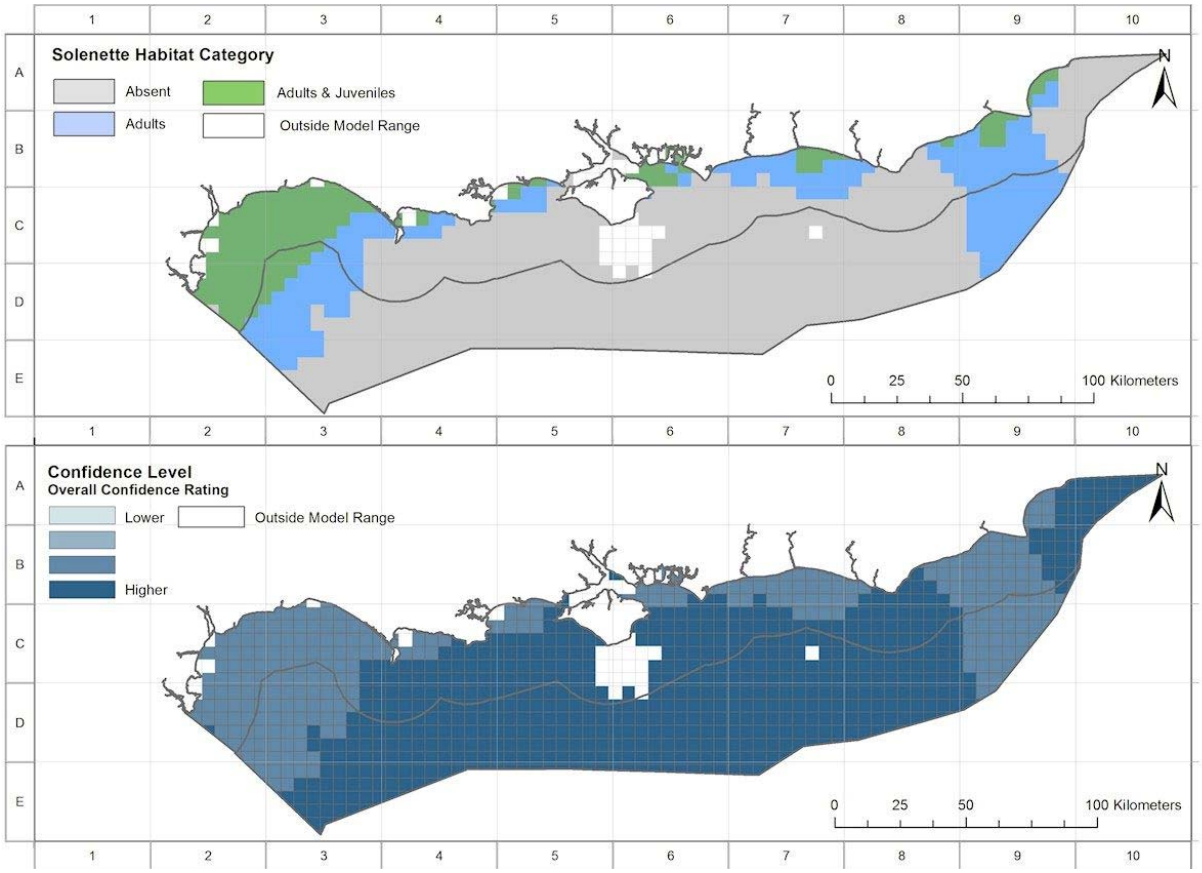
Overall confidence in the model outputs for common dragonet nursery habitat is 'Low'.

5.14 Solenette (*Buglossidium luteum*) adult foraging habitat

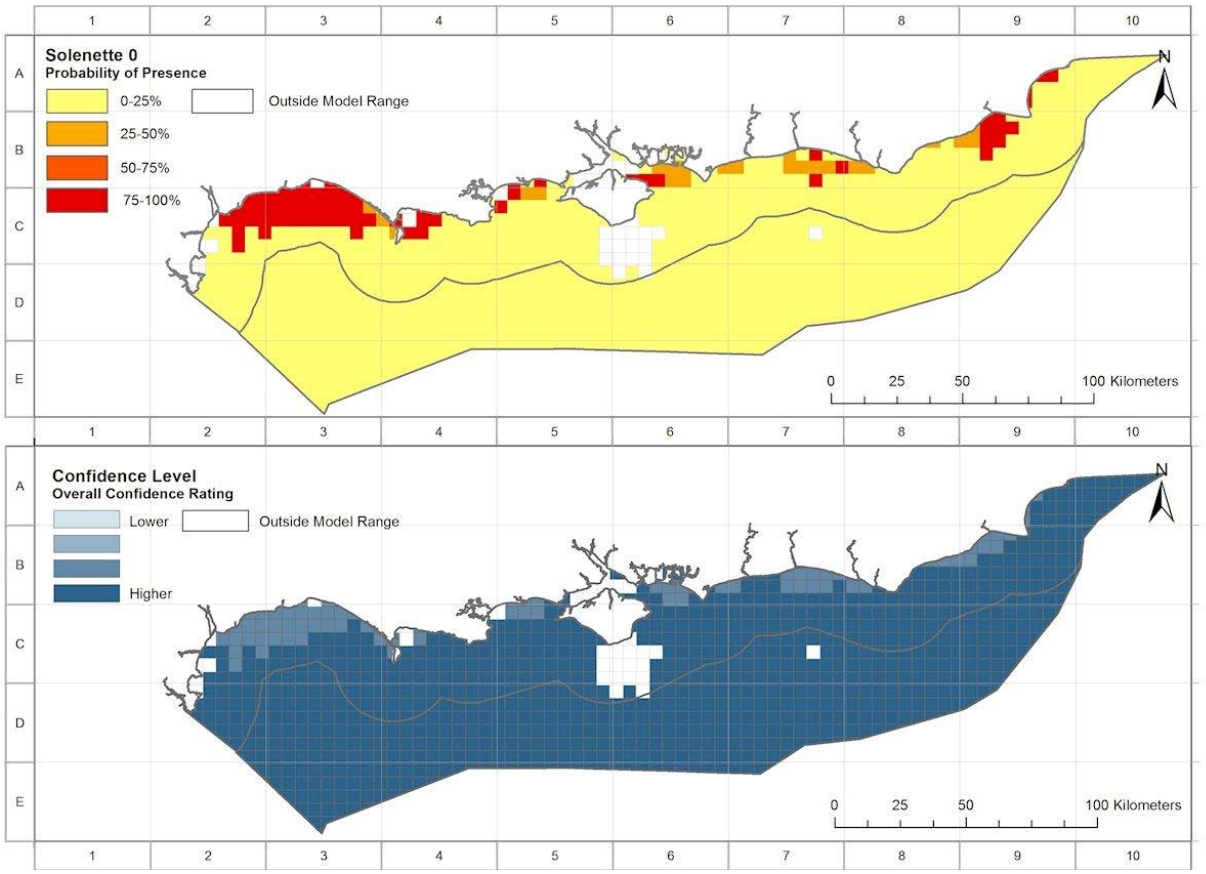
Predicted distribution of adult solenette foraging habitat



Overall confidence in the model outputs for solonette foraging habitat is 'Low'.

5.15 Solenette (*Buglossidium luteum*) nursery habitat

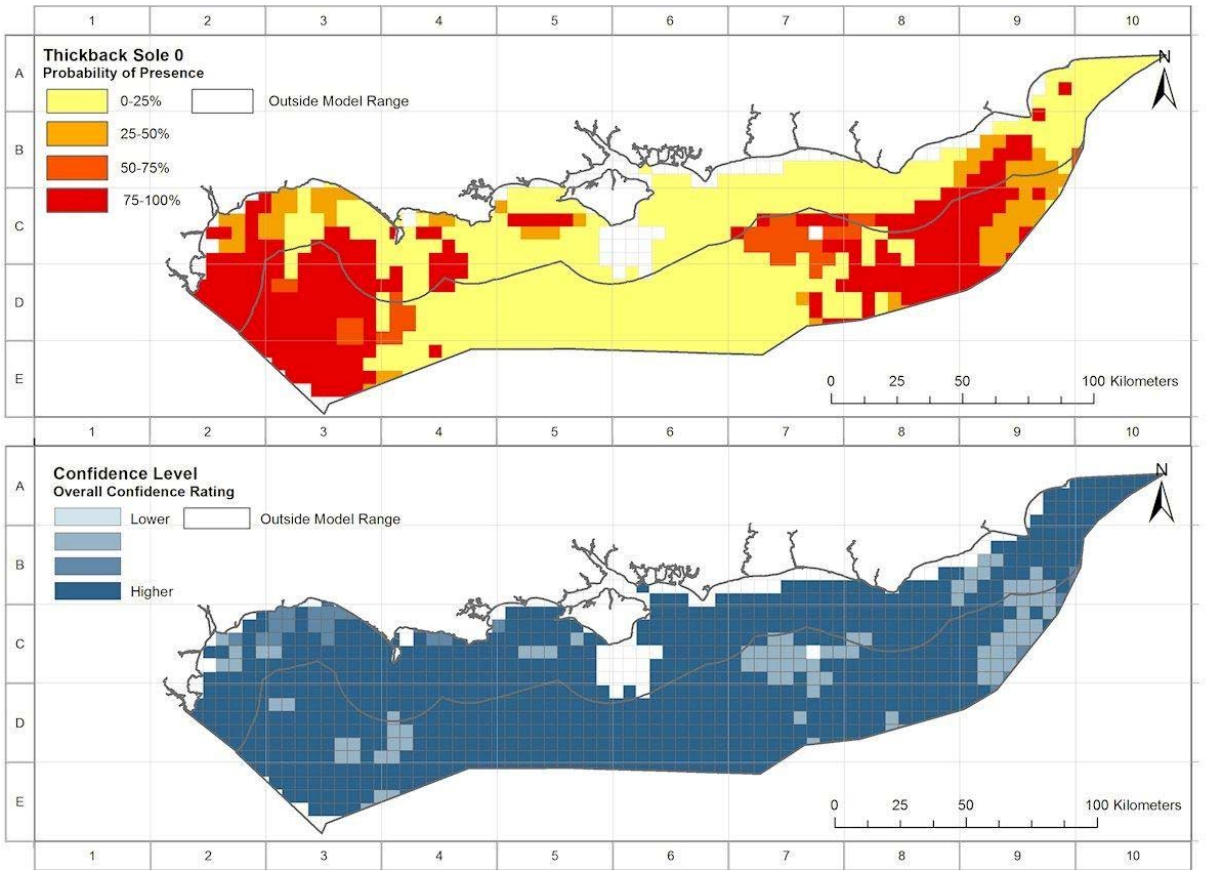
Predicted distribution of solenette nursery habitat (probability of presence of suitable habitat)



Overall confidence in the model outputs for solonette nursery habitat is 'Low'.

5.16 Thickback sole (*Microchirus variegatus*) nursery habitat

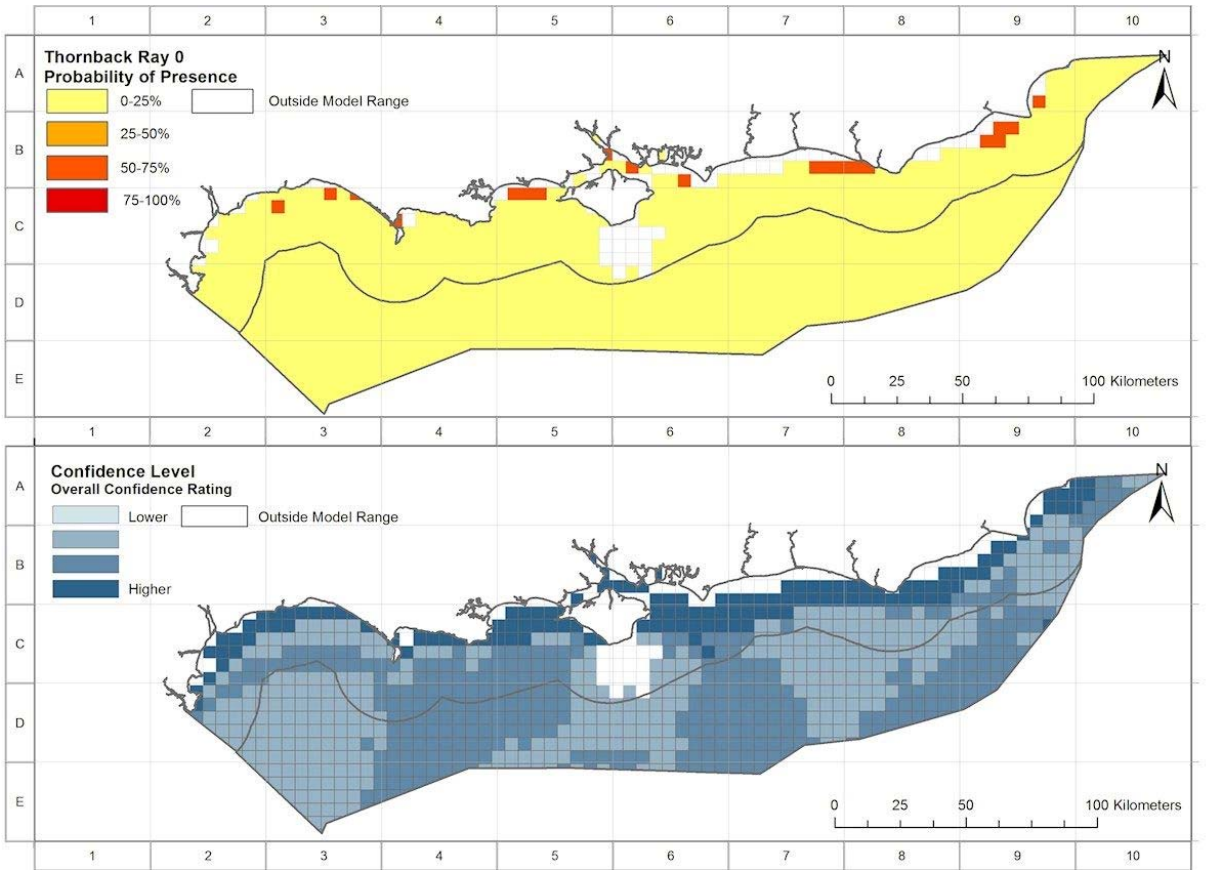
Predicted distribution of thickback sole nursery habitat (probability of presence of suitable habitat)



Overall confidence in the model outputs for thickback sole nursery habitat is 'Low'.

5.17 Thornback ray (*Raja clavata*) nursery habitat

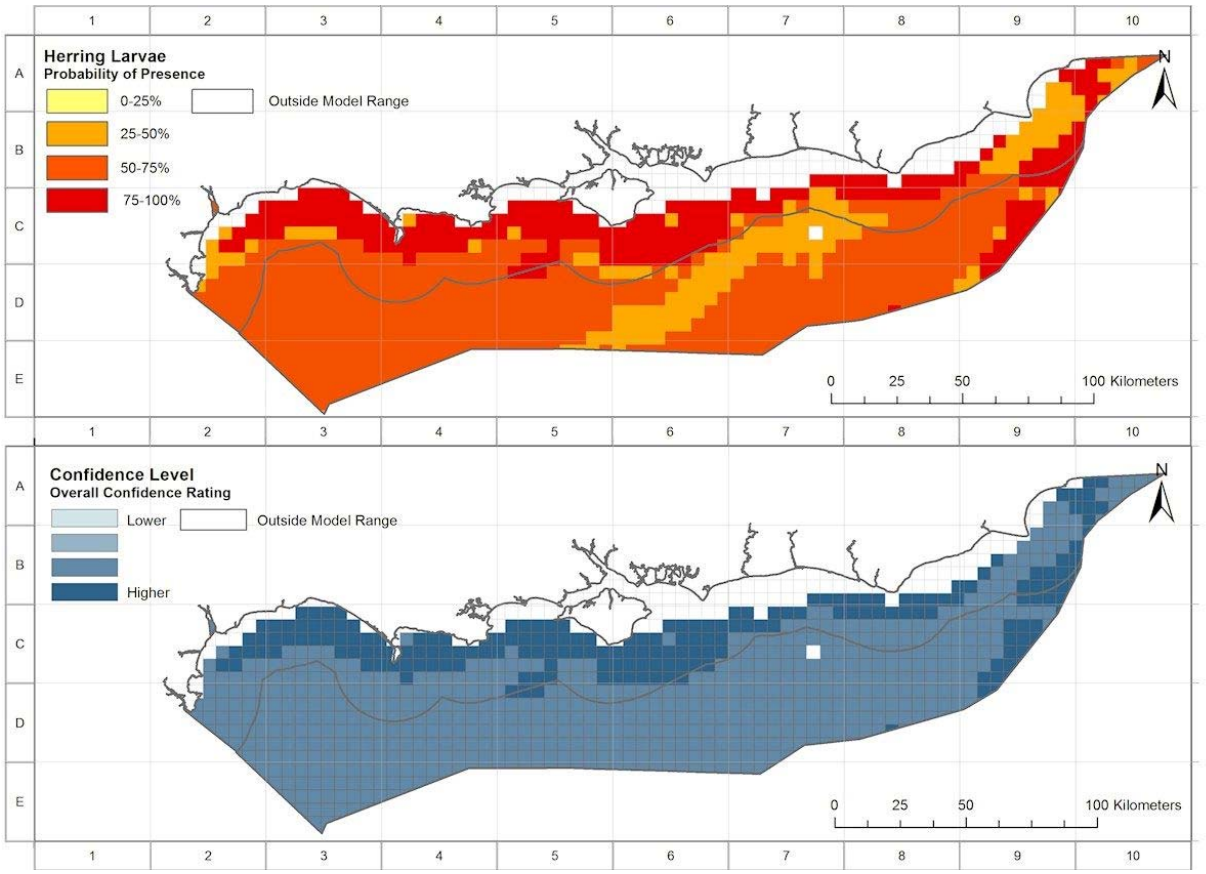
Predicted distribution of thornback ray nursery habitat (probability of presence of suitable habitat)



Overall confidence in the model outputs for thornback ray nursery habitat is 'Low'.

5.18 Herring (*Clupea harengus*) spawning habitat

Predicted distribution of herring spawning habitat (probability of presence of suitable habitat)



Overall confidence in the model outputs for herring spawning habitat is 'Moderate'.

6. Datasets used

6.1 Fish data

A brief summary of the general data requirements/criteria that were identified and used to screen fish data for the project is provided (below):
- data from scientific fish surveys using standard fishing methods and including species catches (CPUE), fish size (length), information on the sampling method and strategy (e.g. gear, seasonality) and associated environmental data recorded during survey (e.g. depth, temperature, salinity)
- data availability for the species selected in the project
- distribution of fishing stations within the South Inshore and Offshore Marine Plan areas, and, if possible, in the wider English Channel
- data availability for the period 2000-2012
- information available on survey methods and design
- comparability of data from different datasets, based upon the use of similar survey strategies (e.g. gear, seasonality).

The following table summarises the fish data that have been collated by the project and indicate which data have been used in the modelling process.

Fish data	Source	Survey/data information	Used for model calibration
UK Eastern English Channel Beam Trawl Survey (BTS)	ICES, online fish trawl surveys database (DATRAS) (public access)	Survey series starting in 1989 and ongoing, carried out by Cefas. Fishing during July/August (Quarter 3) over an allocated area of the Southern North Sea and Eastern English Channel using a standard grid. Station, catch, length (all species) and biological data (selected species) for each of the annual surveys covering the Southern North Sea and Eastern English Channel using research vessels and 4m beam trawl in support of EU data regulations and as part of an ICES funded research program. The primary aim was to assess the relative abundance of prerecruit plaice and sole in ICES Division VIId (with extension to southern North Sea in 1995); consequently most of the sampling is concentrated in areas that are nursery grounds for these species. Additional aims include collection of water temperature and salinity and acoustic data. (Data 2000-2012 within English Channel: N=852)	Yes

Fish data	Source	Survey/data information	Used for model calibration
ICES International Herring Larval Survey (IHLS)	ICES, online fish eggs and larvae database (public access)	Survey series starting in 1967 and ongoing, with combined effort of different countries (UK, France, Germany, Netherlands), as part of an ICES funded research programme. Surveys carried out in specific periods and areas, following autumn and winter spawning activity of herring from north to south (December/January in the English Channel), with double oblique hauls of high-speed plankton sampler deployed on a fixed stations grid from research vessels. Data on herring larvae CPUE (individuals per square meter) per haul per length class (small, medium, large larvae), sampling methods (e.g., gear type, hauling duration) and environmental conditions measured during sampling (e.g., depth, water temperature, salinity). The main purpose of the international herring larval surveys (IHLS) programme is to provide quantitative estimates of herring larval abundance, which are used as a relative index of changes of the herring spawning-stock biomass in the assessment. (Data 2000-2011 within English Channel: N=1503)	Yes
ICES North Sea Cod and Plaice Egg Surveys in the North Sea (WGEGGS)	ICES, online fish eggs and larvae database (public access)	Survey series conducted in winter (December/January) 2003/04 and 2008/09, with combined effort of different countries (France, Germany, Netherlands), as part of an ICES funded research programme. Use of different sampling strategies (e.g., double oblique hauls of high-speed plankton sampler, surface sampling with continuous underway fish egg sampler) Station, egg abundance (eggs per haul per species), egg stage (all species) and length (selected species) data for each of the annual surveys covering the North Sea, down to Eastern English Channel using research vessels and different sampling gears. The database contains also the haul information data, position, time, duration, filtered water volume, depth, temperature and salinity. The surveys were originally directed at cod and plaice, but also supply data of other winter spawning North Sea fish. (Data 2003/4 and 2008/09 within English Channel: N=172 with high-speed plankton sampler 280um mesh; N=93 (Jan 2009 only) with continuous underway fish egg sampler)	Yes
French groundfish survey in the Eastern English Channel (FR_CGFS)	Ifremer	Survey series Survey series starting in 1989 and ongoing (October, Quarter 4), carried out by Ifremer using GOV trawler. Surveys as part of the ICES programme of International Bottom Trawl Surveys in the Western and Southern Areas (WS-IBTS). These surveys aim to provide consistent and standardized data for examining spatial and temporal changes in the distribution and relative abundance of fish and fish assemblages and of the biological parameters of commercial fish species for stock assessment purposes. Fish CPUE per haul per species per length class. (Data 2000-2010 within English Channel: N=1111)	No (no complete data obtained)

Fish data	Source	Survey/data information	Used for model calibration
Cefas Southern North Sea and English Channel Sole Egg Survey	Cefas	Four cruises were undertaken in 1991 (Spring) collecting 70-80 samples to estimate the spawning stock biomass of the sole (*Solea solea*) in the English Channel and southern North Sea. Abundance / density of fish eggs and fish larvae from plankton tows. Eggs from sole assigned to developmental stages. Associated environmental data (temperature salinity).	No (time constraints; no data after 2000)
National Fish Population Dataset (inshore fish data)	Environment Agency	Collation of data obtained by the EA between 2004 and 2012 from different fish surveys of inshore/estuarine water bodies (Adur, Arun, Cuckmere, Dart, Exe, Lime Bay West, Pool Harbour, Rother, Southampton Water) for WFD assessment purposes. Surveys combine different methods (e.g., beam trawls, fyke nets, otter trawls, and seine nets) and sampling months (March to December). Station, catch (counts), length for each survey. Additional information on sampling event (gear used, date, effort, the latter not recorded for all data and with inconsistencies) (Data 2000-2010 within English Channel: N=730)	No (time constraints; non comparable data (multiple methods/strategies) , missing/inconsistent data on sampling effort)
UK South West Beam Trawl Survey (Q1SW)	Cefas	Survey series starting in 2006 and ongoing, carried out by Cefas. Fishing during March (Quarter 1) over an allocated area (with random-stratified design) covering the ICES Division VII e-h (including Western English Channel) using two 4m beam trawls (with different mesh size). Station, catch, length and biological data for each of the annual surveys in support of EU data regulations and as part of an ICES funded research program. (Data 2006-2013 within English Channel: N=1037)	No (time constraints; non comparable catch data with those from BTS in Eastern English Channel (different methods and season))
Cefas Young Fish Surveys in South Coast areas	Cefas	Survey series carried out between 1981 and 2006 by Cefas. Fishing inshore with 2m scientific beam trawl (with 4mm mesh liner) in September each year. Surveys aim to provide indices of abundance of small dermersal fish, in particular juvenile 0-group and 1-group plaice and sole, prior to their recruitment to the fishery. The data is in support of the EU Data Collection Regulation. Station, catch, length data for each of the annual surveys. (Data 2000-2006 within English Channel: N=496)	No (time constraints; non comparable catch data with those from BTS in Eastern English Channel (different methods and season))
Cefas Small Pelagic Fish Western Channel and Celtic Sea plankton survey (PELTIC11)	Cefas	Cefas surveys in the Western Channel and the Celtic Sea targeting small pelagic fish. Surveys in May/June 2011, using multiple methods (sandeel trawl, otter trawl, rosette sampler, drop nets, high speed manta trawl, sounders). Station, catch, length and biological data, as well as associated oceanographic data. (Data 2011 within English Channel: N=56)	No (time constraints)

6.2 Environmental data

A brief summary of the general data requirements/criteria that were identified and used to screen environmental data for the project is provided (below):

- data availability for the main environmental variables considered relevant to fish species (including depth, sediment type, water temperature, salinity, hydrodynamic

conditions);
- full spatial coverage of the South Inshore and Offshore Marine Plan areas, and, if possible, of the wider area where fish survey stations are located;
- data layers at a spatial resolution equal or higher than the spatial resolution used in the project (5 km x 5 km);
- (for variables showing a marked seasonal and inter-annual variability, e.g. oceanographic data such as water temperature) availability of data layers for different seasons and years, covering the temporal extent/resolution of the specific fish survey dataset.

The following tables summarise:
A) The environmental data layers that have been collated by the project and used to obtain predictor variables in the analyses.
B) The environmental variables obtained as potential predictors of essential fish habitat distribution.

A)

Data theme	Data layer (Source)	Description
Elevation and bathymetry	Bathymetry (EMODnet)	For each maritime region bathymetric survey data and aggregated bathymetry data sets have been collated from public and private organizations. These have been processed and quality controlled and used to produce a regional Digital Terrain Model (DTM) with a grid size of .25 minute * .25 minute. The DTM values have been determined from the combination of bathymetric survey data (high resolution data sets from single and multibeam surveys), composite data sets produced and delivered by a number of external data providers such as Hydrographic Offices derived from their internal bathymetric database and based upon historic surveys, and GEBCO 30" gridded data, used to complete area coverage in case there are no survey data or composite data sets available to the partners.
Habitats and biotopes - substratum	Seabed substratum type (EMODnet for EUSeaMap)	The current map is collated from more than 200 separate sea-bed substrate maps provided by different partners (based on sediment sampling, multibeam echosounder, Side Scan Sonar, bathymetric and seismic surveys). Each partner harmonised their available sea-bed substrate data according to a common classification scheme (modified Folk triangle). Data are provided at a 1:1 million scale (the smallest cartographic unit (polygon) on the map being about 4 km2).

Data theme	Data layer (Source)	Description
Habitats and biotopes - substratum	JNCC EuSeaMap North and Celtic Seas Energy data layers (EUSeaMap)	Under a specific contract for the EUSeaMap project, energy layers were produced for the North and Celtic seas. Energy layers are built using data from National Oceanographic Centre (NOC) wave (ProWAM at a resolution of 12.5km) and current models (the CS20, CS3 and NEA models at resolutions of 1.8km, 10km and 35km respectively). These were all processed to populate a 1km resolution grid, with a high (~300m) bespoke resolution DHI Spectral Wave model used to augment the coastal areas where the ProWAM model resolution was inadequate. Data cover the EU Continental Shelf with variable resolution (0.1 to 35 kilometres). Wave and current data were combined to produce the input energy layer for the EUSeaMap model after classification into energy categories. No confidence estimates are available for the original data layers, but uncertainty in the class boundaries was assessed.
Habitats and biotopes - substratum	Habitats Directive Annex 1 Reefs (JNCC)	This is a collation of all data identifying surveyed Annex I reefs in UK waters out to the edge of the UK continental shelf. Data sources include Natural England, Countryside Council for Wales, Scottish Natural Heritage, Joint Nature Conservation Committee, British Geological Survey and National Oceangraphy Centre It can be displayed with "UK Not Reefs v1 2011", which shows area that are not reef in UK waters.
Habitats and Biotopes - water column	Marine Water Column Features (JNCC)	This dataset describes aspects of the water column over the UKCS. 4 shapefiles, one for each season (Autumn, Winter, Spring, and Summer) are given. It describes stratification and mixing of water types.
Habitats and Biotopes - water column	Global Ocean OSTIA Sea Surface Temperature and Sea Ice analysis REPROCESSED (1985-2007) (EU project My Ocean)	The Operational Sea Surface Temperature and Sea Ice Analysis (OSTIA) global Sea Surface Temperature Reanalysis product provides daily gap-free maps of sea surface temperature (referred to as an L4 product) at 0.05deg.x 0.05deg. horizontal resolution, using in-situ and satellite data from infra-red radiometers. The OSTIA system is run by the UK Met Office. The OSTIA reanalysis uses satellite data provided by the Pathfinder AVHRR project and reprocessed (A)ATSR data together with in-situ observations from the ICOADS data-set, to determine the sea surface temperature. It also uses reprocessed sea-ice concentration data from the EUMETSAT OSI-SAF. The reanalysis data is available from 1985-2007, providing full time series processed consistently with up-to-date knowledge on satellite sensor calibration, characterization and attitude, complete (as far as possible) ancillary data sets, latest versions of models and algorithms. The analysis product has been validated through calculation of mean and RMS statistics of observation-minus-background and observation-minus-analysis. Inter-comparisons with other historical data-sets, e.g. Reynolds OI, HadISST, have been carried out.

Data theme	Data layer (Source)	Description
Habitats and Biotopes - water column	Pan European Seas, Ocean Optics Products (monthly average) Reprocessed (1997-2010) (EU project My Ocean)	Ocean Colour "Optics" products are derived from remote sensing (MODIS-Aqua and SeaWIFS sensors). The spectral variations in the light leaving the water surface are related to inherent optical properties (IOPs), including phytoplankton absorption coefficient (APH). These IOPs can be interpreted in terms of concentrations of optically-significant constituents in the water. Corrections to remove the atmospheric contribution are applied and validation with in situ data has been carried out. The reprocessed data layer covers the period 1997-2010, providing full time series processed consistently with up-to-date knowledge on satellite sensor calibration, characterization and attitude, complete (as far as possible) ancillary data sets, latest versions of models and algorithms. Indication of a possible update is given, but there is no commitment that this will actually happen. Data are provided at a high resolution (2km).

B)

Variable	Theme	Type	description	Source	Predictor for fish data
WDepth	bathymetry	continuous	**Water depth**_mean depth (m below surface) calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation	EMODnet (derived)	WGEGGS
			Water depth recorded during fish sampling (for model calibration only)	Fish survey data	BTS, IHLS
DomMix	water column, mixing type	categorical	**Type of mixing of the water column**_dominant type of mixing calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation; Following types are included: 1 (a) = well-mixed ROFI (Region of Freshwater Influence); 2 (b) = well-mixed shelf water; 3 (c) = weakly stratified ROFI; 4 (d) = weakly stratified shelf water. Seasonal value matching seasonality of fish data (Summer - BTS; Winter - IHLS and WGEGGS) This variable can be considered a proxy for salinity (no salinity data layers could be obtained), with also information on the mixing of water masses of marine and continental origin.	JNCC, Marine water column features (Seasonal)	BTS, IHLS, WGEGGS

Variable	Theme	Type	description	Source	Predictor for fish data
SST	water column, SST	continuous	**Sea surface temperature**, C degrees_average value of mean seasonal temperature calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation	EU project My Ocean (derived)	BTS, IHLS, WGEGGS
APH	water column, APH	continuous	**APH**_ monthly mean absorption coefficient due to phytoplankton at 443 nm (expressed in m^{-1}) _mean value of max APH calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation	EU project My Ocean (derived)	IHLS, WGEGGS
TidE	substratum, energy	continuous	**Tidal energy**_Mean tidal energy (N/m2) calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation	EUSeaMap (derived)	BTS, IHLS, WGEGGS
WavE	substratum, energy	continuous	**Wave energy**_Mean wave energy (N/m2) calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation	EUSeaMap (derived)	BTS, IHLS, WGEGGS
M-sM	substratum, type	continuous	**Mud to sandy mud**_Proportion of area (0-1) within 2.5km from the station (mean location)	EMODnet for EUSeaMap (derived)	BTS, IHLS, WGEGGS
S-mS	substratum, type	continuous	**Sand to muddy sand**_Proportion of area (0-1) calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation	EMODnet for EUSeaMap (derived)	BTS, IHLS, WGEGGS
Cs	substratum, type	continuous	**Coarse sediment**_Proportion of area (0-1) calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation	EMODnet for EUSeaMap (derived)	BTS, IHLS, WGEGGS
Mx	substratum, type	continuous	**Mixed sediment**_Proportion of area (0-1) calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation	EMODnet for EUSeaMap (derived)	BTS, IHLS, WGEGGS
R	substratum, type	continuous	**Rock or other hard substrata**_Proportion of area (0-1) calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid	EMODnet for EUSeaMap (derived)	BTS, IHLS, WGEGGS

Variable	Theme	Type	description	Source	Predictor for fish data
			cell for model implementation		
DomSubst	substratum, type	categorical	**Dominant substratum type** calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation: 1=M-sM, 2=S-mS, 3=Cs, 4=Mx, 5=R (substratum type codes as per variables above)	EMODnet for EUSeaMap (derived)	BTS, IHLS, WGEGGS
Reef	substratum, type	categorical	**Presence-absence of reef** calculated within 2.5km from the fish survey station (mean location), for model calibration, or within 5km grid cell for model implementation Reef presence category takes into account also **level of confidence** in the reef map: 0 (a) =no reef 1 (b) =reef potentially present (lower confidence) 2 (d)=reef present	JNCC, Habitats Directive Annex 1 Reefs	BTS, IHLS, WGEGGS