SYMPHONY METADATA

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Swedish Agency
for Marine and
Water Management

This document describes the Geodata used as input data for the 'Symphony tool' – a multicriteria analysis tool for modeling cumulative environmental impacts in the Swedish Marine Environment. The Symphony tool is used by the Swedish Agency for Marine and Water Management (SwAM) for informing the development of national marine spatial plans in Swedish waters. This document was prepared by the Geological Survey of Sweden for SwAM and is based on metadata provided by the data sources and data authors.

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Metadata Template

The title of the data (English).	
Swedish Name	The title of the dataset (Swedish).
Symphony Theme	The thematic group used to classify this data type.
Symphony Category	The data type category - i.e. 'Pressure' or 'Ecosystem' for Symphony input data or 'Source' for reference data.
Symphony Data Type	The type of data. This could be 'Normalised', 'Non-normalised' or 'Source' Data.
Date Created	Reference date detailing the date of creation. Dates may be specified with different precision depending on the update cycle (more regular updates require more precision in the date). Dates are presented in the format: YYYY-MM-DD, hh: mm: ss
Status	Completed
Data Format	Free text used to define the format and if applicable the format version that the data is supplied in.
Temporal Period	If the geodata describes and covers a certain temporal period, this should be defined. The temporal period is usually back in time but if the resource is about planning and forecasting it could also be in the future. Specified as two time stamps in the standard date time format with sufficient accuracy. Use the time-date format below with sufficient accuracy. YYYY-MM-DDThh: mm: ss
Resource Type	Identifies the type of resource as one of the following: "dataset", "data series" or "service"
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The summary describes what kind of "objects" are registered and the key characteristics for these items. It describes some of the characteristics of the data and some general limitations of the information relating to the validity and quality of the data.

	The summary also describes the purpose of the resource and should be written in way that can be understood by non-experts. Note that general background information or methodological information are not included - this is detailed in the 'lineage' element.
Summary (Swedish)	Sammanfattningen beskriver vilken typ av objekt som är registrerade och nyckelegenskaper för dessa objekt. Den beskriver några egenskaper hos använt data och vissa generella begränsningar av informationen relaterat till validitet och kvalitet av data. Sammanfattningen beskriver också syftet med resursen och bör utformas så att den kan förstås av icke-experter. Observera att generell bakgrundsinformation och metodinformation inte ska inkluderas här utan återges i ”Tillkomsthistorik”.
Lineage	This is a very important element which includes information about the source data and process used to create the data resource and assess it's quality. The lineage element should detail aspects such as how the data was sourced / collected and what tools and systems were used and if the data originated from a single source or multiple sources. It should provide a description of the source data including the scale(s) media type(s) and the date(s) and if the data were internal or external to the producer organisation. It may also include known limitations - for example with the field collection approach for producing the product. This element should also detail the process for creating the data and where describing the process this should include the processing steps performed on the source data to arrive at the final dataset. The history of the processing steps generally includes the data capture method(s), any intermediate processing method(s) and the method(s) used to generate the final product. It may include details of the [software/hardware] tools were used to process the data to create the resource and any quality control procedures undertaken during data collection and processing and any standards followed. This should be a concise report - full details of the processing steps taken to produce the data layers for Symphony are captured in a data processing log.
Limitations for use in Symphony: This field describes limitations of the data specific to use in the Symphony application taking into account the desired resolution of the data (250m grid) and the use of the resource for multicriteria analysis of cumulative impacts in a national marine planning context.	

Recommendations for data improvement: Based on the limitations identified this element outlines some proposals for data strengthening and improvement. Where possible this element outlines source data dependencies and issues (e.g. access to higher resolution data) it may for example identify if additional fieldwork or desk based analysis is required and where collaboration would be beneficial.	
Data authoring organisation: Contact organisation for the data author.	
Contact organisation: Contact organisation for the data owner.	
Data Author Contact: Email address for the data author.	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	This indicates the main INSPIRE topic categories related to the data resource (ISO19115 compliant). http://inspire.ec.europa.eu/metadata-codelist/TopicCategory
INSPIRE theme	INSPIRE theme keywords selected from: http://www.eionet.europa.eu/gemet/inspire_themes GEMET - INSPIRE themes, version 1.0, 2008-06-01
GEMET keywords	GEMET Concept keywords selected from: http://www.eionet.europa.eu/gemet/en/alphabetic/ GEMET - Concepts, version 4.0.1, 28 Jun 2017
Access Use Restrictions	One of the following values must be entered: "Copyright / copyright" "Patent" "Pending patent" "Trademark" "License" "Intellectual" "limited / restricted" "Other constraints" "No restrictions" "Unknown restrictions"
Use Limitations	This text describes the specific limitations on the usability of the data and could for example highlight use cases where the data is expressly not suitable.

	"no conditions apply", "conditions unknown" or free text - this may for example include a link to licence conditions.
Other Restrictions	This free text element is used to describe restrictions on use or access in more detail.
Map Acknowledgement	This is a summary of data sources for use in an acknowledgement statement (for inclusion on map products).
Security Classification	Description of the level of protection required chosen from the following: "no protection required" - No or negligible damage occurs with open access to the resource. "limited protection required - available to qualified personnel" - Slight damage caused by unauthorized access to the resource "limited protection required - available to qualified personnel" - Not insignificant damage caused by unauthorized access to the resource. "high protection required - available to qualified personnel" - Significant damage caused by unauthorized access to the resource. "Very high security requirement available to qualified personnel" - Note: Serious damage caused by unauthorized access to the resource. "
Maintenance	This should indicate how often the updated resource becomes available to the user. "Continuous", "Daily", "Weekly", "Every 14 days", "Monthly", "Quarterly", "Semi-annually", "Annually", "If necessary", "Irregular", "Not planned", "Unknown"
Metadata Date	This describes the last date the metadata was updated. If the metadata has not been updated it should give the date on which it was created. This date is provided in the format compatible with ISO 8601:2011 (i.e.: YYYY-MM-DD, YYYY-MM or YYYY)
Metadata Organisation	Provides a description of an organisation who has the responsibility for maintaining the metadata.
Metadata Contact	Email contact for the person who has responsibility for maintaining the metadata.

Swedish Agency for Marine and Water Management

Ecosystem components

Coastal birds	
Swedish Name	Kustfågel
Symphony Theme	Birds
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-03-21
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2010 2017
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster data intends to show bird density in coastal areas around the Swedish coast. The source data is voluntary observational statistics exported to an excel file from SLU Artdatabanken (species database) via Analysisportal.se and these data have been converted to density data (average numbers of individual birds reported between May and June within 5km of each grid cell over the period 2010-2017). These data are based on voluntary reporting and are therefore subject to observer bias. Areas without sightings are not reported and areas where many reports are made may be visited by multiple observers. As a consequence these data should be treated cautiously. A cell value of zero represents no reported observation of birds a cell value of 100 represents the maximum observed species diversity at the Beijershamn nature reserve in Öland. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area

	scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa fågeltäthet i kustområden kring den svenska kusten. Källdata är frivilligt inrapporterad observationsstatistik från SLU:s Artdatabanken via Analysisportal.se som exporterats till en Excel-fil, dessa data har konverterats till täthetsdata (medelvärde av individuella fåglar rapporterade mellan maj och juni inom 5 km från varje gridcell, under perioden 2010-2017). Denna data är baserat på frivillig rapportering och kan därför variera i kontinuitet. Områden utan observationer rapporteras inte och områden där många rapporter gjorts kan ha besökt av flera observatörer. Följaktligen bör dessa data behandlas med försiktighet. Ett cellvärde av 0 motsvarar inga rapporterade fågelobservationer, ett cellvärde av 100 motsvarar den maximala observerade fågeltätheten vid Beijershamns naturreservat på Öland. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data is based on reported observations of birds (extract from Artdatabanken, SLU via Analysisportal.se). Species reported in this data are rödspov, tordmule, kärrsnäppa (underarten schinzii), vitkindad gås, skärfläcka, fisktärna, silvertärna, sillgrissla, tobisgrissla, skräntärna, silltrut, svärta, kustlabb, toppskarv, tretåig mås, stjärtand, årta, roskarl, brunand, bergand, brushane, ejder, småtärna, kentsk tärna och gråtrut. Data were extracted for the same period (May 25 to July 20) for all years between 2010 and 2017. The number of observed individuals was summed per grid cell at a resolution of 1 x 1km. The average value per 5 km was then calculated. The values in the screen were normalized against the maximum value of observations in the Beijershamn nature reserve (off the coast of Öland) to reduce the impact of over reporting in certain areas.

Limitations for use in Symphony: The source data in this analysis is based on voluntary observational reporting by individuals and therefore data varies in continuity. It is likely that more observations are reported where more people are present (i.e. near to urban centres) or in well known bird watching areas.	
Recommendations for data improvement: Determine if null data are recorded (i.e. where observations are made but no species are determined) and if observation density data are available. It might be possible to correct observer bias if such data exist (i.e. map survey intensity and divide observation reports by the number of observations).	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, bird species
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Coastal birds" dataset is a derived from source data provided by Lund University. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	LU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Seabird coastal wintering

Swedish Name	Sjöfågel övervintringsområde kust
Symphony Theme	Birds
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2016-10-09
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show important areas for four seabird species in Swedish coastal waters during the winter period. This raster is a spatial model which shows aggregated species density (relative to the total species population size) of Velvet Scoter, Long tailed duck, Common Scoter and Common Eider. It is based on source data in the form of observational presence & abundance data from a national aerial surveys undertaken in 2015 for the International Waterfowl Census supplied by Lund University. The highest occurring value between the species has been attributed to each individual cell and a linear transformation was applied so that a cell value of 0 is equivalent to zero abundance (or no data) and a cell value of 100 is equivalent to the maximum [relative] density for any one of these five species. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa viktiga områden för fyra sjöfågelarter i svenska kustvatten under vinterperioden. Detta rasterskikt är en rumslig modell vilken visar aggregerad artdensitet (relativt till populationens totala storlek) av svärta, alfågel, sjöorre och ejder. Det är baserat på källdata i form av observerad förekomst- och abundansdata från en nationell flygundersökning från 2015

	för den nationella sjöfågelinventeringen från Lunds universitet. Det högsta förekommande värdet mellan arter har getts till varje enskild cell och en linjär transformation har applicerats så att ett cellvärde av 0 motsvarar ingen abundans (eller ingen data), och ett cellvärde av 100 motsvarar maximal (relativ) densitet för någon av dessa fyra arter. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	National data on four species of seabirds (Velvet Scoter, Long tailed duck, Common Scoter, Common Eider) were sourced from the national seabird inventory (see: ORNIS SVECICA 26: 3-54, 2016) in the form of aerial line-inventories and point inventory data. These were used to calculate proportional population densities for defined inventory sectoral areas. For each species the observed abundance was divided by the survey area sector to produce areal abundance data. This areal abundance layer was then divided by the species' total population to give a proportional value relative to the species as a whole. The total populations used were: Common Eider: 515 000, Common Scoter: 412 000, Long-Tailed Duck: 1 482 000, Velvet Scoter: 373 000. Finally, data for each of the five species were aggregated into a single layer where the highest proportional value from any of these species was attributed to each sector. In order to capture the full spatial range of the seabirds including areas of peripheral importance this aggregated species density dataset was normalised using a transformation (lin100LogxLin01) and rescaled between 0 and 100 in ArcGIS. Consultation on the methodology has taken place between WSP, Lund University and the Swedish Agency for Water and Marine Management.
Limitations for use in Symphony: Note that the model is based on interpolation techniques and it does not predict densities significantly beyond the source data (for example using environmental data to infer distributions to unsurveyed areas). In order to attempt to make the data more conservative (i.e. precautionary) the data has been transformed to emphasise areas which have both core are peripheral importance. This approach might reduce some of the observer bias (by	

increasing the influence of unsurveyed areas) in the interpolation model but the result should be considered to be a conservative estimate of species density.	
Recommendations for data improvement: More advanced modelling could perhaps be undertaken using environmental preference data to predict distribution patterns as per the SOWBAS study from 2011 undertaken for these species offshore.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, bird species
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Seabird coastal wintering" dataset is a derived from source data from the National Seabird Inventory funded by the Swedish Environmental Protection Agency and reported by Leif Nilsson & Frederik Haas from Lund University in ORNIS SVECICA 26:3–54, 2016.. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	LU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Seabird offshore wintering

Swedish Name	Sjöfågel övervintringsområde utsjö
Symphony Theme	Birds
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2016-11-01
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2007 2009
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show important areas for four seabird species in Swedish offshore waters during the winter period. This raster is a spatial model which shows aggregated species density (relative to the total species population size) of Velvet Scoter, Long tailed duck, Common Scoter and Common Eider. It is based on modelled population densities which were produced using environmental data to infer species distributions in unsurveyed areas. These models were based on field surveys undertaken in the Baltic Sea between 2007 and 2009. The highest occurring value between the species has been attributed to each individual cell and a linear transformation was applied so that a cell value of 0 is equivalent to zero abundance (or no data) and a cell value of 100 is equivalent to the maximum [relative] density for any one of these five species. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa viktiga områden för fyra sjöfågelarter i svenska havsvatten under vinterperioden. Detta rasterskikt är en rumslig modell vilken visar aggregerad artdensitet (relativt till populationens totala storlek) av svärta, alfågel, sjöorre och ejder. Det är baserat på modellerad populationsdensitet vilket producerades med

	hjälp av miljödata för att ge upphov till artfördelningar i ej undersökta områden. Dessa modeller baseras på fältundersökningar gjorda i Östersjön mellan 2007 och 2009. Det högsta förekommande värdet mellan arter har getts till varje enskild cell och en linjär transformation har applicerats så att ett cellvärde av 0 motsvarar ingen abundans (eller ingen data), och ett cellvärde av 100 motsvarar maximal (relativ) densitet för någon av dessa fyra arter. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data for the Baltic Sea on four species of wintering seabirds (Velvet Scoter, Long tailed duck, Common Scoter, Common Eider) were sourced in the form of modelled raster data from the SOWBAS database (Status of wintering Waterbird populations in the Baltic Sea) as detailed in the report: Waterbird Populations and Pressures in the Baltic Sea, Nordic Council of Ministers, Copenhagen, TemaNord 2011:550 ISBN 978-92-893-2249-2). The source data are from aerial, shore and ship based surveys undertaken between 2007 and 2009 and these data were modelled (using a two step General Additive Model) to predict the species distribution both inside and outside surveyed areas based on environmental predictor variables. The modelled area is limited to the Baltic Sea. The modelled densities are expressed in number / km2 and these data were normalized against the species total population to give the value per cell relative to the species population as a whole. The total populations used were: Common Eider: 515 000, Common Scoter: 412 000, Long-Tailed Duck: 1 482 000, Velvet Scoter: 373 000. Finally, the relative occurrence of the four species was aggregated where the value of the species with the highest relative occurrence was attributed to each cell. In order to capture the full spatial range of the seabirds including areas of peripheral importance this aggregated species density dataset was normalised using a transformation (lin100LogxLin01) and rescaled between 0 and 100 in ArcGIS.

	Consultation on the methodology has been carried out between the WSP and the Swedish Agency for Water and Marine Management.
Limitations for use in Symphony: This dataset is based on two years of survey data from 2007 and 2009 and as a consequence it is now fairly outdated.	
Recommendations for data improvement: Investment in updating this product with more new input data is recommended. This may also facilitate insight into temporal trends that may further inform spatial policy decisions.	
Data authoring organisation: Swedish Agency for Marine and Water Management	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, bird species
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Seabird offshore wintering" dataset is a derived from SOWBAS data (Status of wintering Waterbird populations in the Baltic Sea) funded Nordic Council of Ministers and utilising survey data from the Swedish Environmental Protection Agency, WWF Sweden, Nordstream AG and The German Federal Agency for Nature Conservation (BfN) as reported in Waterbird Populations and Pressures in the Baltic Sea TemaNord 2011:550. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SEPA, WWF, Nordstream AG, NORDEN SOWBAS, BfN
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01

Swedish Agency for Marine and Water Management

Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Anoxia background

Swedish Name	Syrebristbakgrund
Symphony Theme	Eutrophication
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-12-23
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	1960 2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the predicted risk of anoxia in marine benthic substrates in Sweden coastal and offshore waters. A value of 1 represents a high risk of anoxia (i.e. substrate with < 2 mg/L O2) and a value 0 represents a low risk of anoxia (i.e. substrate with > 6 mg/L O2). The layer is based on analysis and combination of a number of primary data sources. Sediment sample observational data (binary i.e. anoxic or oxic) from the Geological Survey of Sweden (SGU) has been combined with near bottom oxygen concentration measurements from in-water sampling and predicted levels from biochemical modelling from the Swedish Meteorological and Hydrological Institute (SMHI). Open depth data from the Swedish Maritime Administration is used as a spatial predictor, and shoreline complexity from the Swedish Land Survey is used as a predictor variable along the shoreline. Various secondary data sources are also used by SMHI in their biochemical modelling. This data is subject to a range of limitations and should be interpreted as an unvalidated benthic anoxia risk map. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental

	impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad risk för syrebrist i marina bentiska substrat i svenska kust- och havsvatten. Ett värde av 1 motsvarar hög risk för syrebrist (substrat med < 2 mg/L O2), och ett värde av 0 motsvarar låg risk för syrebrist (substrat med > 6 mg/ L O2). Lagret är baserat på analys och en kombination av ett antal primära datakällor. Observationsdata från sedimentprover (binärt dvs. anoxiska eller oxiska) från Sveriges geologiska undersökning (SGU) har kombinerats med mätningar av syrgaskoncentration nära botten vid provtagning i vatten och beräknada nivåer från biokemisk modellering från Sveriges meteorologiska och hydrologiska institut (SMHI). Öppen djupdata från Sjöfartsverket har använts som en rumslig prediktor och kustlinjekomplexitet från Lantmäteriet används som en prediktorvariabel längs kustlinjen. Olika sekundära datakällor används också av SMHI i deras biokemiska modellering. Denna data innehar en rad begränsningar, och bör tolkas som en icke validerad riskkarta över bentisk syrebrist. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Lineage SMHIs source data was provided to SGU in various formats. Measured data on oxygen has been interpolated by SMHI into continuous data layers as part of the Swedish contribution to the Emodnet European Marine Data Network and can be downloaded as NetCDF files http://sextant.ifremer.fr/en/web/emodnet_chemistry/catalogue. In addition predictions of oxygen concentrations based on biochemical modelling were also available for the inshore environment and for the offshore environment for the Baltic, More information on SMHIs modelling can be found here: http://www.smhi.se/en/research/research-departments/oceanography/biogeochemical-modelling-1.31327 . SGU data was sourced from their data archive and covers the period 1993 to 2014. Data detailing anoxic or oxic substrate conditions is determined from visual methods, more details of the data collection method can be found in the combined SGU SMHI report from 2008 http://www.smhi.se/polopoly_fs/1.1975!/oceanografi_95%5B1%5D.pdf The data processing followed the following steps:

	1. Interpolation of SGU samples using an inverse distance weighting algorithm 2. Merging of SMHIs inshore model, offshore model for the Baltic and interpolated measurement data using an overlay approach (mosaic) in the order mentioned. 3. Combination of the SGU interpolation and the SMHI models where overlapping using a Mean Average (assuming equal validity in models) 4. Apply a spatial smoothing filter (mean average over 7km) 5. Adjustment of the model to take into account a trend showing very low anoxia risk in SGU samples in shallow water to 10m (globally) and an increasing risk to 70m in the Baltic Proper. The steps above are described in more detail in a data processing log created by SGU and provided to SWAM. This can be provided on request.

Limitations for use in Symphony:

This dataset is created from models based on water column source data from two different time periods (1993-2014 and 1960-2014) and historical sediment data (1950-2014). There is significant temporal variability (both annual and decadal) in oxygen conditions which are not represented in this data product.

We combine all the available data with the intention of showing maximum spatial extent of annual average sediment anoxia over the range of all input data (1950-2014). The modelled data from SMHI lack spatial resolution inshore so depth is used as a proxy based on a observed trend of increasing sediment anoxia with depth in SGU's sediment records.

Anoxia is also assumed to increase in areas with complex shorelines (due to decreased currents) but there is no data available to confirm this trend.

Recommendations for data improvement:

At present there is insufficient data with the descriptive resolution and spatial precision to produce an reliable (i.e. empirically validated) model of current (or even decadal annual average) sediment anoxia conditions.

SGU now have an oxygen sensor attached to their camera system which is used to sample water column anoxia.

We recommend collection of field sample data detailing oxygen content of the sediment samples along with nutrient and geophysical and geochemical conditions which could lead to a better understanding of the spatial dynamics and therefore enable the production of a spatial models which can use proxies (depth, sediment composition and water column data) to predict benthic conditions and which can be used for model validation.

Autonomous field sampling (i.e. data nodes and landers) is a potential solution to better data as technology improves.

https://viewintotheblue.com/underwater-science-nodes

Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: duncan.hume@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	pollution effect , environmental impact , eutrophication
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Anoxia background" dataset is a derived from source data provided by the Swedish Meteorological and Hydrological Institute (SMHI) and the Geological Survey of Sweden (SGU). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMHI, SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Cod

Swedish Name	Torsk
Symphony Theme	Fish
Symphony Category	Ecosystem

Symphony Data Type	Normalised
Date Created	2016-10-12
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2010 2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the predicted distribution of Cod in Swedish coastal and offshore waters. A cell value of 0 is equivalent to zero abundance and a cell value of 100 is equivalent to high relative abundance. Underlying data are from three sources and consist of modelled data, catch per unit effort data, and catch data (landings) all covering the period 2010-2015. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad distribution av torsk i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar ingen abundans, och ett cellvärde av 100 motsvarar hög relativ abundans. Underlagsdata härrör från tre källor och består av modellerad data, fångst per enhet ”effort data”, och fångstdata (landning) vilka täcker perioden 2010-2015. Denna data skapades som ett data input layer för ’Symphony’ verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna. Notera - ett data prcocessingfel varr identifierades under slutstadiet av dataproduktion. Värdena för torskhabitatet kring Stockholm och Nordöstra Gotland (i synnerhet) är något lägre än vad de borde vara. Detta kommer att åtgärdas i nästa datauppdatering.

Lineage	Data are Cod modelled data from the Baltic Sea, catch per unit effort data from a survey of the West coast and catch data (landings) from commercial fishing in the Gulf of Bothnia. All datasets cover the period 2010-2015. Data processing took the following steps: 1. Sum catch data from commercial fishing and survey data from the West coast within their respective ICES rectangles. 2. Sum Cod models for large and small cod to encompass all cod sizes. 3. Extrapolate data to the coastline in areas that were not covered by the Cod models 4. Normalise rasters. 5. Combine the rasters from the different methods. 6. Adjust to SYMPHONY requirements.
Limitations for use in Symphony: Outside of the Baltic proper ICES source data used in the production of this dataset - these data are generally mapped to the ICES rectangle scale (30x60nm) and as a consequence there is very little information about the spatial variability within these areas.	
Recommendations for data improvement: Predictive modelling of cod using relevant environmental variables may be possible for the entire area of interest. If valid this approach would provide a dataset with a higher descriptive resolution ouside the Baltic.	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: marten.erlandsson@slu.se; ulf.bergstrom@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, fish
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Cod" dataset is a derived from fisheries monitoring data collected by Swedish University of

	Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and from the unpublished doctoral dissertation of Alessandro Orio which restricts use outside of Symphony. . This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Herring

Swedish Name	Sill
Symphony Theme	Fish
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-02-17
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2010 -01-01 2015-12-31
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the predicted distribution of Herring in Swedish marine waters. A cell value of 0 is equivalent to zero abundance and a cell value of 100 is equivalent to high relative abundance. Underlying data are from two sources and consist of acoustic density data (fish/area) and catch data (landings 2010-2015) from

	commercial fishing. The raster provides a good indication of fish distribution for each ICES rectangle however uncertainty is considerably higher for each 250 m cell as the data provides no information on spatial variation within ICES rectangles. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad distribution av sill i svenska havsvatten. Ett cellvärde av 0 motsvarar ingen abundans, och ett cellvärde av 100 motsvarar hög relativ abundans. Underlagsdata härrör från två källor och består av data från akustikstudier (fisk/område) och fångstdata (landning 2010-2015) från kommersiellt fiske. Rastret ger en god indikation på fiskdistribution inom varje ICES-rektangel, men osäkerheten är avsevärt högre för varje 250 m-cell eftersom denna data inte ger någon information om rumslig variation inom ICES-rektanglar. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data are Herring acoustic density data (fish/area) from the Baltic International Acoustic Survey (BIAS) and Herring catch data (landings 2010-2015) from commercial fishing. Data processing took the following steps: 1. Sum catch data from commercial fishing into ICES rectangles. 2. Extrapolate acoustic density data (BIAS) to the coastline. 3. Combine the rasters from the different methods. 4. Adjust to SYMPHONY requirements and normalise.
Limitations for use in Symphony: The ICES source data used in the production of this dataset are generally mapped to the ICES rectangle scale (30x60nm) and as a consequence there is very little information about the spatial variability within these areas.	

Recommendations for data improvement: Predictive modelling of herring using relevant environmental variables may be possible. If valid this approach would likely provide a dataset with a higher descriptive resolution.	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: marten.erlandsson@slu.se; ulf.bergstrom@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, fish
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Herring" dataset is a derived from data provided by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua
Security Classification	no protection required
Maintenance	Annual
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Rivermouth fish

Swedish Name	Fisk älvmynning
Symphony Theme	Fish

Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-02-07
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	1952 2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the predicted diversity of river mouth fish species in Swedish marine waters. A cell value of 0 is equivalent to no fish species present and a cell value of 100 is equivalent to a high relative number of fish species present. Underlying data are from two sources and consist of presence data (1952-2015) of several river mouth fish species. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad mångfald av älvmynningsfisk i svenska havsvatten. Ett cellvärde av 0 motsvarar ingen förekomst av fisk, och ett cellvärde av 100 motsvarar hög relativ förekomst av fisk. Underlagsdata härrör från två källor och består av förekomstdata (1952-2015) av flera olika älvmynningsfiskarter. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data are Salmon, Trout, and Eel presence data (1952-2015) in river mouths, from the Swedish Electrofishing Register (Svenskt Elfiskeregister - SERS), as well as Sea Lamprey presence data in rivermouths from the report "Åtgärdsprogram för diadroma arter i Västerhavet med fokus havsnejonöga".

	Data processing took the following steps: 1. Aggregate presence data into a single file. 2. Calculate the number of species at each river mouth. 3. Calculate a buffer area around each river mouth. 4. Adjust to SYMPHONY requirements and normalise.
Limitations for use in Symphony: No limitations identified by SLU	
Recommendations for data improvement: No recommendations suggested by SLU	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: marten.erlandsson@slu.se; ulf.bergstrom@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, fish
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Rivermouth fish" dataset is a derived from fisheries monitoring data collected by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and recorded in SERS "Svenskt ElfiskeRegiSter". This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua
Security Classification	no protection required
Maintenance	Annual

Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Sprat

Swedish Name	Skarpsill
Symphony Theme	Fish
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-02-17
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2010 -01-01 2015-12-31
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the predicted distribution of Sprat in Swedish marine waters. A cell value of 0 is equivalent to zero abundance and a cell value of 100 is equivalent to high relative abundance. Underlying data are from two sources and consist of acoustic density data (fish /area) and catch data (landings 2010-2015) from commercial fishing. The raster provides a good indication of fish distribution for each ICES rectangle however uncertainty is considerably higher for each 250 m cell as the data provides no information on spatial variation within ICES rectangles. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad distribution av skarpsill i svenska havsvatten. Ett cellvärde av 0 motsvarar ingen abundans, och ett cellvärde av 100 motsvarar hög relativ abundans. Underliggande data härrör från två källor

	och består av data från akustikstudier (fisk/område) och fångstdata (2010-2015) från kommersiellt fiske. Rastret ger en god indikation på fiskdistribution inom varje ICES-rektangel, men osäkerheten är avsevärt högre för varje 250 m-cell eftersom denna data inte ger någon information om rumslig variation inom ICES-rektanglar. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data are Sprat acoustic density data (fish /area) from the Baltic International Acoustic Survey (BIAS) and Sprat catch data (landings 2010-2015) from commercial fishing. Data processing took the following steps: 1. Sum catch data from commercial fishing into ICES rectangles. 2. Extrapolate acoustic density data (BIAS) to the coastline. 3. Combine the rasters from the different methods. 4. Adjust to SYMPHONY requirements and normalise.
Limitations for use in Symphony: The ICES source data used in the production of this dataset are generally mapped to the ICES rectangle scale (30x60nm) and as a consequence there is very little information about the spatial variability within these areas.	
Recommendations for data improvement: Predictive modelling of Sprat using relevant environmental variables may be possible. If valid this approach would likely provide a dataset with a higher descriptive resolution.	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: marten.erlandsson@slu.se; ulf.bergstrom@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, fish
Access Use Restrictions	Licence

Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Sprat" dataset is a derived from data provided by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua
Security Classification	no protection required
Maintenance	Annual
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Vendace

Swedish Name	Siklöja
Symphony Theme	Fish
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-02-17
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2010 -01-01 2015-12-31
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the predicted distribution of Vendace in Swedish marine waters. A cell value of 0 is equivalent to zero abundance and a cell value of 100 is equivalent to high relative abundance. Underlying data are catch data (landings 2010-2015) from commercial fishing. These data were created as a data input layer for 'Symphony'

	tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad distribution av siklöja i svenska havsvatten. Ett cellvärde av 0 motsvarar ingen abundans, och ett cellvärde av 100 motsvarar hög relativ abundans. Underlagsdata består av fångstdata (2010-2015) från kommersiellt fiske. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data processing took the following steps: 1. Interpolate catch data using a search window with a radius of 5 km (home range). 2. Compensate the distribution to account for the ratio of land/water within the home range for each cell. 3. Adjust to SYMPHONY requirements and normalise.
Limitations for use in Symphony: No limitations identified by SLU	
Recommendations for data improvement: Predictive modelling of Vendace using relevant environmental variables may be possible. If valid this approach would likely provide a dataset with a higher descriptive resolution.	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: marten.erlandsson@slu.se; ulf.bergstrom@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, fish

Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Vendace" dataset is a derived from data provided by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua
Security Classification	no protection required
Maintenance	Annual
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Eel migration

Swedish Name	Ålvandring
Symphony Theme	Fish function
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-02-23
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	1999 2003
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the predicted migration routes of Eels in Swedish marine waters. A cell value of 0 is equivalent to zero abundance and a cell value of 100 is equivalent to high relative abundance. Underlying data are

	coastal catch data (1999-2003). Due to a large lack of knowledge/information on Eels This raster has high uncertainty and does not show migration routes outside of the coastal areas. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad ålvandring i svenska havsvatten. Ett cellvärde av 0 motsvarar noll abundans, och ett cellvärde av 100 motsvarar hög relativ abundans. Underlagsdata härrör från fångstdata från kustfiske (1999-2003). På grund av stor brist på kunskap/information om ål, har detta rasterskikt hög osäkerhet och påvisar ingen ålvandring utanför kustområden. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data are Eel catch data (1999-2003) from coastal areas. Data processing took the following steps: 1. Convert catch data from polygons to rasters. 2. Add to raster together with a cell resolution of 10 km2¬. 3. Interpolate using a search window with a radius of 20 km. 4. Adjust to SYMPHONY requirements and normalise.
Limitations for use in Symphony: Due to a large lack of knowledge/information on Eels this layer has very high uncertainty and does not show migration routes outside of the coastal areas.	
Recommendations for data improvement: No recommendations suggested by SLU	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: marten.erlandsson@slu.se; ulf.bergstrom@slu.se	

Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, fish
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Eel migration" dataset is a derived from fisheries monitoring data collected by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua
Security Classification	no protection required
Maintenance	Annual
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Fish spawning

Swedish Name	Fisklekområde
Symphony Theme	Fish function
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-02-07
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available

Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show a general picture of important areas for commercial fish spawning in Swedish marine waters. A cell value of 0 is equivalent to no economic value for spawning and a cell value of 100 is equivalent to the highest economic value of spawning species. Underlying data are from two sources and consist of a depth model combined with the spawning area and spawning depth data of commercial fish species. This raster shows a measure of economic value by space based on the ratio between the economic value of each species and its calculated spawning area, summed for all species with an economic value> 100k per year for each marine plan area. The data were normalised on a linear scale for each plan area so a cell value of 100 on the West coast (North Sea) plan area equates to 25 species whereas on the East coast (Baltic) plan area it equates to 12 species and in the Northern plan area (Bottniskaviken) it equates to 5 species. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa en generell bild över viktiga områden för fisklek för kommersiella fiskarter i svenska havsvatten. Ett cellvärde av 0 motsvarar ingen fisklek, och ett cellvärde av 100 motsvarar hög relativ fisklek hos kommersiella fiskarter. Underlagsdata härrör från två källor och består av en djupmodell kombinerat med lekområdes- och lekdjupdata över kommersiella fiskarter. Denna data visar ett mått på ekonomiskt värde per ytenhet baserad på kvoten mellan varje arts ekonomiska värde och dess beräknade lekarea, summerad för alla arter med ett ekonomiskt värde > 100 kkr per år för varje havsområde Data normaliseras på en linjär skala för varje område, ett cellvärde av 100 på västkusten (Nordsjön) motsvarar 25 arter, medan samma värde på östkusten (Östersjön) motsvarar 12 arter och i Bottniska viken motsvarar värdet 5 arter. Denna data skapades som ett data input layer för

	'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna. Viktiga lekområden för yrkesfiskets arter. Baserad på kvoten mellan varje arts ekonomiska värde och dess beräknade lekarea, summerad för alla arter med ett ekonomiskt värde > 100 kkr per år för varje havsområde
Lineage	Data are from SLUs National Spawning Database (Nationella Lektidsdatabasen) and SYMPHONY's depth raster. The Spawning Database receives information from a large number of sources. Information on each species is collated from available research. Data processing took the following steps: 1. Couple the National Spawning Database with area polygons. 2. Convert the National Spawning Database polygons to rasters. 3. Limit each species spawning area by depth. 4. Create plan area rasters for any commercial species (with an annual value over 100,000kr in that plan areas) 5 Sum rasters and rescale 0-100 for each plan area 6. Mosaic each summed plan area raster to a national product
Limitations for use in Symphony: No limitations identified by SLU	
Recommendations for data improvement: Future versions of this raster can be supplemented with nursery grounds. The nursery database contains information about nursery habitat, which could be linked to the SGU substrate map.	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: marten.erlandsson@slu.se; ulf.bergstrom@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)

Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, fish
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Fish spawning" dataset is a derived from data provided by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and the Swedish Maritime Authority (SMA). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua, SMA
Security Classification	no protection required
Maintenance	Annual
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Abrasion bottom trawl

Swedish Name	Bottentrål skavning
Symphony Theme	Fishing
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-12-01
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2015
Resource Type	dataset

Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster layer intends to show the predicted abrasion of benthic substrates as a consequence of bottom trawling in Swedish coastal and offshore waters. Underlying data are from two sources and consist of Surface Area Ratio (SAR) of trawling (OSPAR 2009-2013, and HELCOM 2009-2015) data. A cell value of 0 is equivalent to no benthic abrasion by bottom trawling and a cell value of 100 is equivalent to abrasion (SAR ≥ 8.196288). The surface area ratios (SAR) of trawling are produced by summing total swept area of trawling within a measurement area and then normalize the swept area to the measurement area. Assuming that within the measurement area the trawling is evenly distributed the surface area ratio is interpreted as the number of times per unit of time the measurement area is trawled over. The swept area for a specific fishing vessel is estimated using modelled trawl door spread (for a specific fishery/gear) multiplied by the vms (vessel monitoring system) speed and vms ping interval for a vms signal/position representing benthic trawling. The total swept area within a measurement area is then the sum of all swept area positions, from all vessels within a measurement area. For these data a logarithmic relationship between trawl intensity SAR and benthic impact due to abrasion is assumed, however habitat specific susceptibility to trawling is not modelled so this is a simplistic assumption. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad störning av bentiska substrat som en konsekvens av bottentrålning i svenska kust- och havsvatten. Underlagsdata kommer från två källor och består av data över Surface Area Ratio (SAR) från trålning (OSPAR 2009-2013, och HELCOM 2009-2015). Ett cellvärde av 0 motsvarar ingen bentisk störning från bottentrålning, och ett cellvärde av 100 motsvarar störning (SAR ≥ 8,196288). Denna data skapades som ett data input layer för ’Symphony’ verktyget utvecklat av enheten för havsplaneringen på Havs- och

	vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna. SAR för trålning skapas genom att summera den totala arean som trålats inom ett mätområde och sedan normaliseras det trålade området till mätområdet. Det antas att trålningen inom mätområdet är jämnt fördelad, varvid SAR tolkas som antalet gånger per tidsenhet som området trålats. Det trålade området för ett specifikt fiskefartyg beräknas genom modellerad tråldörrsspridning (för ett specifikt fiske/redskap) multiplicerat med vms-hastighet (vessel monitoring system) och vms-pingintervall för en vms-signal/position som representerar bentisk trålning. Det totala trålade området inom mätområdet är då summan av alla trålade områden, från alla fartyg inom mätområdet. För dessa data antas ett logaritmiskt förhållande mellan trålningsintensitets-SAR och bentisk påverkan på grund av störning, dock är habitatspecifik känslighet inte modellerat så detta är ett förenklat antagande. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data are internationally collected data on bottom trawling impact produced by the ICES working group on spatial fisheries data (ICES WGSFD). Standardized products on surface area ratio (SAR) of trawling were downloaded from the working group link on ICES homepage. The method is described in the working group reports (ICES Working Group Spatial Fisheries Data report 2016), but in short the SAR of trawling are produced by summing total swept area of trawling within a measurement area and then normalize the swept area to the measurement area. Assuming that within the measurement area the trawling is evenly distributed the SAR is interpreted as the number of times per unit of time the measurement area is trawled over. The swept area for a specific fishing vessel is estimated using modelled trawl door spread (for a specific fishery/gear) multiplied by the vms speed and vms ping interval for a vms signal/position representing fishery. The total swept area

	within a measurement area is then the sum of all swept area positions, from all vessels within a measurement area. The underlying data has been aggregated yearly on a geographic grid of resolution 0.05 degree (approximately 1.5 x 3 nm square at 57 N). Yearly data on total SAR are produced in the HELCOM (the Baltic including Kattegat) and OSPAR (North East Atlantic incl. Kattegat) region respectively. Data are available for the years 2009 – 2013 in the HELCOM region and 2009-2015 in the OSPAR region. Data are available as spatial polygons. Each year's polygon dataset were projected into the Symphony projection ETRS1989 LAEA. Further the polygons were rasterized on the symphony grid using mean values if several polygons overlay the same raster grid cell. Averages of SAR values are calculated (introducing zero values in NA raster cells) over the time periods (2009-2015 for OSPAR and 2009-2013 for HELCOM) and the Kattegat area where masked from the HELCOM data set. Finally the two data sets were added and save as 'Bottom_trawling_intensity_mean_SAR.tif' The raster was normalized by dividing the data set by the maximum SAR value in the Swedish exclusive economic zone (EEZ): maxEEZ SAR = 8.196288 From this underlying data set, representing swept area of bottom trawlers, a logarithmic response proxy was derived representing sedimentation impact from trawling and these data were rescaled on a 0-1 scale. Uncertainty of this layer is set to 0.5 representing a "good" model, in the whole region as the data are almost complete international data (representing vessels >12 m), they are averages over several years and thus represent a large part of the total trawling effort and resource outtake but aggregated into larger cells (0.05 degree resolution) and partly validated. Also compared to traditional proxies for bottom trawling like kW*fishing hours, the SAR values takes into account typical trawl widths for different fishing fleets.
Limitations for use in Symphony: This bottom impact layer aims to describe the impact of bottom trawling on benthic habitats. This bottom-trawling index is used as a proxy for this impact and a logarithmic relationship between trawl intensity and benthic impact is used. This a is simplified assumption - habitat specific susceptibility to trawling is not modelled.	
Recommendations for data improvement: The source data for Symphony should continue to be based on international data. Work should continue to increase the availability of data volumes collected today by ICES within WGSFD. Current available data is not divided into pelagic / demersal species. Official	

landing statistics per ICES box could be used to weight trawl index for catches per box and, for example, per demersal / pelagic target species. New research (Benthis - 7th Framework Program and Trawling - Best Practice Project) is currently underway to develop indicators for use in, inter alia, the Marine Directive. These proposed indicators are based on a mechanistic link between trawl intensity and habitat specific benthic responses. This are therefore different from previous expert-based sensitivity estimates and the benefits of these kind of data have been highlighted in ICES advice. The indicator data being created in the Benthis project will have the advantage of being normalized to the interval [0.1] and will therefore be suitable for future Symphony updates. Work is also ongoing to include not only the direct physical impact (abrasion/mechanical damage) but also sedimentation. Future data products should, if possible, consist of the internationally produced indicators. In order to improve these indicators, it is primarily knowledge about habitats and bottom type that should be improved - funding support for participation in any research and development projects that would help to continue this development are recommended.	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.jonsson@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	fishery, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Abrasion bottom trawl" dataset is a derived from fisheries monitoring data collected by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua). This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua
Security Classification	no protection required

Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Artificial reef

Swedish Name	Konstgjort rev
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2016-10-09
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show presence of artificial reef structures (i.e. bridges, lighthouses at sea, wind power turbines, wrecks etc.) in Swedish coastal and offshore waters. The surface area of artificial reefs has not been determined. Data shows only the occurrence of artificial structures that can form artificial reefs with a resolution of 250 x 250 m. A cell value of 0 is equivalent to no presence and a cell value of 100 is equivalent to presence. Underlying data are from several different sources and consist of presence data in the form of shapefiles. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa förekomst av artificiella revstrukturer (dvs. broar, fyrar till havs, vindkraftsverk, vrak

	etc.) i svenska kust och havsvatten. Den ytmässiga omfattningen av artificiella rev har inte bestämts. Data visar endast förekomst av artificiella strukturer som kan skapa artificiella rev med en upplösning på 250 x 250 m. Ett cellvärde av 0 motsvarar ingen förekomst, och ett cellvärde av 100 motsvarar förekomst. Underlagsdata härrör från ett flertal källor och består av förekomstdata i form av shape-filer. Detta data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Vectorised layers of structures at sea/ocean were converted to a raster where presence of structures was represented by a cell value of 100 and absence of structures was represented by a cell value of 0. Checks of the layer showed that distribution of the reef effect was, in general, less than 250m from the structure (i.e. one grid cell). Several data sources were combined: National road database/Bridge and Tunnel management (the Swedish Transport Administration (TRV), NVDB/Batman, shapefile, polyline), light houses, bridges and train bridges (the Swedish mapping, cadastral and land registration authority, Fastighetskartan, shapefile, polyline), ship wreck occurrences around Sweden (Swedish National Heritage Board (RAA), Fornminnesregistret (FMIS), shapefile, point), shipwrecks in Estonia (Estonian National Heritage Board, shapefile, point), shipwrecks in Denmark (the Danish Agency for Culture, shapefile, point), ship wrecks (the Government of Åland, shapefile, point). Discussion of the method occurred between WSP (consultant), TRV (data source) and SWaM (client). More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: The surface of the reef can not be read from this substrate. The result of modelling where these data are included should therefore be interpreted with caution.	
Recommendations for data improvement: Gather attribution which can be used to predict the surface area and predict impacts or benefits of habitat change. For example data on the type of exposed substrates may be used	

to predict beneficial effects of artificial habitat (e.g. block form, ph balanced concrete armouring) vs. low quality substrate (e.g. plastic culvert pipe).	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, abiotic environment, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Artificial reef" dataset is a derived from source data provided by the Swedish Agency for Marine and Water Management (SwAM), the Swedish Transport Administration (TRV), the Swedish mapping, cadastral and land registration authority (LM), the Swedish National Heritage Board (RAA), the National Heritage Board of Estonia, The Danish Agency for Culture and Palaces (KS Danmark), the Government of Åland and The Swedish National Grid (SVK). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SwAM, TRV, LM, RAA, RAA Estonia, KS Danmark, Åland, SVK
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Rough bottom aphotic

Swedish Name	Ojämn botten afotisk
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2018-05-01
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster indicates 'hard bottom' substrate in shallow (<60m) aphotic water areas. It is supplementary to the Symphony 'Hard bottom deep' layer. This raster is modelled using morphology metrics calculated from depth data provided by the Swedish Maritime Administration and expert judgement based on comparison with geological surveys undertaken by the Swedish Geological Survey (in areas surveyed by both agencies). A cell value of 0 is equivilent to zero probability of the prescence of hard bottom and a cell value of 100 is equivilent to a high probability of presence. Underlying data are from 'best available' historical data with variable quality: refer to the associated uncertainty layer for for information on data quality. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt indikerar utbredning av "hård botten" substrat i grunda (>60m) afotisk havsområden. Det kompletterar "Symphony Hard Bottom Deep", men data beräknas med bathymetriska källa data (från Sjöfartsverket). Data var tolkad med expertbedömning jämförelse med geologiska undersökningar som gjorts av den svenska geologiska undersökningen i områdena som kartläggs av

	båda myndigheterna. Ett cellvärde av 0 motsvarar ingen sannolikhet för förekomst, och ett cellvärde av 100 motsvarar hög sannolikhet för förekomst. Underliggande data är från "bästa tillgängliga" historiska data med variabel kvalitet: hänvisa till det associerade osäkerhetslagret för information om datakvalitet. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset was created by combining a range of seabed complexity metrics which were calculated in ArcGIS (with the spatial analyst extension) on a 10m resolution depth model maintained by the Swedish Maritime Agency (SMA). The indata to this analysis are from a 'best available' 10m resolution depth grid known as DIS (depth information system). Although the data are gridded to 10m the it is important to be aware that the input data are of highly varying quality. Refer to the associated map of spatial uncertainty for this layer to understand where major data gaps exist. DIS contains data which can be categorised into three quality classes. The highest quality data are collected using from modern techniques (for example multibeam echosounder surveys) and provide full coverage depth data (this is mostly restricted to shipping lanes), these data are charted to international standards (IHO S-44). The second category of data are those collected using modern techniques but which do not comply with international charting standards (although are still very high resolution for our intended use), they are data collected after 1987 (and therefore have a good positional accuracy) but they may not provide 100% coverage of the seafloor. The final, lower quality class of data are those collected before 1987 from historical chart archives based on data collected using older methods (e.g. single beam echosounders or lead-line surveys). In all classes of data it should be noted that depths may also be subject to a shoal-bias (reduced depths) which is standard practice for reducing potential collision risk in navigational charting. Due to mixing data resolutions data artefacts are likely to be present in the grid at boundaries between high resolution and low resolution surveys. The procedure used to produce the complexity datasets for Symphony were as follows:

	A) 6 complexity metrics and a hillshade were calculated: 1. Bathymetric Positioning Index (BPI) with an inner diameter of 10m & outer diameter of 250m, 2. Bathymetric Positioning Index with ID:10m & OD:50m: https://coast.noaa.gov/digitalcoast/tools/btm.html 3. Slope using a 10m grid with ArcGIS spatial analyst. 4. Slope using a 250m grid (downsampled from the 10m grid) with ArcGIS spatial analyst. 5. Standard deviation of depth using a neighborhood size of 5 cells (50m) and the 10m grid with ArcGIS spatial analyst. 6. Standard deviation of depth using a neighborhood size of 25cell (250m) and the 10m grid with ArcGIS spatial analyst. 7. A hillshade layer for visual interpretation Data were generated using a ArcGIS modelbuilder toolbox developed by SGU, and executed by SMA. B) All 6 complexity metrics where resampled to a 50m raster (mean value) using ArcGIS C) BPI metrics (1. and 2.) were stretched using an e log (base 2,718) function and rescaled between 0 and 10. D) Slope and standard deviation metrics were also stretched using an e log function and rescaled between 0 and 10. E) A average (MEAN) raster was calcultated by combining all the stretched and rescaled metrics from (C & D) . F) Raster values between 2.5 and 7.5 in the raster (E) were rescaled between 0 and 10 normalising the data to reflect hardbottom features. G) The resulting dataset was then downsampled from 50m to 300m using the maximum value in a 6x6 cell neighbourhood. H) The result (G) was standardised to the Symphony grid 250m (nearest neighbour) with no-data set to zero. I) The result (H) was normalised by substrating the Symphony hardbottom dataset and the result rescaled between 0 and 100. J) The result (I) was split into 3 depth zones photic, and aphotic below & aphotic above 60m
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around Bratten Bohuslän coast. For further information on depth data uncertainty refer to the confidence map associated with this dataset. 2) The model is based on data with a minimum mapping unit of 50m. This is not detailed enough to pick out smaller depth / morphology variations and a consequence the dataset may not help in the identification of certain geological features (e.g. sparse boulders on a flat landscape) which may be important or sensitive habitat. 3) This dataset is intended to be used as a proxy for hard bottom bethic habitat (i.e. identifying areas where SGUs geological survey data are unavailable) however this refers to morphological complexity (and light penetration) and does not consider geological substrate. Therefore areas which are 'complex' in terms of morphology may not always be hard bottom. 4) Normalisation to reflect 'hard bottom' features was undertaken by visual comparison with Symphony 'hard bottom' data - i.e. derived from SGUs geological maps. However, a perfect match between complexity and hardbottom is not possible using expert judgement. 5) These data are currently only available for Sweden.	
Recommendations for data improvement: Further data collection is requied in areas with no data or low quality data. Rather than using two separate habitat proxy datasets in Symphony - morphological complexity (modelled from depth) and hardbottom (modelled from geological maps) the data on complexity should instead be used to drive a predictive model of substrate in combination with other physical predictor variables (such as currents & wave exposure) and ground validation data from point obserations. This work is in progress at SGU. This approach demonstrates a great deal of potential for improvement of national geological datasets. It is therefore reccomended that the approach is extended to surrounding countries (perhaps via international collaboration projects like Emodnet).	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Rough bottom aphotic" dataset is a derived in part from source data provided by the Swedish Maritime Adminstration (SMA). This derived dataset is licensed under a Creative Commons Attribution 4.0

	International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SwAM, SMA, SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2018-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Rough bottom deep

Swedish Name	Ojämn botten djup
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2018-05-01
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster indicates 'hard bottom' substrate in deep (>60m) aphotic water areas. It is supplementary to the Symphony 'Hard bottom deep' layer but the data is calculated using metrics of depth data (sourced from the Swedish Maritime Administration) and expert judgement based on comparison with geological surveys undertaken by the Swedish Geological Survey (in areas surveyed by both agencies). A cell value of 0 is equivilent to zero probability of the prescence of hard bottom and a cell value of 100 is equivilent to a high probability of presence. Underlying data are from 'best available' historical data with variable quality: refer to the associated uncertainty layer for for information on data

	quality. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt indikerar utbredning av "hård botten" substrat i djupa (> 60m) aphotiska havsområden. Det kompletterar "Symphony Hard Bottom Deep", men data beräknas med bathymetriska källa data (från Sjöfartsverket). Data var tolkad med expertbedömning jämförelse med geologiska undersökningar som gjorts av den svenska geologiska undersökningen i områdena som kartläggs av båda myndigheterna. Ett cellvärde av 0 motsvarar ingen sannolikhet för förekomst, och ett cellvärde av 100 motsvarar hög sannolikhet för förekomst. Underliggande data är från "bästa tillgängliga" historiska data med variabel kvalitet: hänvisa till det associerade osäkerhetslagret för information om datakvalitet. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
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	G) The resulting dataset was then downsampled from 50m to 300m using the maximum value in a 6x6 cell neighbourhood. H) The result (G) was standardised to the Symphony grid 250m (nearest neighbour) with no-data set to zero. I) The result (H) was normalised by substrating the Symphony hardbottom dataset and the result rescaled between 0 and 100. J) The result (I) was split into 3 depth zones photic, and aphotic below & aphotic above 60m

Limitations for use in Symphony:

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2) The model is based on data with a minimum mapping unit of 50m. This is not detailed enough to pick out smaller depth / morphology variations and a consequence the dataset may not help in the identification of certain geological features (e.g. sparse boulders on a flat landscape) which may be important or sensitive habitat.

3) This dataset is intended to be used as a proxy for hard bottom bethic habitat (i.e. identifying areas where SGUs geological survey data are unavailable) however this refers to morphological complexity (and light penetration) and does not consider geological substrate. Therefore areas which are 'complex' in terms of morphology may not always be hard bottom.

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Recommendations for data improvement:

Further data collection is requied in areas with no data or low quality data.

Rather than using two separate habitat proxy datasets in Symphony - morphological complexity (modelled from depth) and hardbottom (modelled from geological maps) the data on complexity should instead be used to drive a predictive model of substrate in combination with other physical predictor variables (such as currents & wave exposure) and ground validation data from point obserations. This work is in progress at SGU.

This approach demonstrates a great deal of potential for improvement of national geological datasets. It is therefore reccomended that the approach is extended to surrounding countries (perhaps via international collaboration projects like Emodnet).

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Contact organisation: Swedish Agency for Marine and Water Management

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Map Acknowledgement	SwAM, SMA, SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2018-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Rough bottom photic

Swedish Name	Ojämn botten fotisk
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2018-05-01
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset

Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster indicates 'hard bottom' substrate in photic water areas. It is supplementary to the Symphony 'Hard bottom deep' layer. This raster is modelled using morphology metrics calculated from depth data provided by the Swedish Maritime Administration and expert judgement based on comparison with geological surveys undertaken by the Swedish Geological Survey (in areas surveyed by both agencies). A cell value of 0 is equivilent to zero probability of the prescence of hard bottom and a cell value of 100 is equivilent to a high probability of presence. Underlying data are from 'best available' historical data with variable quality: refer to the associated uncertainty layer for for information on data quality. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
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Recommendations for data improvement: Further data collection is requied in areas with no data or low quality data. Rather than using two separate habitat proxy datasets in Symphony - morphological complexity (modelled from depth) and hardbottom (modelled from geological maps) the data on complexity should instead be used to drive a predictive model of substrate in combination with other physical predictor variables (such as currents & wave exposure) and ground validation data from point obserations. This work is in progress at SGU. This approach demonstrates a great deal of potential for improvement of national geological datasets. It is therefore reccomended that the approach is extended to surrounding countries (perhaps via international collaboration projects like Emodnet).	
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Contact organisation: Swedish Agency for Marine and Water Management	
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Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
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INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Rough bottom photic" dataset is a derived in part from source data provided by the Swedish Maritime Adminstration (SMA). This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SwAM, SMA, SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2018-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Deep reef

Swedish Name	Djupt rev
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2016-10-01
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2006 2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster is intended to show the distribution of deep water coral reefs and sponge communities in Swedish coastal and offshore waters. This raster is represented with the value 100 where lophelia spp. and / or poriforia spp. communities are predicted to be present and value 0 where there is no information available. It is based on field survey point observation data stored in Gothenburg University's Koster database and the Swedish Meteorological and Hydrological Institute's SHARK ("Svenskt HavsARKiv") database. No prediction is made of where these communities might exist in unsurveyed areas. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs marine spatial planning at plan area scales. Re-use of these data for other purposes and particularly for local decision support is only advisable with the guidance and advice of the data source.
Summary (Swedish)	Detta rasterskikt avser att visa distribution av djupvattenskorallrev och svampsamhällen i svenska kust- och havsvatten. Detta rasterskikt presenteras med värdet 100 där lophelia spp. och/eller poriforia spp. samhällen förutsägs finnas, och ett värde av 0 där det inte finns någon information tillgänglig. Det baseras på punktdata från fältundersökningar lagrad i Göteborgs universitets Koster-databas och Sveriges meteorologiska och hydrologiska instituts SHARK ("Svenskt Havsarkiv") databas. Ingen förutsägelse görs om dessa samhällen kan finnas i ej

	undersökta områden. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The observational data used to create this dataset is from Gothenburg University's 'Koster' database, SMHI's 'SHARK' database, "Tomas Lundälv, 2014, Kartläggning yttre havler nordöstra skagerrak" and from internal data held by Aquabiota AB. Various tools and internal developed models were used in ArcMap 10.3 to produce the final data such as Dissolve, Point to Raster, Polygon to Raster, Raster calculator and Water Ways model 1.02 (Aquabiota AB model). The method is a simple GIS-model that aims to extrapolate lophelia and porifera distributions based on presence point density and distance between point through water ways. This model does not take into account any environmental variables The model groups presence samples if they are within 1500 m distance through water ways and therefore the entire buffered grouped area becomes an expected distribution area. Expected distribution area is represented with value 100 in raster file. Another condition is needed to be fulfilled to form an expected lophelia distribution area which is the samples density need to be three or more than three samples and they need to be at least 125 m away from each other. The radius 1500 m is selected based on average sampling spatial distribution across the Swedish water body and therefore it is most likely to group samples in a more considerable way than other radius distances. The second condition distance is selected based on cell size distance which is 250 m. It is set 125 m with the reason of being half of the cell size distance and therefore aims to eliminate points that might be on the same raster cell that could lead to a false creation of expected bivalvia distribution area. The samples density three or more than three is selected based on average sampling spatial distribution within the area with the radius 1500 m. All sampling points that do not fulfil those two conditions are represented as only one cell with the value 100. More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.

Limitations for use in Symphony: This dataset does not predict or model the possible presence of deep reef or sponge communities it relies on observational data. This data is therefore likely to an underestimate the presence of these habitats (perhaps significantly) because these habitats are hard to detect (they cannot be identified with acoustic data) and there is very little survey effort in deep water offshore areas.	
Recommendations for data improvement: Based on available point data. Sampling efforts directed towards these species could improve the map, and possibly enable a more advanced modelling. If predictive modelling were to be attempted in future, better data on abiotic parameters (depth, water chemistry, currents and geology) data would be required to make reliable predictions - there are significant data gaps in the offshore environments on the West Coast of Sweden where these species are found. .	
Data authoring organisation: Aquabiota AB	
Contact organisation: Swedish Agency for Marine and Water Management	
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Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Deep reef" dataset is a derived from source data provided by the Swedish Meteorological and Hydrological Institute (SMHI) and Gothenburg University (GU). This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Aquabiota AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMHI, GU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01

Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Haploops reef

Swedish Name	Haploops-rev
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2016-10-01
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2006 2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster is intended to show the distribution of Haploops reefs in Swedish coastal and offshore waters. This raster is represented with the value 100 where Haploops spp. was present in data and "NoData" where there is no information about Haploops spp.. It is based on data sourced from Helsingborg Municipal Council and the Swedish Meteorological and Hydrological Institute's SHARK ("Svenskt HavsARKiv") database. No prediction is made of where these communities might exist in unsurveyed areas. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa distribution av Haploopsrev i svenska kust- och havsvatten. Detta rasterskikt presenteras med värde 100 där Haploops spp. förekom i data, och ”NoData” där det inte finns någon information om Haploops spp.. Det baseras på data från Helsingborgs kommun och Sveriges meteorologiska och hydrologiska instituts SHARK ("Svenskt Havsarkiv") databas. Ingen förutsägelse görs om

	dessa samhällen kan finnas i ej undersökta områden. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The observational data used to create this dataset is from "Miljöövervakning av Knähaken marina reservat 2011, Stina Bertilsson Vuksan och Peter Göransson, Miljöförvaltningen i Helsingborgs stad" and from SMHIs SHARK database where the point data is represented as "P" (Presence). The dataset simply shows pixels with an occurrence of Haploops. No distribution modelling is attempted and no environmental variables are considered. Pixels with an observation and given a value of 100 in the data.
Limitations for use in Symphony: This dataset does not predict or model the possible presence of Haploops -it relies on observational data. This data is therefore likely to an underestimate the presence of these habitats (perhaps significantly) .	
Recommendations for data improvement: Based on available point data. Sampling efforts directed towards these species could improve the map, and possibly enable a more advanced modelling. If predictive modelling were to be attempted in future, better data on abiotic parameters (depth, water chemistry, currents and geology) data would be required to make reliable predictions.	
Data authoring organisation: Aquabiota AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: antonia.sandman@aquabiota.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Haploops reef" dataset is a derived from source data provided by the Swedish Meteorological and

	Hydrological Institute (SMHI) and Helsingborg Kommun. This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Aquabiota AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMHI, HK
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Hard bottom aphotic

Swedish Name	Hårdbotten afotisk
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-01-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer shows the predicted probability of occurrence of hard marine benthic substrates (i.e. rocks, boulders, and bedrock) in aphotic zones shallower than 60 m (generally above the halocline) around Sweden. A cell value of 0 is equivalent to a low probability of occurrence and a cell value of 100 is equivalent to a high probability of occurrence. Underlying data consists of benthic substrate data (1975-2015), depth data (2013, 2015), and photic zone data. These data were created as a data input layer for 'Symphony' tool

	developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt visar beräknad sannolikhet för förekomst av hårdbotten (dvs. sten, block och berggrund) i afotiska zonen grundare än 60 m (generellt över haloklinen) runtom Sverige. Ett cellvärde av 0 motsvarar låg sannolikhet för förekomst, och ett cellvärde av 100 motsvarar hög sannolikhet för förekomst. Underlagsdata består av bentisk substratdata (1975-2015), djupdata (2013,2015) och fotisk zondata. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this product comes from custom made substrate maps (2016 Estimated Proportions of Surface Substrate Classes), a depth model (2016 Geological Survey of Sweden SYMPHONY Depth Grid V2), and a photic depth layer (2016 SYMPHONY Photic Zone). Predictions of hardbottom substrate classes (i.e. cobbles, boulders, and bedrock) were combined and extracted from depth shallower than 60m but below the photic zone using conditional statements in ArcGIS raster calculator.

Limitations for use in Symphony:

There are a number of key limitations users should be aware of when using this dataset:

1) Only presence/absence data is available for sediment fractions in SGUs legacy sample inventory. Equal proportionality is assumed between the recorded sediment fractions but this may be invalid.

2) It was assumed that at least 20 replicates would be required to define the proportional makeup of each sediment class (in each sea area / depth / mapscale) . However, a power analysis was not undertaken to ensure sufficient sample availability for each surface substrate class and there is a significant range in replicate numbers between classes.

3) Where insufficient sample replication occurred to enable classification by depth, sea area and map scale data were averaged across depth ranges and between sea areas so certain classes are more reliable than others.

4) Surface substrates which form a veneer cover a smaller area of the seabed and consequently for some classes insufficient replicates were available for analysis. In this event

the underlying sediment class was used for reclassification instead. In some classes on larger scale maps this might cause veneered sediments to be depicted as mixed proportions of the underlying substrate & veneer sediment fractions.	
Recommendations for data improvement: Apply a sensitivity analysis approach to determine the overall consequence of misclassification. Review the approach to proportionality by validating the model predictions with empirical data (e.g. particle size analysis data). Undertake an expert review. Gather additional source data from surrounding countries to produce better harmonisation.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, abiotic environment, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Hard bottom aphotic" dataset is a derived from data originally provided by the Swedish Maritime Authority (SMA), the Geological Survey of Sweden (SGU), the International Council for Exploration of the Sea (ICES), the Baltic Marine Environment Protection Commission (HELCOM), the Swedish Meteorological and Hydrological Institute (SMHI). the Swedish mapping, cadastral and land registration authority (LM), the Swedish Country Administrative Boards (LS), Emodnet Bathytmetry (EMODNET-BATY), the Swedish Agency for Marine and Water Management (SwAM) and Aquabiota AB . This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.

Map Acknowledgement	SMA, SGU, HELCOM, SMHI, LM, LS, EMODNET-BATY, SwAM, Aquabiota AB
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Hard bottom deep

Swedish Name	Hårdbotten djup
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-01-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer shows the predicted probability of occurrence of hard marine benthic substrates (i.e. rocks, boulders, and bedrock) in aphotic zones deeper than 60 m (generally below the halocline) around Sweden. A cell value of 0 is equivalent to a low probability of occurrence and a cell value of 100 is equivalent to a high probability of occurrence. Underlying data consists of benthic substrate data (1975-2015), depth data (2013, 2015), and photic zone data. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.

Summary (Swedish)	Detta rasterskikt visar beräknad sannolikhet för förekomst av hårdbotten (dvs. sten, block och berggrund) i afotiska zonen djupare än 60 m (generellt under haloklinen) runtom Sverige. Ett cellvärde av 0 motsvarar låg sannolikhet för förekomst, och ett cellvärde av 100 motsvarar hög sannolikhet för förekomst. Underlagsdata består av bentisk substratdata (1975-2015), djupdata (2013,2015) och fotisk zondata. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this product comes from custom made substrate maps (2016 Estimated Proportions of Surface Substrate Classes), a depth model (2016 Geological Survey of Sweden SYMPHONY Depth Grid V2), and a photic depth layer (2016 SYMPHONY Photic Zone). Predictions of hardbottom substrate class (i.e. cobbles, boulders, and bedrock) were combined and extracted from areas with depth greater than 60 m using conditional statements in ArcGIS raster calculator.

Limitations for use in Symphony:

There are a number of key limitations users should be aware of when using this dataset:

1) Only presence/absence data is available for sediment fractions in SGUs legacy sample inventory. Equal proportionality is assumed between the recorded sediment fractions but this may be invalid.

2) It was assumed that at least 20 replicates would be required to define the proportional makeup of each sediment class (in each sea area / depth / mapscale) . However, a power analysis was not undertaken to ensure sufficient sample availability for each surface substrate class and there is a significant range in replicate numbers between classes.

3) Where insufficient sample replication occurred to enable classification by depth, sea area and map scale data were averaged across depth ranges and between sea areas so certain classes are more reliable than others.

4) Surface substrates which form a veneer cover a smaller area of the seabed and consequently for some classes insufficient replicates were available for analysis. In this event the underlying sediment class was used for reclassification instead. In some classes on larger scale maps this might cause veneered sediments to be depicted as mixed proportions of the underlying substrate & veneer sediment fractions.

Recommendations for data improvement:

Apply a sensitivity analysis approach to determine the overall consequence of misclassification.

Review the approach to proportionality by validating the model predictions with empirical data (e.g. particle size analysis data). Undertake an expert review. Gather additional source data from surrounding countries to produce better harmonisation.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, abiotic environment, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Hard bottom deep" dataset is a derived from data originally provided by the Swedish Maritime Authority (SMA), the Geological Survey of Sweden (SGU), the International Council for Exploration of the Sea (ICES), the Baltic Marine Environment Protection Commission (HELCOM), the Swedish Meteorological and Hydrological Institute (SMHI). the Swedish mapping, cadastral and land registration authority (LM), the Swedish Country Administrative Boards (LS), Emodnet Bathytmetry (EMODNET-BATY), the Swedish Agency for Marine and Water Management (SwAM) and Aquabiota AB . This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMA, SGU, HELCOM, SMHI, LM, LS, EMODNET-BATY, SwAM, Aquabiota AB
Security Classification	no protection required
Maintenance	Not Planned

Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Mussel reef

Swedish Name	Musselrev
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2016-10-01
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2006 2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster is intended to show the distribution of mussel reef habitat in Swedish coastal and offshore waters. The dataset is derived from two input layers. The first is a predictive spatial model of areas with at least 10% cover of blue mussels (Mytilus edulis) which utilises environmental data parameters to predict distribution in unsurveyed areas. The second is a simple spatial model of bivalve distribution based on observational data and proximity information. These two source datasets are binary data. They have been aggregated with a higher weight given to the bivalve dataset. A value of 0 in the combined dataset represents areas where no blue mussels are predicted and where no bivalve observations exist, a value of 100 represents areas where (or in close proximity to where) bivalves have been observed. A value of 30 represents areas where >10% cover of blue mussels are predicted (but where no observational data exists). No prediction is made of where bivalves (other than blue mussels) might exist in unsurveyed areas. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters

	and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa distribution av musselrevshabitat i svenska kust- och havsvatten. rasterskiktet härstammar från två inputs-rasterskikt. Den första är en prediktiv, rumslig modell av områden med minst 10 % täckning av blåmusslor (Mytilus Edulis) som använder miljödataparametrar för att förutsäga distribution i ej undersökta områden. Den andra är en enkel rumslig modell av musseldistribution baserad på observationsdata och proximitet. Dessa två källrasterskikt är binära data. De är aggregerade med större vikt lagd vid musselrasterskiktet. Ett värde av 0 i det kombinerade rasterskiktet motsvarar områden där inga blåmusslor förutspås förekomma och ingen observation av musslor finns, ett värde av 100 motsvarar ett område (eller i närheten av) där musslor har observerats. Ett värde av 30 representerar områden där > 10 % täckning av blåmusslor förväntas (men ingen observationsdata finns). Ingen förutsägelse görs om musslor (förutom blåmusslor) kan finnas i ej undersökta områden. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This layer was created by combining a predictive model of blue mussel distribution (mytilus edilus) with presence data of bivalves (including Macoma balthica, Cerastoderma glaucum, Arctica islandica, Modiolus modiolus). These data were combined by the SGU at the request of SwAM using a conditional statement in ArcGIS 10.3 Raster Calculator so that sites with observational records are given a value of 100 and sites with a prediction are given a value of 30. The first input layer for mytilus edulis was modelled using epibenthos data from SHARK (source: SMHI), where there are blue mussel observational records detailing % cover ranging from 0 to 100%. Data was divided into cover of <10% (0) and >=10% (1). This binary dataset was set to fit a presence-absence model (GAM, mgcv for R). This model used predictor variables including depth, sourced from biological records where available and completed with depth data from SwAM's Symphony depth dataset (source: Swedish Maritime Administration) where missing; Wave exposure: log(n+1)-transformed; bottom salinity (source:

	Emodnet Chemistry); benthic substrate from SwAM's Symphony geology data series: hardbotten_250m for the east coast and block_250m for the west coast (source: Geological Survey of Sweden). On the west coast a slope layer calculated from the depth grid was also included in the model. The model was predicted using the same layers in 250 m resolution. The cut-off in probability was set to 0.30 for the east coast and 0.10 for the west coast (the cut-off values are derived from the model and set to maximise the number of correctly classified presences and absences), so that the cut-off value or higher is considered a presence and lower is considered an absence. The second input layer showing sites with observations of 'Bivalves' was created from ”Miljöövervakning av Knähaken marina reservat 2011, Stina Bertilsson Vuksan och Peter Göransson, Miljöförvaltningen i Helsingborgs stad” and SHARKdata where the point data is represented as "P" (Presence). It includes all bivalves from the above sources such as Macoma balthica, Cerastoderma glaucum, Arctica islandica, Modiolus modiolus etc. Various tools and internal developed models were used in ArcMap 10.3 to produce the final data such as Dissolve, Point to Raster, Polygon to Raster, Raster calculator and Water Ways model 1.02 (Aquabiota AB's internally developed model). More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: For the modelled blue mussel data component model accuracy is limited by the resolution and quality of the environmental predictor variables. Salinity and temperature data are particularly lacking on the west coast.	
Recommendations for data improvement: For blue mussels the analysis could be improved if more accurate depth, salinity and temperature data were available (i.e. more survey effort). Coverage of sampling data is weak in some parts, especially on the west coast.	
Data authoring organisation: Aquabiota AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: antonia.sandman@aquabiota.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features

GEMET keywords	marine ecosystem, marine biota, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Mussel reef" dataset is a derived from source data provided by the Swedish Meteorological and Hydrological Institute (SMHI), Helsingborg Kommun, the Geological Survey of Sweden, the Swedish Maritime Administration and Emodnet Chemistry. This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Aquabiota AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMHI, SGU, SMA, HK, EMODNET-KEMI
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Plankton pelagic

Swedish Name	Plankton pelagial
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2016-08-15
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2014 1016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the predicted plankton distribution in Swedish coastal and offshore waters via

	integrated chlorophyll-a concentration ([int chl-a]). Underlying data consists of modelled chlorophyll-a concentration data from satellite image analysis. A cell value of 0 is equivalent to an [int chl-a] of 0 mg/m2 and a cell value of 100 is equivalent to an [int chl-a] of 151.47 mg/m2. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad planktonförekomst i svenska kust- och havsvatten genom integrerad klorofyll a koncentration ([int chl-a]). Underlagsdata består av modellerad klorofyll a koncentrationsdata från satellitbildsanalys. Ett cellvärde av 0 motsvarar ([int chl-a]) av 0 mg/m2, och ett cellvärde av 100 motsvarar ([int chl-a]) av 151,47 mg/m2. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This layer was produced from modelled chlorophyll-a concentration ([Chl-a], (mg/m3)) data (BALTICSEA_ANALYSIS_FORECAST_BIO_003_007) published by marine Copernicus (2014-2016). Data processing took the following steps: 1. Using a script in the program NCO in Linux modelled [Chl-a] data were integrated by multiplying concentrations with respective weighted vectors and summing these to produce integrated chlorophyll-a concentration ([int Chl-a], mg/m2), after which mean [int Chl-a] values were calculated for summer, winter and the whole year. Median values and standard deviations were also calculated. 2. Average [int Chl-a] values were transferred to a SYMPHONY raster 3. Data were then normalised using a sigmoidal function to reduce the impact of extreme values

Limitations for use in Symphony: None - data is high quality. It is the latest satellite data and is processed using state of the art algorithms and delivered via international open data archives.	
Recommendations for data improvement: No current recommendations	
Data authoring organisation: Medins Havs och Vattenkonsulter AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: martin.mattsson@medinsab.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, marine biota
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Plankton pelagic" dataset is a derived from open access source data from marine.copernicus.eu. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Medins Havs och Vattenkonsulter AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	COPERNICUS
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Shoreline

Swedish Name	Kustlinje
Symphony Theme	Habitat

Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-05-09
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This data set intends to show the complexity of the Swedish coastal zone as an indication of ecological importance. The source data used is Lantmäteriet's terrain map shoreline dataset. A cell value zero is equivalent to a completely flat shoreline and a cell value of 100 is equivalent to a shoreline of >1500m length in that cell. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa komplexiteten av den svenska kustzonen som en indikation för ekologisk betydelse. Källdata som använts är kustlinjerasterskikt från Lantmäteriets terrängkarta. Ett cellvärde av 0 motsvarar en helt platt kustlinje, och ett cellvärde av 100 motsvarar en kustlinje på >1500 m längd i den cellen. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this product is the Swedish coastline sourced from Terrängkartan from the Swedish mapping, cadastral and land registration authority (Läntmateriet) The symphony grid (250m cell) was used to split the shoreline into individual segments for each cell (using ArcMap 10.3.1)

	The length of each segment in each cell was calculated (using ArcMap 10.3.1 geometry) The shapefile was then transfered into a symphony cell standard raster with the shapelength as the value. Normalisation: The data was linear transformed from 0-1500 m shoreline length/cell to 0-1 scale (outlier values up to 3000 meter existed).
Limitations for use in Symphony: Shoreline complexity is a simplistic measure of ecological value, many other factors are influential such as geology, currents and exposure however it is assumed that these factors result in either a complex of simple coastal structure. This relationship is unlikely to be so simple.	
Recommendations for data improvement: Introduce additional predictive factors into a future model such as terrain morphology, coastal geology or exposure,	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, abiotic environment, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Shoreline" dataset is a derived from data provided by the Swedish mapping, cadastral and land registration authority (LM). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	LM
Security Classification	no protection required

Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Soft bottom aphotic

Swedish Name	Mjukbotten afotisk
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-01-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer shows the predicted probability of occurrence of soft marine benthic substrates (i.e. mud, silt, and clay) in aphotic zones shallower than 60 m (generally above the halocline) around Sweden. A cell value of 0 is equivalent to a low probability of occurrence and a cell value of 100 is equivalent to a high probability of occurrence. Underlying data consists of benthic substrate data (1975-2015), depth data (2013, 2015), and photic zone data. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt visar beräknad sannolikhet för förekomst av mjukbotten (dvs. lera, silt och gyttja) i afotiska zonen grundare än 60 m (generellt över haloklinen) runtom Sverige. Ett cellvärde av 0 motsvarar låg sannolikhet för förekomst och ett cellvärde av 100 motsvarar hög

	sannolikhet för förekomst. Underlagsdata består av bentisk substratdata (1975-2015), djupdata (2013,2015) och fotisk zondata. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this product comes from custom made substrate maps (2016 Estimated Proportions of Surface Substrate Classes), a depth model (2016 Geological Survey of Sweden SYMPHONY Depth Grid V2), and a photic depth layer (2016 SYMPHONY Photic Zone). Predictions of softbottom substrate classes (i.e. mud, silt, and clay) were combined and extracted from the area shallower than 60 m and below the photic zone using conditional statements in ArcGIS raster calculator.

Limitations for use in Symphony:

There are a number of key limitations users should be aware of when using this dataset:

1) Only presence/absence data is available for sediment fractions in SGUs legacy sample inventory. Equal proportionality is assumed between the recorded sediment fractions but this may be invalid.

2) It was assumed that at least 20 replicates would be required to define the proportional makeup of each sediment class (in each sea area / depth / mapscale) . However, a power analysis was not undertaken to ensure sufficient sample availability for each surface substrate class and there is a significant range in replicate numbers between classes.

3) Where insufficient sample replication occurred to enable classification by depth, sea area and map scale data were averaged across depth ranges and between sea areas so certain classes are more reliable than others.

4) Surface substrates which form a veneer cover a smaller area of the seabed and consequently for some classes insufficient replicates were available for analysis. In this event the underlying sediment class was used for reclassification instead. In some classes on larger scale maps this might cause veneered sediments to be depicted as mixed proportions of the underlying substrate & veneer sediment fractions.

Recommendations for data improvement:

Apply a sensitivity analysis approach to determine the overall consequence of misclassification.

Review the approach to proportionality by validating the model predictions with empirical data (e.g. particle size analysis data).

Undertake an expert review.

Gather additional source data from surrounding countries to produce better harmonisation.

Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, abiotic environment, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Soft bottom aphotic" dataset is a derived from data originally provided by the Swedish Maritime Authority (SMA), the Geological Survey of Sweden (SGU), the International Council for Exploration of the Sea (ICES), the Baltic Marine Environment Protection Commission (HELCOM), the Swedish Meteorological and Hydrological Institute (SMHI). the Swedish mapping, cadastral and land registration authority (LM), the Swedish Country Administrative Boards (LS), Emodnet Bathytmetry (EMODNET-BATY), the Swedish Agency for Marine and Water Management (SwAM) and Aquabiota AB . This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMA, SGU, HELCOM, SMHI, LM, LS, EMODNET-BATY, SwAM, Aquabiota AB
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Soft bottom deep

Swedish Name	Mjukbotten djup
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-01-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer shows the predicted probability of occurrence of soft marine benthic substrates (i.e. mud, silt, and clay) in aphotic zones deeper than 60 m (generally below the halocline) around Sweden. A cell value of 0 is equivalent to a low probability of occurrence and a cell value of 100 is equivalent to a high probability of occurrence. Underlying data consists of benthic substrate data (1975-2015), depth data (2013, 2015), and photic zone data. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt visar beräknad sannolikhet för förekomst av mjukbotten (dvs. lera, silt och gyttja) i afotiska zoner djupare än 60 m (generellt under haloklinen) runtom Sverige. Ett cellvärde av 0 motsvarar låg sannolikhet för förekomst och ett cellvärde av 100 motsvarar hög sannolikhet för förekomst. Underlagsdata består av bentisk substratdata (1975-2015), djupdata (2013,2015) och fotisk zondata. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av

	denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this product comes from custom made substrate maps (2016 Estimated Proportions of Surface Substrate Classes), a depth model (2016 Geological Survey of Sweden SYMPHONY Depth Grid V2), and a photic depth layer (2016 SYMPHONY Photic Zone). Predictions of softbottom substrate class (i.e. mud, silt, and clay) were combined and extracted from the region below 60 m deep using conditional statements in ArcGIS raster calculator.

Limitations for use in Symphony:

There are a number of key limitations users should be aware of when using this dataset:

1) Only presence/absence data is available for sediment fractions in SGUs legacy sample inventory. Equal proportionality is assumed between the recorded sediment fractions but this may be invalid.

2) It was assumed that at least 20 replicates would be required to define the proportional makeup of each sediment class (in each sea area / depth / mapscale) . However, a power analysis was not undertaken to ensure sufficient sample availability for each surface substrate class and there is a significant range in replicate numbers between classes.

3) Where insufficient sample replication occurred to enable classification by depth, sea area and map scale data were averaged across depth ranges and between sea areas so certain classes are more reliable than others.

4) Surface substrates which form a veneer cover a smaller area of the seabed and consequently for some classes insufficient replicates were available for analysis. In this event the underlying sediment class was used for reclassification instead. In some classes on larger scale maps this might cause veneered sediments to be depicted as mixed proportions of the underlying substrate & veneer sediment fractions.

Recommendations for data improvement:

Apply a sensitivity analysis approach to determine the overall consequence of misclassification.

Review the approach to proportionality by validating the model predictions with empirical data (e.g. particle size analysis data).

Undertake an expert review.

Gather additional source data from surrounding countries to produce better harmonisation.

Data authoring organisation: The Geological Survey of Sweden (SGU)

Contact organisation: Swedish Agency for Marine and Water Management

Data Author Contact: gustav.kågesten@sgu.se

Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)

Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, abiotic environment, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Soft bottom deep" dataset is a derived from data originally provided by the Swedish Maritime Authority (SMA), the Geological Survey of Sweden (SGU), the International Council for Exploration of the Sea (ICES), the Baltic Marine Environment Protection Commission (HELCOM), the Swedish Meteorological and Hydrological Institute (SMHI). the Swedish mapping, cadastral and land registration authority (LM), the Swedish Country Administrative Boards (LS), Emodnet Bathytmetry (EMODNET-BATY), the Swedish Agency for Marine and Water Management (SwAM) and Aquabiota AB . This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMA, SGU, HELCOM, SMHI, LM, LS, EMODNET-BATY, SwAM, Aquabiota AB
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Soft bottom photic

Swedish Name	Mjukbotten fotisk
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised

Date Created	2017-01-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer shows the predicted probability of occurrence of soft marine benthic substrates (i.e. mud, silt, and clay) in the photic zone around Sweden. A cell value of 0 is equivalent to a low probability of occurrence and a cell value of 100 is equivalent to a high probability of occurrence. Underlying data consists of benthic substrate data (1975-2015), depth data (2013, 2015), and photic zone data. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt visar beräknad sannolikhet för förekomst av mjukbotten (dvs. lera, silt och gyttja) i den fotiska zonen runtom Sverige. Ett cellvärde av 0 motsvarar låg sannolikhet för förekomst, och ett cellvärde av 100 motsvarar hög sannolikhet för förekomst. Underlagsdata består av bentisk substratdata (1975-2015), djupdata (2013,2015) och fotisk zondata. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this product comes from custom made substrate maps (2016 Estimated Proportions of Surface Substrate Classes), a depth model (2016 Geological Survey of Sweden SYMPHONY Depth Grid V2), and a photic depth layer (2016 SYMPHONY Photic Zone). Predictions of softbottom substrate classes (i.e. mud, silt, and clay) were combined and extracted from the photic zone

	area using conditional statements in ArcGIS raster calculator.

Limitations for use in Symphony:

There are a number of key limitations users should be aware of when using this dataset:

1) Only presence/absence data is available for sediment fractions in SGUs legacy sample inventory. Equal proportionality is assumed between the recorded sediment fractions but this may be invalid.

2) It was assumed that at least 20 replicates would be required to define the proportional makeup of each sediment class (in each sea area / depth / mapscale) . However, a power analysis was not undertaken to ensure sufficient sample availability for each surface substrate class and there is a significant range in replicate numbers between classes.

3) Where insufficient sample replication occurred to enable classification by depth, sea area and map scale data were averaged across depth ranges and between sea areas so certain classes are more reliable than others.

4) Surface substrates which form a veneer cover a smaller area of the seabed and consequently for some classes insufficient replicates were available for analysis. In this event the underlying sediment class was used for reclassification instead. In some classes on larger scale maps this might cause veneered sediments to be depicted as mixed proportions of the underlying substrate & veneer sediment fractions.

Recommendations for data improvement:

Apply a sensitivity analysis approach to determine the overall consequence of misclassification.

Review the approach to proportionality by validating the model predictions with empirical data (e.g. particle size analysis data).

Undertake an expert review.

Gather additional source data from surrounding countries to produce better harmonisation.

Data authoring organisation: The Geological Survey of Sweden (SGU)

Contact organisation: Swedish Agency for Marine and Water Management

Data Author Contact: gustav.kågesten@sgu.se

Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, abiotic environment, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode

Other Restrictions	This "Soft bottom photic" dataset is a derived from data originally provided by the Swedish Maritime Authority (SMA), the Geological Survey of Sweden (SGU), the International Council for Exploration of the Sea (ICES), the Baltic Marine Environment Protection Commission (HELCOM), the Swedish Meteorological and Hydrological Institute (SMHI). the Swedish mapping, cadastral and land registration authority (LM), the Swedish Country Administrative Boards (LS), Emodnet Bathytmetry (EMODNET-BATY), the Swedish Agency for Marine and Water Management (SwAM) and Aquabiota AB . This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMA, SGU, HELCOM, SMHI, LM, LS, EMODNET-BATY, SwAM, Aquabiota AB
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Transport bottom aphotic

Swedish Name	Transportbotten afotisk
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-01-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area

	http://epsg.io/3035
Summary	This raster intends to show the predicted probability occurrence of soft marine benthic substrates (i.e. sand and gravel) in aphotic zones shallower than 60 m (generally above the halocline) in Swedish coastal and offshore waters. A value of 0 is equivalent to a low probability of occurrence and a value of 1 is equivalent to a high probability of occurrence. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad sannolikhet för förekomst av mjukbotten (dvs. sand och grus) i afotiska zonen grundare än 60 m (generellt över haloklinen) i svenska kust- och havsvatten. Ett värde av 0 motsvarar låg sannolikhet för förekomst, och ett värde av 1 motsvarar hög sannolikhet för förekomst. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this product comes from custom made substrate maps (2016 Estimated Proportions of Surface Substrate Classes), a depth model (2016 Geological Survey of Sweden SYMPHONY Depth Grid V2), and a photic depth layer (2016 SYMPHONY Photic Zone). Predictions of transport bottom substrate classes (i.e. sand and gravel) were combined and extracted from the region below the photic zone but above 60m deep using conditional statements in ArcGIS raster calculator.
Limitations for use in Symphony: There are a number of key limitations users should be aware of when using this dataset: 1) Only presence/absence data is available for sediment fractions in SGUs legacy sample inventory. Equal proportionality is assumed between the recorded sediment fractions but this may be invalid. 2) It was assumed that at least 20 replicates would be required to define the proportional makeup of each sediment class (in each sea area / depth / mapscale) . However, a power	

analysis was not undertaken to ensure sufficient sample availability for each surface substrate class and there is a significant range in replicate numbers between classes. 3) Where insufficient sample replication occurred to enable classification by depth, sea area and map scale data were averaged across depth ranges and between sea areas so certain classes are more reliable than others. 4) Surface substrates which form a veneer cover a smaller area of the seabed and consequently for some classes insufficient replicates were available for analysis. In this event the underlying sediment class was used for reclassification instead. In some classes on larger scale maps this might cause veneered sediments to be depicted as mixed proportions of the underlying substrate & veneer sediment fractions.	
Recommendations for data improvement: Apply a sensitivity analysis approach to determine the overall consequence of misclassification. Review the approach to proportionality by validating the model predictions with empirical data (e.g. particle size analysis data). Undertake an expert review. Gather additional source data from surrounding countries to produce better harmonisation.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, abiotic environment, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Transport bottom aphotic" dataset is a derived from data originally provided by the Swedish Maritime Authority (SMA), the Geological Survey of Sweden (SGU), the International Council for Exploration of the Sea (ICES), the Baltic Marine Environment Protection Commission (HELCOM), the Swedish Meteorological and Hydrological Institute (SMHI). the Swedish mapping, cadastral and land registration authority (LM), the Swedish Country Administrative Boards (LS), Emodnet Bathytmetry (EMODNET-BATY), the Swedish Agency for Marine and Water Management (SwAM) and Aquabiota AB . This derived dataset is licenced under a

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Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Transport bottom deep

Swedish Name	Transportbotten djup
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-01-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the predicted probability occurrence of soft marine benthic substrates (i.e. sand and gravel) in aphotic zones deeper than 60 m (generally below the halocline) in Swedish coastal and offshore waters. A value of 0 is equivalent to a low probability of occurrence and a value of 1 is equivalent to a high probability of occurrence. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the

	cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad sannolikhet för förekomst av mjukbotten (dvs. sand och grus) i afotiska zonen djupare än 60 m (generellt under haloklinen) i svenska kust- och havsvatten. Ett värde av 0 motsvarar låg sannolikhet för förekomst, och ett värde av 1 motsvarar hög sannolikhet för förekomst. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this product comes from custom made substrate maps (2016 Estimated Proportions of Surface Substrate Classes), a depth model (2016 Geological Survey of Sweden SYMPHONY Depth Grid V2), and a photic depth layer (2016 SYMPHONY Photic Zone). Predictions of transport bottom substrate classes (i.e. sand and gravel) were combined and extracted from the region below 60m deep using conditional statements in ArcGIS raster calculator.

Limitations for use in Symphony:

There are a number of key limitations users should be aware of when using this dataset:

1) Only presence/absence data is available for sediment fractions in SGUs legacy sample inventory. Equal proportionality is assumed between the recorded sediment fractions but this may be invalid.

2) It was assumed that at least 20 replicates would be required to define the proportional makeup of each sediment class (in each sea area / depth / mapscale) . However, a power analysis was not undertaken to ensure sufficient sample availability for each surface substrate class and there is a significant range in replicate numbers between classes.

3) Where insufficient sample replication occurred to enable classification by depth, sea area and map scale data were averaged across depth ranges and between sea areas so certain classes are more reliable than others.

4) Surface substrates which form a veneer cover a smaller area of the seabed and consequently for some classes insufficient replicates were available for analysis. In this event the underlying sediment class was used for reclassification instead. In some classes on larger scale maps this might cause veneered sediments to be depicted as mixed proportions of the underlying substrate & veneer sediment fractions.

Recommendations for data improvement: Apply a sensitivity analysis approach to determine the overall consequence of misclassification. Review the approach to proportionality by validating the model predictions with empirical data (e.g. particle size analysis data). Undertake an expert review. Gather additional source data from surrounding countries to produce better harmonisation.	
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Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, abiotic environment, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Transport bottom deep" dataset is a derived from data originally provided by the Swedish Maritime Authority (SMA), the Geological Survey of Sweden (SGU), the International Council for Exploration of the Sea (ICES), the Baltic Marine Environment Protection Commission (HELCOM), the Swedish Meteorological and Hydrological Institute (SMHI). the Swedish mapping, cadastral and land registration authority (LM), the Swedish Country Administrative Boards (LS), Emodnet Bathytmetry (EMODNET-BATY), the Swedish Agency for Marine and Water Management (SwAM) and Aquabiota AB . This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMA, SGU, HELCOM, SMHI, LM, LS, EMODNET-BATY, SwAM, Aquabiota AB
Security Classification	no protection required

Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Transport bottom photic

Swedish Name	Transportbotten fotisk
Symphony Theme	Habitat
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-01-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the predicted probability occurrence of soft marine benthic substrates (i.e. sand and gravel) in the photic zone in Swedish coastal and offshore waters. A value of 0 is equivalent to a low probability of occurrence and a value of 1 is equivalent to a high probability of occurrence. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad sannolikhet för förekomst av mjukbotten (dvs. sand och grus) i den fotiska zonen i svenska kust- och havsvatten. Ett värde av 0 motsvarar låg sannolikhet för förekomst, och ett värde av 1 motsvarar hög sannolikhet för förekomst. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och

	vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this product comes from custom made substrate maps (2016 Estimated Proportions of Surface Substrate Classes), a depth model (2016 Geological Survey of Sweden SYMPHONY Depth Grid V2), and a photic depth layer (2016 SYMPHONY Photic Zone). Predictions of transport bottom substrate class (i.e. sand and gravel) were combined and extracted for the area within the photic zone using conditional statements in ArcGIS raster calculator.

Limitations for use in Symphony:

There are a number of key limitations users should be aware of when using this dataset:

1) Only presence/absence data is available for sediment fractions in SGUs legacy sample inventory. Equal proportionality is assumed between the recorded sediment fractions but this may be invalid.

2) It was assumed that at least 20 replicates would be required to define the proportional makeup of each sediment class (in each sea area / depth / mapscale) . However, a power analysis was not undertaken to ensure sufficient sample availability for each surface substrate class and there is a significant range in replicate numbers between classes.

3) Where insufficient sample replication occurred to enable classification by depth, sea area and map scale data were averaged across depth ranges and between sea areas so certain classes are more reliable than others.

4) Surface substrates which form a veneer cover a smaller area of the seabed and consequently for some classes insufficient replicates were available for analysis. In this event the underlying sediment class was used for reclassification instead. In some classes on larger scale maps this might cause veneered sediments to be depicted as mixed proportions of the underlying substrate & veneer sediment fractions.

Recommendations for data improvement:

Apply a sensitivity analysis approach to determine the overall consequence of misclassification.

Review the approach to proportionality by validating the model predictions with empirical data (e.g. particle size analysis data).

Undertake an expert review.

Gather additional source data from surrounding countries to produce better harmonisation.

Data authoring organisation: The Geological Survey of Sweden (SGU)

Contact organisation: Swedish Agency for Marine and Water Management

Data Author Contact: gustav.kågesten@sgu.se

Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, abiotic environment, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Transport bottom photic" dataset is a derived from data originally provided by the Swedish Maritime Authority (SMA), the Geological Survey of Sweden (SGU), the International Council for Exploration of the Sea (ICES), the Baltic Marine Environment Protection Commission (HELCOM), the Swedish Meteorological and Hydrological Institute (SMHI). the Swedish mapping, cadastral and land registration authority (LM), the Swedish Country Administrative Boards (LS), Emodnet Bathytmetry (EMODNET-BATY), the Swedish Agency for Marine and Water Management (SwAM) and Aquabiota AB . This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMA, SGU, HELCOM, SMHI, LM, LS, EMODNET-BATY, SwAM, Aquabiota AB
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Grey seal

Swedish Name	Gråsäl
Symphony Theme	Marine Mammals

Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-02-23
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2010 2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the predicted distribution of Grey seals in Swedish marine waters. A cell value of 0 is equivalent to zero abundance and a cell value of 100 is equivalent to high relative abundance. Underlying data are inventory data from national monitoring (2010-2015) that have been modelled. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad distribution av gråsäl i svenska havsvatten. Ett cellvärde av 0 motsvarar ingen abundans, och ett cellvärde av 100 motsvarar hög relativ abundans. Underlagsdata är inventeringsdata från nationell övervakning (2010-2015) som modellerats. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data are inventory point data (2010-2015) collected as part of national monitoring of Grey Seals from The Swedish Museum of Natural History (Naturhistoriska riksmuseet). Data processing took the following steps: 1. Interpolate point data using a search window with a radius of 60 km (home range)

	2. Compensate the distribution to account for longer migration behaviour and the ratio of land/water within the home range for each cell. 3. Adjust to SYMPHONY requirements and normalise.
Limitations for use in Symphony: No limitations identified by SLU	
Recommendations for data improvement: No recommendations suggested by SLU	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: marten.erlandsson@slu.se; ulf.bergstrom@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine biota, marine ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Grey seal" dataset is a derived from monitoring data collected by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and the Museum of Natural History in Stockholm (Naturhistoriska riksmuseet). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua, NRM
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Harbour seal

Swedish Name	Knubbsäl
Symphony Theme	Marine Mammals
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-02-23
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2010 2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the predicted distribution of Harbour seals in Swedish marine waters. A cell value of 0 is equivalent to zero abundance and a cell value of 100 is equivalent to a high relative abundance. Underlying data are inventory data from national monitoring (2010-2015) that have been modelled. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad distribution av knubbsäl i svenska havsvatten. Ett cellvärde av 0 motsvarar ingen abundans, och ett cellvärde av 100 motsvarar hög relativ abundans. Underlagsdata är inventeringsdata från nationell övervakning (2010-2015), som modellerats. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för

	andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data are inventory point data (2010-2015) collected as part of national monitoring of Harbour Seals from the Swedish Ocean Archive (Svenska Hav Arkiv - SHARK) at the Swedish Meteorological and Hydrological Institute (SMHI). Data processing took the following steps: 1. Interpolate point data using a search window with a radius of 40 km (home range) 2. Compensate the distribution to account for the ratio of land/water within the home range for each cell. 3. Adjust to SYMPHONY requirements and normalise.
Limitations for use in Symphony: No limitations identified by SLU	
Recommendations for data improvement: No recommendations suggested by SLU	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: marten.erlandsson@slu.se; ulf.bergstrom@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine biota, marine ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Harbour seal" dataset is a derived from data provided by the Swedish Meteorological and Hydrological Institute (SMHI). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.

Map Acknowledgement	SMHI
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Hard bottom photic

Swedish Name	Hårdbotten fotisk
Symphony Theme	Marine Mammals
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-01-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer shows the predicted probability of occurrence of hard marine benthic substrates (i.e. rocks, boulders, and bedrock) in the photic zone around Sweden. A cell value of 0 is equivalent to a low probability of occurrence and a cell value of 100 is equivalent to a high probability of occurrence. Underlying data consists of benthic substrate data (1975-2015), depth data (2013, 2015), and photic zone data. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt visar beräknad sannolikhet för förekomst av hårdbotten (dvs. sten, block och berggrund) i den fotiska

	zonen runt Sverige. Ett cellvärde av 0 motsvarar låg sannolikhet för förekomst av hårdbotten, och ett cellvärde av 100 motsvarar hög sannolikhet för förekomst. Underlagsdata består av bentisk substratdata (1975-2015), djupdata (2013,2015) och fotisk zondata. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this product comes from custom made substrate maps (2016 Estimated Proportions of Surface Substrate Classes), a depth model (2016 Geological Survey of Sweden SYMPHONY Depth Grid V2), and a photic depth layer (2016 SYMPHONY Photic Zone). Predictions of hardbottom substrate class (i.e. rocks, boulders, and bedrock) were combined and extracted from the region within the photic zone using conditional statements in ArcGIS raster calculator.

Limitations for use in Symphony:

There are a number of key limitations users should be aware of when using this dataset:

1) Only presence/absence data is available for sediment fractions in SGUs legacy sample inventory. Equal proportionality is assumed between the recorded sediment fractions but this may be invalid.

2) It was assumed that at least 20 replicates would be required to define the proportional makeup of each sediment class (in each sea area / depth / mapscale) . However, a power analysis was not undertaken to ensure sufficient sample availability for each surface substrate class and there is a significant range in replicate numbers between classes.

3) Where insufficient sample replication occured to enable classification by depth, sea area and map scale data were averaged across depth ranges and between sea areas so certain classes are more reliable than others.

4) Surface substrates which form a veneer cover a smaller area of the seabed and consequently for some classes insufficient replicates were available for analysis. In this event the underlying sediment class was used for reclassification instead. In some classes on larger scale maps this might cause veneered sediments to be depicted as mixed proportions of the underlying substrate & veneer sediment fractions.

Recommendations for data improvement:

Apply a sensitivity analysis approach to determine the overall consequence of misclassification.

Review the approach to proportionality by validating the model predictions with empirical data (e.g. particle size analysis data).

Undertake an expert review.

Gather additional source data from surrounding countries to produce better harmonisation.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine biota, marine ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Hard bottom photic" dataset is a derived from data originally provided by the Swedish Maritime Authority (SMA), the Geological Survey of Sweden (SGU), the International Council for Exploration of the Sea (ICES), the Baltic Marine Environment Protection Commission (HELCOM), the Swedish Meteorological and Hydrological Institute (SMHI). the Swedish mapping, cadastral and land registration authority (LM), the Swedish Country Administrative Boards (LS), Emodnet Bathymetry (EMODNET-BATY), the Swedish Agency for Marine and Water Management (SwAM) and Aquabiota AB . This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMA, SGU, HELCOM, SMHI, LM, LS, EMODNET-BATY, SwAM, Aquabiota AB
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Porpoise baltic sea

Swedish Name	Tumlare Östersjön
Symphony Theme	Marine Mammals
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-18-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2011-2013
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show marine areas utilised by porpoises in coastal and offshore waters in the Baltic Sea proper. This raster is derived from acoustic monitoring data collected between 2011 to 2013 These data represent the Baltic Sea Porpoise population (a distinct group) over an annual period. A cell value of 0 shows areas where no porpoises are predicted and a cell value of 100 is equivalent to the maximum predicted average annual population density. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa marina områden vilka används av tumlare i kust- och havsvatten i Egentliga Östersjön. rasterskiktet är baseras på akustiska övervakningsdata som samlats in mellan 2011 och 2013. Dessa data representerar Östersjöviktspopulationen (en distinkt grupp) över en årlig tidsperiod. Ett cellvärde av 0 visar områden där inga tumlare förväntas förekomma, och ett cellvärde av 100 motsvarar maximala beräknada, genomsnittlig årlig populationsdensitet. Denna data skapades som ett data input layer för ’Symphony’ verktyget utvecklat av enheten för havsplaneringen på Havs- och

	vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	These data were prepared primarily from acoustic monitoring data collected during the SAMBAH project between 2011 and 2013. The probability of encountering porpoises was calculated from measurements of sounds emitted from the animals. The study included animals in the Baltic Sea between Åland and the Belt Sea (see method description in Static Acoustic Monitoring of the Baltic Harbor porpoise, SAMBAH, non-technical report http://www.sambah.org/Non-technical-report-v.-1.8.1.pdf). Summer and winter data were provided and these were combined (mean average) to produce an annual dataset for Symphony. The SAMBAH project (See SAMBAH Non-technical report) suggests a limit of the Baltic porpoise population. At this suggested demarcation line was therefore used to isolate the Baltic Population for separate treatment in Symphony. Data were extrapolated using an inverse distance weighting algorithmn to avoid a sharp break. Values were normalized between 0 - 100 using a linear transformation (where 100 represents the maximum value in the data). The were then resampled to a 250mx250m grid. More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.

Limitations for use in Symphony: In avoid a sharp boundary the area between the Belt Sea population and the Baltic Sea population have been interpolated from the maximum value along the population limit proposed in the project SAMBAH (See SAMBAH Non-technical report) down to zero along an arbitrary limit at Bornholm. The demarcation generates a fictitious decline in the Baltic population in the west-southwest direction, which does not correspond to real conditions.	
Recommendations for data improvement:	
Data authoring organisation: Swedish Agency for Marine and Water Management	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se

INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine biota, marine ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Porpoise baltic sea" dataset is a derived from source data from the SAMBAH Life project (LIFE08 NAT/S/000261). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	LIFE SAMBAH
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Porpoise belt sea

Swedish Name	Tumlare Bälthavet
Symphony Theme	Marine Mammals
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-18-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	1997-2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035

Summary	This raster intends to show marine areas utilised by porpoises in the Belt Sea (Danish Straights). Underlying data are modelled population density data generated from tracking of 78 satellite-tagged porpoises during two periods between 1997 and 2016 by Aarhus University. These modelled data were then normalized and log transformed for use in Symphony. A cell value of 0 shows areas where no porpoises are predicted and a cell value of 100 is equivalent to the maximum average annual population density (within the Swedish EEZ). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa marina områden som används av tumlare i Bältsjön. Underlaget härrör från modellerad populationsdensitetsdata beräknad från spårningsdata som samlats in från 78 satellitmärkta tumlare. Spårningsdata samlades in under två perioder mellan åren 1997 och 2016 av Århus Universitet. Dessa modellerade data normaliserades och log-transformerades sedan för att användas i Symphony. Ett cellvärde av 0 visar områden där inga tumlare förväntas förekomma, och ett cellvärde av 100 motsvarar den maximala beräknade genomsnittliga årliga populationsdensiteten (inom Svensk EEZ). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Since 1997, Aarhus University (AU) has been attaching satellite transmitters on harbour porpoises incidentally caught in pound nets in the inner Danish waters (Kattegat, Belt Seas, the Sound and the western Baltic). For detailed description of tagging methodology see Sveegaard et al. (2011a). The telemetry tracking data allows for a detailed view of movement of the individual porpoises. However, by combining data from several porpoises, a good overview of the entire porpoise population distribution may be obtained. Such a study was published in 2011 containing the data from 64 porpoises tagged from 1997 – 2007 (Sveegaard et al. 2011). From 2007 to 2016, Aarhus University have tagged an additional 56 individuals i.e. 120 harbour porpoises in total.

	Data from 18 individuals were removed prior to further analysis by Aarhus due to data quality issues. The data from 78 animals (located in the Belt Sea area) were analysed by Aarhus univeristity using kernel density estimation (KDE) generating summer, winter and annual datasets. A detail description of the KDE method can be found in Sveegaard et al 2011 data were filtered using a DAR filter (Distance, Angle, Rate, Douglas Argos filter v7.03) to 1 location per porpoise per day. KDE were performed using the ArcToolbox in ArcGIS v. 10.3. Grid size = 1x1 km, smoothing factor = 20.000 and each animal were weighted equally in the analysis. In preparation for use in Symphony only the annual data were used and these data were logarithmically transformed and normalised. The data were transformed using a (Log10 (cell value + 1) calculation in ArcGIS. Values were then normalized (linear rescale in ArcGIS) between 0 - 100 with 100 representing the maximum value within the Swedish EEZ. The were then resampled to the 250mx250m Symphony grid. More detailed information on the lineage and methodology is available and can be supplied on request to the data owner. Method reference: Sveegaard, S., Teilmann, J., Tougaard, J., Dietz, R., Mouritsen, K.N., Desportes, G., Siebert, U., 2011. High-density areas for harbour porpoises (Phocoena phocoena) identified by satellite tracking. Mar. Mam. Sci. 27, 230–246.

Limitations for use in Symphony:

These data are based on porpoises which were caught in Danish waters, this may lead to sampling bias (when intending to represent populations in Swedish waters).

The porpoise population data were log transformed before being used in Symphony – this 'smooths' the data providing a more general data trend. It is intended to ensure the data is conservatively interpreted. Smoothing the data does however decrease the spatial specificity and the relative importance of specific spatial 'hotspots' which could be linked for example to seabed features.

Recommendations for data improvement:

The effect of pressures on the different populations (i.e. Belt-sea, Baltic and North Sea population) should be evaluated separately as sensitivity may vary due to the large difference in total population size.

Collection of additional data from animals in Swedish waters would enhance data quality.

Further work to test for spatial relationships between the porpoise population and predictor variables (e.g. seabed/water column features) might provide additional insight relevant to spatial planning.	
Data authoring organisation: Swedish Agency for Marine and Water Management	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine biota, marine ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Porpoise belt sea" dataset is a derived from source data from DCE - Danish Centre For Environment And Energy, Aarhus University (www.dce.au.dk). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	DCE, AARHUS UNI
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Porpoise north sea

Swedish Name	Tumlare Nordsjön
Symphony Theme	Marine Mammals
Symphony Category	Ecosystem
Symphony Data Type	Normalised

Date Created	2017-18-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	1997-2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show marine areas utilised by porpoises in the North Sea (North Sea/Skagerrak/Northern Kattegat area.). Underlying data are modelled population density data generated from tracking of 78 satellite-tagged porpoises during two periods between 1997 and 2016 by Aarhus University. These modelled data were then normalized and log transformed for use in Symphony. A cell value of 0 shows areas where no porpoises are predicted and a cell value of 100 is equivalent to the maximum average annual population density (within the Swedish EEZ). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa marina områden som används av tumlare i Nordsjön (Skaggerak). Underlaget härrör från modellerad populationsdensitetsdata beräknad från spårningsdata som samlats in från 78 satellitmärkta tumlare. Spårningsdata samlades in under två perioder mellan åren 1997 och 2016 av Århus Universitet. Dessa modellerade data normaliserades och log-transformerades sedan för att användas i Symphony. Ett cellvärde av 0 visar områden där inga tumlare förväntas förekomma, och ett cellvärde av 100 motsvarar den maximala beräknade genomsnittliga årliga populationsdensiteten (inom Svensk EEZ). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Since 1997, Aarhus University (AU) has been attaching satellite transmitters on harbour porpoises incidentally caught in pound nets in the inner Danish waters (Kattegat, Belt Seas, the Sound

	and the western Baltic). For detailed description of tagging methodology see Sveegaard et al. (2011a). The telemetry tracking data allows for a detailed view of movement of the individual porpoises. However, by combining data from several porpoises, a good overview of the entire porpoise population distribution may be obtained. Such a study was published in 2011 containing the data from 64 porpoises tagged from 1997 – 2007 (Sveegaard et al. 2011). From 2007 to 2016, Aarhus University have tagged an additional 56 individuals i.e. 120 harbour porpoises in total. Data from 18 individuals were removed prior to further analysis by Aarhus due to data quality issues. The data from 62 animals (located in the North Sea area) were analysed by Aarhus univeristity using kernel density estimation (KDE) generating summer, winter and annual datasets. A detail description of the KDE method can be found in Sveegaard et al 2011 data were filtered using a DAR filter (Distance, Angle, Rate, Douglas Argos filter v7.03) to 1 location per porpoise per day. KDE were performed using the ArcToolbox in ArcGIS v. 10.3. Grid size = 1x1 km, smoothing factor = 20.000 and each animal were weighted equally in the analysis. In preparation for use in Symphony only the annual data were used these data were then logarithmically transformed and normalised. The data were transformed using a (Log10 (cell value + 1) calculation in ArcGIS. Values were then normalized (linear rescale in ArcGIS) between 0 - 100 with 100 representing the maximum value within the Swedish EEZ. The were then resampled to the 250mx250m Symphony grid. More detailed information on the lineage and methodology is available and can be supplied on request to the data owner. Method reference: Sveegaard, S., Teilmann, J., Tougaard, J., Dietz, R., Mouritsen, K.N., Desportes, G., Siebert, U., 2011. High-density areas for harbour porpoises (Phocoena phocoena) identified by satellite tracking. Mar. Mam. Sci. 27, 230–246.
Limitations for use in Symphony: These data are based on porpoises which were caught in Danish waters, this may lead to sampling bias (when intending to represent populations in Swedish waters). The porpoise population data were log transformed before being used in Symphony – this 'smooths' the data providing a more general data trend. It is intended to ensure the data is conservatively interpreted. Smoothing the data does however decrease the spatial specificity and the relative importance of specific spatial 'hotspots' which could be linked for example to seabed features.	
Recommendations for data improvement:	

The effect of pressures on the different populations (i.e. Belt-sea, Baltic and North Sea population) should be evaluated separately as sensitivity may vary due to the large difference in total population size. Collection of additional data from animals in Swedish waters would enhance data quality in future analyses.	
Data authoring organisation: SwAM (WSP/Århus University)]	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine biota, marine ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Porpoise north sea" dataset is a derived from source data from DCE - Danish Centre For Environment And Energy, Aarhus University (www.dce.au.dk). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	DCE, AARHUS UNI
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Ringed seal

Swedish Name	Vikare
Symphony Theme	Marine Mammals

Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2017-02-23
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2010 2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the predicted distribution of Ringed seals in Swedish marine waters. A cell value of 0 is equivalent to zero abundance and a cell value of 100 is equivalent to high relative abundance. Underlying data are inventory data from national monitoring (2010-2015) that have been modelled. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad distribution av vikare i svenska havsvatten. Ett cellvärde av 0 motsvarar ingen abundans, och ett cellvärde av 100 motsvarar hög relativ abundans. Underlagsdata är inventeringsdata från nationell övervakning (2010-2015), som modellerats. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.

Lineage	Data are inventory point data (2010-2015) collected as part of national monitoring of Ringed Seals from the Swedish Ocean Archive (Svenska Hav Arkiv - SHARK) at the Swedish Meteorological and Hydrological Institute (SMHI). Data processing took the following steps: 1. Interpolate point data using a search window with a radius of 60 km (home range). 2. Compensate the distribution to account for the ratio of land/water within the home range for each cell. 3. Adjust to SYMPHONY requirements and normalise.
Limitations for use in Symphony: No limitations identified by SLU	
Recommendations for data improvement: No recommendations suggested by SLU	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: marten.erlandsson@slu.se; ulf.bergstrom@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine biota, marine ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Ringed Seal" dataset is a derived from monitoring data collected by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and the Museum of Natural History in Stockholm (NRM). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.

Map Acknowledgement	SLU Aqua, NRM
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Angiosperms

Swedish Name	Blomväxter
Symphony Theme	Plants
Symphony Category	Ecosystem
Symphony Data Type	Normalised
Date Created	2016-08-15
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2008 2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster indicates the propagation of Angiosperms and Charales (which includes both seagrasses and freshwater green algae) in Swedish shallow water coastal environments. The data is derived from satellite imagery analysis (Sentinel 2A and SPOT 5 satellites) and observational data from field surveys. A cell value of 0 is equivalent to zero probability of presence and a cell value of 100 is equivalent to a high probability of presence. Underlying data are from two sources and consist of data (May 2008, September 2016) from satellite image analyses. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data

	for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt indikerar utbredning av Angiospermer och Charales (som inkluderar både sjögräs och sötvattensgrönalger) i grunda kustvattenmiljöer. Data härstammar från satellitbildsanalys (Sentinel 2A och SPOT5 satelliter) och observationsdata från fältunderökningar. Ett cellvärde av 0 motsvarar ingen sannolikhet för förekomst, och ett cellvärde av 100 motsvarar hög sannolikhet för förekomst. Underlagsdata härrör från två källor bestående av data från satellitbildsanalyser (maj 2008, september 2016). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset was created by aggregating previous satellite image analyses of these vegetation types based on SPOT 5 images, with new analyzes of the rest of Sweden based on Sentinel 2A images into a 250m grid resolution (downsampled from 10m to 250m) and mosaicing these data into a single layer. The Spot 5 analysis was undertaken for Västra Götaland, Östergötland and Kalmar County and the analysis and method is described in detail in the report: Ålgräsbreddning (Zostera sp.) In Västra Götaland County in summer 2008, County Administrative Board of Västra Götaland County, Water Conservation Unit, Report 2012: 58 (http://www.lansstyrelsen.se/vastragotaland/SiteCollectionDocuments/Sv/publications /2012/2012-58.pdf). The previous analysis results (i.e. 10x10m resolution data) are available from the County Administrative Board of Västra Götaland County (ref Ewa Lawett), and the new Sentinel 2A images at Manrax AB (ref Mats Envall).
Limitations for use in Symphony: There is no distinction between freshwater and saltwater species in this data product. No attempt has been made to model the specific distribution of habitat forming species (e.g. zostera). The data is based on satellite data imagery and as a consequence is limited due to light attenuation in the water column (particularly in turbid water environments surrounding such as river mouths). Water column correction was not undertaken on the satellite imagery.	
Recommendations for data improvement: Atmospheric and water column correction should improve the classification accuracy (particularly in deep water) it is not clear if this was undertaken. Modelling the distribution of various species (e.g. zostera and eelgrass) based on additional environmental criteria such as water depth, substrate salinity and exposure is possible. Some of these data are available (but likely require improvement). Given the importance and vulnerability of seagrass habitats (in particular) this would be highly valuable.	

Data authoring organisation: Medins Havs och Vattenkonsulter AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: mats.envall@manrax.com	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine environment, marine biota, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Angiosperms" dataset is a derived in part from source data provided by Country Administrative Board of Västra Götaland and the Swedish Meteorological and Hydrological Institute (SMHI). This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Medins Havs och Vattenkonsulter AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMHI, LS
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Pressures

Habitat loss fish farm

Swedish Name	Habitatförlust fiskodling
Symphony Theme	Aquaculture
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2018-09-25
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2018
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show areas where potential habitat loss can occur from the presence of fish farms in Swedish coastal and offshore waters. Underlying data consists of fish farm presence data in the form of an excel file from Sweden's national register of aquaculture licences. A cell value of 0 is equivalent to no risk of habitat loss from fish farms and a cell value of 100 is equivalent to a risk of habitat loss from fish farms. Note that the source data refers to licenced sites but no verification has been made to check their operational status. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa områden där habitatförlust potentiellt kan förekomma på grund av fiskodling i svenska kust- och havsvatten. Underlagsdata består av fiskodlingsförekomstdata i form av en Excel-fil från Sveriges nationella register över vattenbrukslicenser. Ett cellvärde av 0

	motsvarar ingen risk för habitatförlust på grund av fiskodling, och ett cellvärde av 100 motsvarar risk för habitatförlust på grund av fiskodling. Kvävehalter har även adderades till de utpekade områdena för fiskodling för att ge ett mer dynamiskt indata för beräkning av kumulativ miljöpåverkan. Observera att källdata avser licensierade anläggningar, men ingen verifikation har gjorts på deras driftstatus. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset is based on a vector point data showing the location of fish farms in Swedish waters. The data was sourced from jordbruksverket who maintain Sweden's national aquaculture register. Further information can be found here: http://www.svensktvattenbruk.se and data can be accessed here: http://www.jordbruksverket.se/etjanster/etjanster/landsbygdsutveckling/sokvattenbruk.4.4b2051c513030542a92800011259.html 1. The source data was downloaded to an excel file and these data were used to create a point shapefile. 2. Point layer was bufferd to 500m 3. Nitrogene concentrations were added to each buffer ring manually. Overlapping rings were given summed value (max=1) 4. Buffer polygones were converted to 25x25 raster format and adjusted to the Symphony standard grid (cell size 25m). 5. The final Symphony layer was created by Snap to raster/processing extant Symphony grid, Cellfactor 10, Aggregation technique MEAN .
Limitations for use in Symphony: There are many factors that can influence the degree of impact from fish farming (for example exposure / currents, feeding systems etc) which are not included in this model. Furthermore, there is no information included on the size of the fish farm or the fish stock density which is likely important to know. If the data is from the national register this refers to licenced sites but no verification has been made to check their operational status. Previous studies suggest this might be a significant difference: see figure 12 page 43 http://www.naturvardsverket.se/Documents/publikationer/978-91-620-6376-4.pdf	
Recommendations for data improvement: Verify the operational status of fishfarms and gather data on impacts Gather attribution which will allow the allocation of variable impact scores. Knowledge of coastal currents and exposure could provide information to model relative impacts (a lack of water movement is likely to increase the probability of impacts). Empirical information detailing site level pollution would be useful for validation of any predictions.	
Data authoring organisation: Medins Havs och Vattenkonsulter AB	

Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: martin.mattsson@medinsab.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	habitat loss, environmental impacts of aquaculture
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Habitat loss fish farm" dataset is a derived from source data provided by Swedish Board of Agriculture (SBA). This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SBA
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2018-09-25
Metadata Organisation	Swedish Agency for Marine and Water Management

Metadata Contact	Linus.hammar@havochvatten.se

Habitat loss mussel farm

Swedish Name	Habitatförlust musselodling
Symphony Theme	Aquaculture
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-09-25
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2018
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show areas where potential habitat loss can occur from the presence of mussel farms in Swedish coastal and offshore waters. Underlying data consists of mussel farm presence data sourced in the form of an excel file from Sweden's national register of aquaculture licences. A cell value of 0 is equivalent to no risk of habitat loss from mussel farms and a cell value of 100 is equivalent to a risk of habitat loss from fish farms. Note that the source data refers to licenced sites but no verification has been made to check their operational status. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa områden där habitatförlust potentiellt kan förekomma på grund av musselodling i svenska kust- och havsvatten.

	Underlagsdata består av data över förekomst av musselodlingar i form av en Excel-fil från Sveriges nationella register över vattenbrukslicenser. Ett cellvärde av 0 motsvarar ingen risk för habitatförlust på grund av musselodling, och ett cellvärde av 100 motsvarar risk för habitatförlust på grund av musselodling. Varje musselodling har även tilldelats ett habitatförlustsvärde. Observera att källdata avser licensierade anläggningar, men ingen verifikation har gjorts på deras driftstatus. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset is based on a vector point data showing the location of fish farms in Swedish waters. The data was sourced from jordbruksverket who maintain Sweden's national aquaculture register. Further information can be found here: http://www.svensktvattenbruk.se and data can be accessed here: http://www.jordbruksverket.se/etjanster/etjanster/landsbygdsutveckling/sokvattenbruk.4.4b2051c513030542a92800011259.html 1. The source data was downloaded to an excel file and these data were used to create a point shapefile. 2. Point layer was bufferd to 500m 3. Habitat loss were added to each buffer ring manually. Overlapping rings were given summed value (max=1) 4. Buffer polygones were converted to 25x25 raster format and adjusted to the Symphony standard grid (cell size 25m). 5. The final Symphony layer was created by Snap to raster/processing extant Symphony grid, Cellfactor 10, Aggregation technique MEAN .
Limitations for use in Symphony: There is no information on site size (area), volume of mussel production or factors such as the site's hydrological conditions which might be utilised to produce relative impact scores for different sites. In addition although sites may have been licenced they might not be active and they might only be active during certain temporal periods.	
Recommendations for data improvement: Gather attribution which will allow the allocation of variable impact scores. Knowledge of coastal currents and exposure could provide information to model relative impacts (a lack of water movement is likely to increase the probability of impacts). Empirical information detailing site level pollution would be useful for validation of any predictions.	
Data authoring organisation: Medins Havs och Vattenkonsulter AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: martin.mattsson@medinsab.se	
Data Owner	Swedish Agency for Water and Marine Management

	(Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	habitat loss, environmental impacts of aquaculture
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Habitat loss mussel farm" dataset is a derived from source data provided by Swedish Board of Agriculture (SBA). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SBA
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2018-09-25
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Nutrients fish farm

Swedish Name	Fiskodling näringsämnen
Symphony Theme	Aquaculture
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2018-09-25
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2018
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show areas where potential nutrient enrichment due to the presence of fish farms in Swedish coastal and offshore waters. Underlying data consists of fish farm presence data in the form of an excel file from Sweden's national register of aquaculture licences. A cell value of 0 is equivalent to no risk of enrichment from fish farms and a cell value of 100 is equivalent to a risk of enrichment from fish farms. Note that the source data refers to licenced sites but no verification has been made to check their operational status. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa områden där frigöring av patogener potentiellt är möjlig på grund av fiskodling i svenska kust- och havsvatten. Underlagsdata består av fiskodlingsförekomstdata i form av en Excel-fil från Sveriges nationella register över vattenbrukslicenser. Ett cellvärde av 0 motsvarar ingen risk för habitatförlust på grund av fiskodling, och ett cellvärde av 100 motsvarar risk för habitatförlust på grund av fiskodling. Kvävehalter har även adderades till de utpekade områdena för fiskodling för

	att ge ett mer dynamiskt indata för beräkning av kumulativ miljöpåverkan. Observera att källdata avser licensierade anläggningar, men ingen verifikation har gjorts på deras driftstatus. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset is based on a vector point data showing the location of fish farms in Swedish waters. The data was sourced from jordbruksverket who maintain Sweden's national aquaculture register. Further information can be found here: http://www.svensktvattenbruk.se and data can be accessed here: http://www.jordbruksverket.se/etjanster/etjanster/landsbygdsutveckling/sokvattenbruk.4.4b2051c513030542a92800011259.html 1. The source data was downloaded to an excel file and these data were used to create a point shapefile. 2. Point layer was bufferd to 1000m 3. Nitrogene concentrations were then calculated to each buffer ring manually. Overlapping rings were given summed value. 4. Buffer polygones were converted to 25x25 raster format and adjusted to the Symphony standard grid (cell size 25m). 5. The final Symphony layer was created by Snap to raster/processing extant Symphony grid, aggregation technique MEAN

Limitations for use in Symphony:

There are many factors which can influence the degree of nutrient enrichement from fish farming (for example exposure / currents, feeding systems etc) which are not included in this model. Furthermore, there is no information included on the size of the fish farm, fish stock density or montioring data which would be valuable for risk assessment.

If the data is from the national register this refers to licenced sites but no verification has been made to check their operational status. Previous studies suggest this might be a significant difference: see figure 12 page 43 http://www.naturvardsverket.se/Documents/publikationer/978-91-620-6376-4.pdf

Recommendations for data improvement:

Verify the operational status of fishfarms and gather data on impacts

Gather attribution which will allow the allocation of variable impact scores. Knowledge of coastal currents and exposure could provide information to model relative impacts (a lack of water movement is likely to increase the probability of impacts). Empirical information detailing monitoring of site level patogens would be most useful.

Data authoring organisation: Medins Havs och Vattenkonsulter AB

Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: martin.mattsson@medinsab.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	habitat loss, environmental impacts of aquaculture
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Nutrients fish farm" dataset is a derived from source data provided by Swedish Board of Agriculture (SBA). This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SBA
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2018-09-25
Metadata Organisation	Swedish Agency for Marine and Water Management

Metadata Contact	Linus.hammar@havochvatten.se

Climate change acidification

Swedish Name	Klimatförändring havsförsurning
Symphony Theme	Climate Change
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-02-21
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2030 2050
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster layer intends to show the predicted increase in sea surface water acidity (i.e. decrease in pH) due to global climate change by the year 2050. Source data are from the North American Atmospheric Administration (NOAA) and are based on the Representative Concentration Pathway climate forecast model - RCP8.5 which is a baseline climate scenario (with comparatively high greenhouse gas emissions) . A cell value of zero is equivalent to no change in ocean acidity by the year 2050 and a cell value of 100 equates to a pH decrease of 0.2 by 2050. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad ökad havsförsurning (dvs. minskat pH) på grund av globala klimatförändringar vid år 2050. Källdata kommer från North American Atmospheric Administration (NOAA) och baseras på the Representative Concentration Pathway

	climate forecast model - RCP8.5 vilken är ett baseline klimatscenario (med jämförelsevis höga utsläpp av växthusgaser). Ett cellvärde av 0 motsvarar ingen förändring i aciditet vid år 2050, och ett cellvärde av 100 motsvarar en minskning i pH med 0,2 vid år 2050. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The raster shows sea acidification by 2050, modelled by NOAA with scenario RCP8.5 (note - RCP stands for representative concentration pathway which is a set of socio-economic assumptions which are used to build a climate scenario. In this scenario there is a rising radiative forcing pathway leading with human emissions resulting in a 8.5 watts per square meter output by 2100. This is a high global anthropogenic radiative forcing scenario. Details about the scenario can be found here: https://link.springer.com/article/10.1007%2Fs10584-011-0149-y Two datasets from NOAAs geophysical fluid dynamics laboratory were downloaded from https://esg-dn1.nsc.liu.se/search/cmip5/ Data ID = cmip5.output1.NOAA-GFDL.GFDL-ESM2G.rcp85.yr.ocnBgchem.Oyr.r1i1p1.v20110601|esgdata.gfdl.noaa.gov Data ID = cmip5.output1.NOAA-GFDL.GFDL-ESM2M.rcp85.yr.ocnBgchem.Oyr.r1i1p1.v20110601|esgdata.gfdl.noaa.gov Ocean acidity data were extracted from the NetCDF files for the baseline (a mean of the 2006-2010) and for the 2050 prediction (mean of the 2046-2050 period) The coordinate system was transformed from tripole grid to ETRS89 and these point data were interpolated to create raster data layers. The rasters were resample to the standard 250m symphony grid. For each model the difference between the baseline dataset and the modelled 2050 future was calculated and a single pH change dataset was created. The average of the ESM2G / ESM2M ocean oriented earth system model runs was used for the final product. The raster was then normalized (linear stretch) to values between 0 - 100 where maximum value 100 = 0.2 pH increase (the maximum average predicted increase).
Limitations for use in Symphony:	

NOAAs ocean acidification data is modelled at a global scale and as a consequence it does not have a high spatial resolution (50km grid) and local hydrological and biophysical conditions are not factored into this model prediction (due to the high cost in computing power). This will significantly increase the model uncertainty.	
Recommendations for data improvement: SMHIs work on climate model downscaling based on the combination of global modelled data and their regional climate model (RCO) has been useful tool for the development of higher resolution prediction in Sweden. At present ocean acifidification is not included as a parameter in any regional models - it would be a useful addition.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	ocean acidification, climate change impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Climate change acidification" dataset is a derived from source data provided by the United States National Ocean and Atmospheric Administration (NOAA). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	NOAA
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management

Swedish Agency for Marine and Water Management

Metadata Contact	Linus.hammar@havochvatten.se

Climate change temperature

Swedish Name	Klimatförändring temperatur
Symphony Theme	Climate Change
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-02-21
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2030 2050
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster layer intends to show the predicted increase in sea surface temperature due to global climate change by the year 2050 in Swedish inshore and offshore waters. The source data for this product are from the Swedish Meteorological and Hydrological Institute (SMHI) and are based on their RCO -SCOBI emission scenario A2 (which is predicts comparatively high greenhouse gas emissions). A cell value of zero is equivalent to no sea surface temperature increase by the year 2050 and a cell value of 100 equates to a temperature increase of 2 degrees Celsius by 2050 (the highest increase predicted in the Symphony study area. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad ökning av ytvattenstemperatur på grund av globala klimatförändringar vid år 2050, i svenska kust- och havsvatten.

	Källdata för denna produkt kommer från Sveriges meteorologiska och hydrologiska institut (SMHI) och är baserat på deras RCO-SCOBI emission scenario A2 (vilken förutsäger jämförelsevis höga utsläpp av växthusgaser). Ett cellvärde av 0 motsvarar ingen ökning av ytvattenstemperatur vid år 2050, och ett cellvärde av 100 motsvarar en temperaturökning med 2 grader Celsius vid år 2050 (den högsta beräknada ökningen inom Symphonys studieområde). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset shows the temperature change (difference between baseline mean 2010-2029 and future mean value for 2035-2064 was calculated based on the regional climate predictions produced by SMHI with their RCO-SCOBI coupled biogeochemical model using forcing data based on the IPCC's A2 scenario (high global emissions). A more detailed description of SMHIs modelling and the results can be found here: https://www.diva-portal.org/smash/get/diva2:947527/FULLTEXT01.pdf More detail on the A2 global emission scenario described by IPCC https://ipcc.ch/pdf/special-reports/spm/sres-en.pdf SMHI's RCO-SCOBI model does not cover the entire Symphony area (missing the Kattegat) so a blanking value is used here. The model has a spatial resolution of 3.7km. Summer mean sea surface temperature predictions were extracted from the SMHI dataset for 2010-2029 and 2035-2064 and mean values calculated. The difference between these values was used to create a predicted temperature increase dataset. Grids have been normalized to values between 0 - 100 where maximum value 100 = 2 degrees Celsius increase (the maximum predicted change).
Limitations for use in Symphony: Only data for the Baltic and the Kattegat were available and therefore a uniform temperature increase level was used for the Skagerrak.	

Recommendations for data improvement: Data are required for the whole of Swedish waters and therefore new data should be requested from SMHI - perhaps the data from RCO-SCOBI could be combined with lower resolution data from EURO-CORDEX to provide a prediction for the Kattegat area. http://www.euro-cordex.net/ The RCO-SCOBI model is 4D so it would also be useful to understand the changes in deep water conditions as this may be more useful for understanding impacts on benthic species and ecosystems.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	global temperature increase, climate change impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Climate change temperature" dataset is a derived from source data provided by the Swedish Meteorological and Hydrological Institute (SMHI). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMHI
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Habitat loss coastal exploitation

Swedish Name	Habitatförlust kustexploatering
Symphony Theme	Coastal Development
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-08-15
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2010 2013
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the predicted coastal exploitation within a zone 300 m from the water line along the Swedish coast. A cell value of 0 is equivalent to no exploitation and a cell value of 100 is equivalent to high exploitation. Underlying data are from two sources and consist of presence data, in the form of shape files, for houses and building (2013), harbours and marinas (2010) , and jetties/docks/piers (2010) that have been modelled and combined. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad kustexploatering inom en zon av 300 m från vattenlinjen längs den svenska kusten. Ett cellvärde av 0 motsvarar ingen exploatering, och ett cellvärde av 100 motsvarar hög grad av exploatering. Underlagsdata härrör från två källor och består av förekomstdata i form av shape-filer för hus och byggnader (2013), hamnar och marinor (2010) och bryggor/kajer/pirar (2010) som har modellerats och kombinerats. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig

	aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This layer was produced by converting three layers “beach exploitation (strandexploatering)” (from the County Administrative Board of Norrland, shapefile, polygon), “jetties/docks/piers (bryggor)” and “harbours/marinas (hamn/marina)” (from the Swedish Environmental Protection Agency, shapefiles, polygon and point) to a raster with Symphony standard raster resolution (i.e. 250 m grid cells). Layers were then weighted according to agreed upon values (1 beach exploitation, 3 jetties/docks/piers, 10 harbours), and mosaicked to a single layer and normalised.
Limitations for use in Symphony: These data are weighted to give emphasis to marine development (harbours and docks). This product assumes that habitat change due to development equates to loss. In some circumstances habitat may be created due to development. This is not considered in these data.	
Recommendations for data improvement: Provide justification for weighting: for example is there some evidence to justify why harbours are given a 10 times higher impact score? Update with latest data (currently under production by METRIA). Determine if there is a requirement to extract certain development types for addition to an artificial reef dataset.	
Data authoring organisation: Medins Havs och Vattenkonsulter AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: mats.envall@manrax.com	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	coastal development, habitat loss, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Habitat loss coastal exploitation" dataset is a derived in part from source data provided by Country Administrative Board of Norrland and the Swedish Environmental Protection Agency. This derived dataset

	is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Medins Havs och Vattenkonsulter AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SEPA, LS
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Habitat loss dumping

Swedish Name	Habitatförlust dumpning
Symphony Theme	Coastal Development
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-12-26
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2014
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show areas where potential habitat loss can occur from dredge spoil dumping in Swedish coastal and offshore waters. Underlying data are from two sources of data which consist of a point vector dataset detailing the location of licensed dredge disposal sites (from 2014) and benthic substrate data (from 2006). The dataset is binary and a cell value of 0 is equivalent to no risk of habitat loss due dredge spoil dumping and a cell value of 100 is equivalent to a risk of habitat loss due to dredge spoil dumping. Note that no specific information were available in a national data archive detailing the source, type and volume

	of sediment being dumped. This has been approximated through analysis of surrounding sediment types. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa områden där habitatförlust potentiellt kan förekomma på grund av dumpning av muddermassor i svenska kust- och havsvatten. Underlagsdata härrör från två datakällor bestående av ett rasterskikt med punktvektorer som specificerar plats för licensierade muddringsanläggningar (från 2014), och bentisk substratdata (från 2006). Detta rasterskikt är binärt och ett cellvärde av 0 motsvarar ingen risk för habitatförlust på grund av dumpning av muddermassor, ett cellvärde av 100 motsvarar risk för habitatförlust på grund av dumpning av muddermassor. Observera att ingen specifik information fanns tillgänglig i nationella dataarkiv angående källa, typ och volym av dumpade sediment istället har detta skattats utifrån analys av omgivningens sediment. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This data was created based on the assumption that dumping spoils with a different grain size will lead to habitat loss in the short term (although this is likely reversible). Two source datasets were used in the model. The location of licenced dredge disposal sites was provided by the Geological Survey of Sweden and this was in turn derived from data supplied by the Swedish Agency for Marine and Water Management (SwAM). The second dataset used was dominant sediment type derived from Helcom's 2006 Balance project. Each point location record was allocated the bottom substrate type derived from the sediment dataset using a spatial join and then each site was buffered by 200m. A comparison of the sediment type at each site and the nearest port was undertaken and differences between sediment

	types were used to guide a spatial selection of sites which are likely to result in habitat loss. These vector data were then translated to a binary raster file matching the Symphony grid specification.
Limitations for use in Symphony: Metadata indicates that substrate data from HELCOM's 2006 Balance project was used rather than the updated substrate data produced by SGU for this project. The sites are buffered by 200m (note that this means some sites cover 1 cell and others 3 depending on the location of the point).	
Recommendations for data improvement: Data detailing the location sites licenced for dredge dumping sites is not well managed. The locations of dumpsites were updated to 2015 by SGU based on information provided by SwAM but no attribution for example detailing the quantities of sediment were available so it was not possible to model the relative impact at different sites. This could be improved in a future model iteration. There are currently some data on HELCOM's portal (HOLAS 2) and EMODNET human activities portal detailing dumping sites but little metadata is available.	
Data authoring organisation: Dansk Hydraulisk Institut (DHI) Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: johan.kling@dhi.se; christin.eriksson@dhi.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	coastal development, ocean dumping, habitat loss, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Habitat loss dumping" dataset is a derived from source data provided by Swedish Agency for Marine and Water Management (SwAM) and the Swedish County Administration Boards (LS) and the Geological Survey of Sweden (SGU). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data

	derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SwAM, LS, SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Habitat loss Infrastructure

Swedish Name	Habitatförlust infrastruktur
Symphony Theme	Coastal Development
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-08-15
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the loss of habitat due to physical infrastructure on the seabed in Swedish coastal and offshore waters. The source data includes coastal features (road and rail bridges, lighthouses) and the nordstream pipeline. The data were derived primarily from Lantmateriets open data (terrain map and road map). A cell value of zero is equivalent to no habitat loss and a cell value of 100 is equivalent to a complete replacement of habitat. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.

Summary (Swedish)	Detta rasterskikt avser att visa habitatförlust på grund av fysisk infrastruktur på havsbotten i svenska kust- och havsvatten. Källdata inkluderar kustområden (väg- och järnvägsbroar, fyrar) och Nord Streams rörledning. Data kommer huvudsakligen från Lantmäteriets öppna data (Terrängkartan och Vägkartan). Ett cellvärde av 0 motsvarar ingen habitatförlust, och ett cellvärde av 100 motsvarar fullständig habitatförändring. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Source data for this layer are: Lighthouses from Lantmäteriet's Terrain map (tk_riks_Sweref_99_TM_shape.zip) downloaded 20160816 Railway bridges from Lantmäteriet's Road Map (vk_riks_Sweref_99_TM_shape.zip) downloaded 20160816 Road bridges from Lantmäteriet's Road map (vk_riks_Sweref_99_TM_shape.zip) downloaded 20160816 Pipelines (Nord stream) provided by the Swedish Agency for Water Management These data were processed as follows: Clip lighthouses in the sea, remove lighthouses on land and create a polygon with buffer (25m), manual position corrections with aerial photography. Clip roads in the sea, remove roads that are on land and create polygon with buffer (25m), manual position corrections with aerial photography. Clip railways in the sea, remove railways on land and create polygon with buffer (25m), manual position corrections with aerial photography. Create polygon with buffer (25m) around the Nord Stream pipeline Copy and paste each layer to a single layer. Scale so presence = 100 and absence = 0.
Limitations for use in Symphony: The model is limited in source data for example coastal features such as docks and piers and anchored offshore navigational features such as buoys or markers and offshore windfarm turbines are not included. The assumption the habitat is lost within 25m is very simplistic.	

Recommendations for data improvement: Add additional features. Wind turbine data are available from the Swedish National Grid, aids to navigation are available from the Swedish Maritime Authority and docks and piers are available from the Swedish Environmental Protection Agency. Gather attribution on feature dimensions that could be used to refine the model.	
Data authoring organisation: Medins Havs och Vattenkonsulter AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: martin.mattsson@medinsab.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	coastal development, habitat loss, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Habitat loss Infrastructure" dataset is a derived from data provided by the Swedish transport authority (STA) and the Swedish mapping, cadastral and land registration authority (LM). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Medins Havs och Vattenkonsulter AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	STA, LM
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Synthetic toxins treatment plant

Swedish Name	Giftiga ämnen reningsverk

Symphony Theme	Coastal Development
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-12-09
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2013
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show areas with potential synthetic toxin contamination associated with wastewater treatment plants in Swedish coastal waters (≤ 500 m from coast). Underlying data consists of wastewater treatment plant presence data in the form of shapefiles. A cell value of 0 is equivalent to low potential water contamination (> 1000 m from wastewater treatment plant) and a cell value of 100 is equivalent to potential water contamination (≤ 1000 m from wastewater treatment plant). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa områden med avloppsreningsverk i svenska kustvatten (≤ 500 m från kust) som potentiellt är förorenade med syntetiska miljögifter. Underlagsdata består av avloppsreningsverksdata i form av shape-filer. Ett cellvärde av 0 motsvarar låg potentiell vattenförorening (> 1000 m från avloppsreningsverk), och ett cellvärde av 100 motsvarar potentiell vattenförorening (≤ 1000 m från avloppsreningsverk). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.

Lineage	This dataset is based on vector data sourced from the Swedish County Administration Boards known as "SE.US Miljöförvaltningsanläggningar" which is published as an open INSPIRE compliant dataset on Sweden's INSPIRE geodata portal: www.geodata.se. This data shows permitted environmentally hazardous activities. This data includes wastewater treatment plants and other industrial activities and their operational status. This dataset was last compiled in 2013. All wastewater treatment plant sites within 500m of the coast (identified with a spatial query) were extracted and these selected point records were buffered with a 1000m buffer. This buffered dataset was then converted to a raster format.

Limitations for use in Symphony:

The 1000 buffer is a simplistic risk estimate.

The data includes only sites within 500m of the coast and does not therefore include the influence of upstream effluent releases.

Recommendations for data improvement:

Develop a clear rationale for applying any buffer. Ideally use a spatially graduated reduction in impact risk with distance (rather than a binary high/no impact.

Model the influence of upstream effluent release locations (for example by scaling river mouth locations depending on number of upstream sites).

Gather empirical data and information (e.g. from SEPA/County Admin monitoring) which can be used to develop and validate a better model of spatial risk of organic/synthetic toxin pollution. Water quality monitoring data can be downloaded from http://viss.lansstyrelsen.se and sediment pollution data is available from SGU https://www.sgu.se/produkter/geologiska-data/oppna-data/maringeologi-oppna-data/marina-data-i-atomfloden/

Gather attribute information on for example from the county admin boards that could be used to modify risk levels (based on data such as volumes permitted to be released) and environmental criteria (such as data on currents / sediments).

The frequency of emergency discharges might also be a factor for scaling impact risk - for example: http://www.nsva.se/var-verksamhet/spillvatten/braddning-och-nodavlopp/

Data authoring organisation: Dansk Hydraulisk Institut (DHI) Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: johan.kling@dhi.se; christin.eriksson@dhi.se	
Data Owner	Swedish Agency for Water and Marine Management

	(Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	coastal development, waste water treatment, chemical pollution, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Synthetic toxins treatment plant" dataset is a derived from source data provided by the Swedish County Administration Boards (Länsstyrelse). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	LS
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Explosions peak

Swedish Name	Explosioner maximaltryck (peak maximum pressure)
Symphony Theme	Defence
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-09
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset

Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show predicted time integrated peak overpressure (kPa) after detonations equivalent to 236 kg of TNT from defence detonation practice areas in Swedish coastal and offshore waters. A cell value of 0 is equivalent to 70 kPa peak overpressure or less and a cell value of 100 is equivalent to 2500 kPa peak overpressure or more at 52 occasions per year. Underlying data consists of presence data in the form of shapefiles that have then been modelled. This raster refers to pressure waves (which may impact all marine life), these spread less efficiently through the water than sound so sound / noise from explosions are represented separately in a layer named 'Explosion SEL'. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa det beräknada tidsintegrerade trycket (peak overpressure kPa) till följd av sprängning motsvarande 236 kg TNT inom försvarets sprängövningsområden i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar ett tryck av 70 kPa eller mindre (vid dessa nivåer eller under har ingen påverkan på tumlare observerats), och ett cellvärde av 100 motsvarar ett tryck av 2500 kPa eller mer under 52 tillfälle per år. Underlagsdata består av förekomstdata i form av shape-filer som har modellerats. Detta skikt avser tryckvågor (som kan påverka allt marint liv), dessa sprids mindre effektivt via vattnet än ljudet så ljud / buller från explosioner representeras separat i ett skikt med namnet "Explosion SEL". Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	A link between peak over pressure (kPA) and distance from detonation from Benda-Beckmann et al., 2015 (Assessing the Impact of Underwater Clearance of Unexploded Ordnance on Harbour Porpoises) was used. kPA from an explosion with a force equivalent to 263 kg TNT was then modelled

	from the Swedish Armed Forces' detonation practice areas. Values above the highest value (i.e. 2500 kPa) measured by Benda-Beckman et al., 2015 were used as the maximum value in the raster (i.e. cell value of 100). The resulting raster was linearly normalised with the minimum value (i.e. cell value of 0) representing the threshold where detrimental effects are unlikely (i.e. 70 kPa). Results were time integrated using reports of historical (2015) number of explosions in permitted areas and assuming a weekly recovery time (thus 52 explosions per year genereates maximum score). There is insufficient information available from the Swedish Armed Forces to assess whether the scale of the detonations is reasonable with respect to the Armed Forces' activities within respective detonation areas. Discussion on the method did not occur between WSP (consultant) and the Swedish Armed Forces (data source). More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: The data available for modelling consists of the location of the practice areas used by the military and not the specific location, type or frequency of explosions and as a consequence the impact levels can only be assumed.	
Recommendations for data improvement: Gather additional attribution from the Armed Forces detailing typical loading weights in each area, in order to adjust the modelling to the appropriate type of detonation. Gather positional data on the specific locations of explosion detonations in order to improve the spatial data resolution of the predicted impacts.	
Data authoring organisation: Swedish Agency for Marine and Water Management	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	military activities , environmental impact ,
Access Use Restrictions	Licence

Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Explosions peak" dataset is a derived from source data provided by the Swedish Armed Forces (FM). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	FM
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Explosions SEL

Swedish Name	Explosioner ljudnivå (Sound Exposure Level)
Symphony Theme	Defence
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-09
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show predicted time integrated sound exposure levels (SEL) after detonations equivalent to 236 kg of TNT from defence detonation practice areas in Swedish inshore and offshore waters. A cell value of 0 is equivalent to 164 dB re 1 uPa SEL or less (at this level or below no effects on porpoises are observed) and a cell value of 100 is equivalent to 216 dB re 1 uPa SEL or more at 52

	occasions per year. Underlying data consists of presence data in the form of shapefiles that have then been modelled. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad tidsintegrerad ljudexponeringsnivå (SEL) till följd av sprängning motsvarande 236 kg TNT inom försvarets sprängövningsområden i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar 164 dB re 1 uPa eller lägre (vid dessa nivåer eller lägre har ingen påverkan på tumlare observerats), och ett cellvärde av 100 motsvarar 216 dB re 1 uPa SEL eller högre vid 52 tillfällen per år. Underlagsdata består av förekomstdata i form av shape-filer som modellerats. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	A link between sound exposure level (SEL) and distance from detonation from Benda-Beckmann et al., 2015 (Assessing the Impact of Underwater Clearance of Unexploded Ordnance on Harbour Porpoises) was used. SEL from an explosion with a force equivalent to 263 kg TNT was then modelled from the Swedish Armed Forces' detonation practice areas. As information on the localisation of individual detonations was not available it was assumed that a detonation could occur at least once per year anywhere within the detonation practice areas. Values above the highest value (i.e. 216 dB re 1 uPa SEL) measured by Benda-Beckman et al., 2015 were used as the maximum value in the raster (i.e. cell value of 100). The resulting raster was linearly normalised with the minimum value (i.e. cell value 0) representing the threshold where injuries to porpoises are first observed (TTS of 164 dB re 1 uPa SEL) (Benda-Beckman et al., 2015). Results were time integrated using reports of historical (2015) number of explosions in permitted areas and assuming a weekly recovery time (thus 52 explosions per year genereates maximum score).

	There is insufficient information available from the Swedish Armed Forces to assess whether the scale of the detonations is reasonable with respect to the Armed Forces' activities within respective detonation areas. Discussion on the method did not occur between WSP (consultant) and the Swedish Armed Forces (data source). More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: The data available for modelling consists of the location of the practice areas used by the military and not the specific location, type or frequency of explosions and as a consequence the impact levels can only be assumed.	
Recommendations for data improvement: Gather additional attribution from the Armed Forces detailing typical loading weights in each area, in order to adjust the modelling to the appropriate type of detonation. Gather positional data on the specific locations of explosion detonations in order to improve the spatial data resolution of the predicted impacts.	
Data authoring organisation: Swedish Agency for Marine and Water Management	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	Military activities , Environmental impact ,
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Explosions SEL" dataset is a derived from source data provided by the Swedish Armed Forces (FM). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.

Map Acknowledgement	FM
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Heavy metals military area

Swedish Name	Tungmetaller militärområden
Symphony Theme	Defence
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-04-17
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the predicted risk of inorganic toxin contamination in marine sediments as a consequence of firing in military practice areas in Swedish coastal and offshore waters. The data is a simplistic model which makes the assumption that the sediment contamination from firing ranges is higher towards the centre of practice areas. A value of 100 represents a high risk for high levels of inorganic toxins in sediments and a value of 0 represents toxins at background level. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.

Summary (Swedish)	Detta rasterskikt avser att visa beräknad risk för oorganiska miljögifter i marina sediment som en följd av skjutningar i militära övningsområden i svenska kust- och havsvatten. Detta data är en förenklad modell vilken gör antagandet att sedimenten är mer förorenade på grund av skjutning närmre centrum av övningsområdet. Ett värde av 100 motsvarar hög risk för höga nivåer av oorganiska miljögifter i sediment, och ett värde av 0 motsvarar bakgrundsnivåer av miljögifter. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset was created using the national interest (riksinteressen) data from the Swedish Armed Forces detailing 'exercise areas and firing ranges at sea' and military 'areas with an impact on the surroundings' - the data was provided by the Swedish Agency for Marine and Water Management. Processing was as follows: 1) Firing ranges were imported. 2) Coastal intersection points were calculated 3) Ranges split into 3 layers based on scale and shape - funnel shaped areas were assumed to be ranges that deploy artillery and were split into large - areas over 20,000m2, medium - between 20 and10,000km2 and small - under 5000km2. It was assumed that larger artillery are used in larger firing ranges. 3) Concentric ring buffers were generated from the centroid of the coastal intersection points. 4) Allocate a stepwise score with distance for large ranges 10 - 5km, 30 - 10km, 30 - 15km, 80 - 20km, 60 - 25km, 50 - 30km, 40 - 35km, 30 - 40km, 20 - 45km, 10 > 50km 5) Allocate a stepwise score with distance for medium ranges 10 - 2km, 30 - 4km, 30 - 6km, 80 - 8km, 60 - 10km, 50 - 12km, 40 - 14km, 30 - 16km, 20 - 18km, 10 > 20km 6) Allocate a stepwise score with distance for small ranges 10 - 0.5km, 30 - 1km, 30 - 1.5km, 80 - 2km, 60 - 2.5km, 50 - 3km, 40 - 3.5km, 30 - 4km, 20 - 4.5km, 10 > 5km

	Note - the spread of fire was assumed to be in an arc with the dominant area of impact fairly close but diminishing with distance. 7) All remaining areas (non funnel shaped) were assumed to be areas with only small arms fire and therefore were allocated an impact score of 10 8) All data layers were combined into a single raster layer 9) A spatial filter was applied to blur the data (focal statistics, 5km mean) 10) Data were rescaled on a 0-100 scale and clipped to the Symphony Grid.
Limitations for use in Symphony: This data is a simplistic model which is based on a number of unverified assumptions. It should therefore be treated as a risk layer which should be validated. In particular the pattern of pressure is an assumption and the level of toxicity due to metals is unknown and assumed based on unverified assumptions. These data should therefore be used with caution.	
Recommendations for data improvement: The Swedish Armed Forces could provide additional data which can be used to produce an accurate model. Details of the type of firing range, how long they have been operational, the kinds of munitions used now and historically and their metal content, likely firing patterns etc could all be used to produce better models, however it is recognised that these kinds of data might be of a sensitive nature. Any environmental data however should be made available if this exists. A more reliable model with empirical validation would be highly recommended.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: duncan.hume@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	chemical pollution , military activities , environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode

Other Restrictions	This "Heavy metals military area" dataset is a derived from source data provided by the Swedish Armed Forces (Försvarsmakten). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	FM
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Disturbance windpower

Swedish Name	Vindkraft fågelstörning
Symphony Theme	Energy
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-09
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show predicted areas surrounding wind power turbines in Swedish coastal and offshore waters where seabirds display avoidance behaviour. A cell value of 0 is equivalent to no avoidance behaviour (> 3000 m from wind power turbine) and a cell value of 100 is equivalent to high relative avoidance behaviour (< 500 m from wind power turbines). Underlying data consists of presence data in the form of a shapefile that has been modelled.

	Note: The model accuracy is approximately 3 km however there are no documented general "avoidance distances" for multiple species or even multiple sites so that data should be used with some caution. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa områden kring vindkraftverk i svenska kust- och havsvatten där sjöfåglar uppvisar undvikande beteende runt vindkraftturbiner. Ett cellvärde av 0 motsvarar inget undvikande beteende (> 3000 m från vindkraftsverk), och ett cellvärde av 100 motsvarar högt relativt undvikande beteende (< 500 m från vindkraftverk). Underlagsdata består av förekomstdata i form av en shape-fil som har modellerats. Observera att modellnoggrannheten är cirka 3 km, det finns dock inga dokumenterade allmänna ”undvikandeavstånd” för olika arter eller olika områden så denna data bör användas med viss försiktighet. Denna data skapades som ett data input layer för ’Symphony’ verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data were from the Swedish National Grid (SVK) and included a shape file of offshore wind farms. Data processing was as follows: The distance from the nearest wind power turbines was calculated using a buffer with a fixed distance (500, 1000, 1500, 2250 and 3000 m). The values were aggregated where “the highest value wins”. There is no general rule that dictates distance for avoidance of wind power turbines by seabirds but is instead species and location specific. The lower limit of 3000 m is a theoretical impact distance for avoidance behaviour by seabirds that has been mentioned in environmental impact assessments (Ramböll, 2015). However, the literature does not demonstrate that a known avoidance occurs down to this distance (e.g. the so called synthesis report from Vindval, Green et al., 2011 specifies, as a rule, avoidance at less than 500 m and typically at approx. 100-200 m, with the exception of loons where reduced density has been

	demonstrated down to approx. 2km). Normalisation was linear with respect to the areal impact, where areas outside of the theoretical impact areas (i.e. > 3000 m) were assigned a cell value of 0 and areas within 500 m of wind power turbines were assigned a cell value of 100. Discussion of the method occurred between WSP (consultant) and SWaM (client). More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: The model accuracy is approximately 3 km however there are no documented general "avoidance distances" for multiple species or even multiple sites so that data should be used with some caution. It may also be important to note that avoidance studies often fail to describe the spatial scale of avoidance and they affected by weather and other behavioural factors. The height of the wind turbines are not included in this model. Mitigation of windfarm construction includes building higher turbines which can theoretically reduce the risk of collision (for some species) - see https://www.bto.org/sites/default/files/u28/downloads/Projects/Final_Report_SOSS02_BTOReview.pdf.	
Recommendations for data improvement: Commission research or gather evidence on avoidance distances (including scales) and flight heights of species within offshore windfarms. Gather attribution on wind farm turbine dimensions that can be used to modify risk based on turbine size.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	Wind power, Environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Disturbance windpower" dataset is a derived from source data provided by the Swedish National Grid (SVK). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of

	the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SVK
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Electromagnetic field

Swedish Name	Elektromagnetiska fält
Symphony Theme	Energy
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-11-03
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show presence of electromagnetic fields (i.e. presence of high voltage power cables) in Swedish coastal and offshore waters. A cell value of 0 is equivalent to no presence and a cell value of 100 is equivalent to presence. Underlying data are from several different sources and consist of presence data in the form of shapefiles. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.

Summary (Swedish)	Detta rasterskikt avser att visa förekomst av elektromagnetiska fält (dvs. förekomst av högspänning kraftledningar) i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar ingen förekomst, och ett cellvärde av 100 motsvarar förekomst. Underlagsdata härrör från flera olika källor och består av förekomstdata i form av shape-filer. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	A compilation of data on underwater cables from the Swedish Agency for Marine and Water Management (SwAM) was converted to a raster where grid cells in which sea cables were present were assigned a value of 100 and cells where sea cables were absent were assigned a value of 0. It was assumed that only high voltage power transmission cables produce biologically relevant electromagnetic fields so these were selected from the dataset supplied by SwAM. A review of the literature suggested that areas impacted by electromagnetic fields were well below 250 m (i.e. one grid cell) from the source. Original data on sea cables within Swedish waters were from the Swedish national grid (SVK), E-ON and HELCOM. Discussion on the method occurred between WSP (consultant) and SwAM (client). More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.

Limitations for use in Symphony:

The mapping accuracy varies between the objects in the database. There is a difference in the position of the SwePol cable reported by Svenska Kraftnät and data from 4COffshore. The degree of accuracy within the Swedish EEZ has been estimated to be higher in the SVK data.

An extensive inventory of the design of the cables and site-specific conditions is required to determine the surface propagation of the electromagnetic fields. Currently, only where power lines are present, and where electromagnetic fields may occur, are indicated. Modelling of impact on ecosystem components should therefore be performed with caution.

Recommendations for data improvement:

Gather additional attribution detailing the type of cable and design and method of deployment / installation. Determine the positional accuracy of the data and gather references and empirical evidence that can be used to validate assumptions made about the spatial impact of EMF from cables.

Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	cable, environmental impact ,
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Electromagnetic field" dataset is a derived from source data provided by the Swedish National Grid (SK), EON and HELCOM. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SK, EON, HELCOM
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Noise 125Hz wind power

Swedish Name	Undervattensbuller 125 Hz vindkraft
Symphony Theme	Energy
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-09
Status	Completed

Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show predicted sound level exposure at a frequency of 125 Hertz from wind power in Swedish coastal and offshore waters. A cell value of 0 is equivalent to low exposure (<100dB re 1 uPa) and a cell value of 100 is equivalent to high exposure (>150 dB re 1 uPa). The maximum noise level is based on values recorded during during strong winds at Lillegrund windfarm (7km from Oresund Bridge) and these maximum values are used as proxy for yearly average noise emissions. The modelled noise pressure should therefore be considered to be a very conservative (loud) estimation of the noise pollution from wind power. Underlying data are from several sources and consist of offshore wind farm data, bottom substrate data, and depth data that have been combined and modelled. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad ljudexponering från vindkraft i frekvensområdet 125 Hertz i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar låg exponering (<100 dB re 1 uPa), och ett cellvärde av 100 motsvarar hög exponering (>150 dB re 1 uPa). Den maximala ljudnivån baseras på värden som registrerats under starka vindar vid Lillegrunds vindkraftpark (7 km från Oresundsbron) och dessa maximala värden används som proxy för årliga genomsnittliga bullerutsläpp. Det modellerade bullertrycket bör därför anses vara en mycket konservativ (hög) uppskattning av bullerföroreningen från vindkraft. Underlagsdata härrör från flera olika källor och består av havsbaserad vindkraftsparksdata, bottensubstratsdata och djupdata som kombinerats och modellerats. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering.

	Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	With the assistance of a generalised spreading model (RL = SL – TL) the Received Level (RL) of sound was calculated for all cells in the SYMPHONY at a frequency of 125 Hz. SL = Source level. Transmission loss (TL) was calculated as a function of the distance from the source (distance) as well as bottom substrate character at the source. For shallow (<30M) bottom with hard sediment character the function 15 × log(distance) was used and for other conditions the function 20 × log(distance) was used. Bottom substrate classification was based on maps of bottom substrate purpose produced by the Geological Survey of Sweden (SGU) for SYMPHONY. Bottom substrates where the proportion of soft bottom was > 50% were defined as having soft sediment character. The aggregated sound from all wind power turbines over a year were combined and converted to sound intensity. The yearly average was calculated and then converted to sound volume expressed in average decibels (dBavg), which was calculated as follows: dBavg =10 × log10(∑Δt/T×(10)^((RL intensity/10)) summed over all Δt under the whole time period T (1 year alternatively 6 months). The source sound volume that was applied was 136 dB at a frequency of 127 Hz (integrated over the frequency range 123 – 132 Hz), which was measured at Lillgrund as a conservative 'worst case' in the upper range for existing wind power turbines. The values for the wind power park at Middelgrunden, Bockstigen and Vindeby demonstrate source volumes < 136 dB (Miller, 2009, Underwater noise from three types of offshore wind turbines, Andersson et al, 2011, Vindval rapport 6436). A value of 114 dB at a one-third octave band centered on 125 Hz has been specified for Middelgrunden which further emphasises that the proposed value of 136 dB constitutes a conservative assumption for wind power turbine. Data were linear normalized between 100 and 150 dB yearly average. More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: Attention should be paid to the underlying quality and accuracy of the sediment substrate data. In particular the Geological Survey of Sweden (SGU) provided data on the probability of occurrence of soft sediment substrates for these modelling, these data are based on both on dominant grain size and categorical maps based on hydroacoustic data. The model does not include information on sediment compaction and morphology which will certainly affect	

sound propagation. This model should therefore be used with caution and should not be used for detailed studies of smaller areas. The model should be used with caution outside Sweden within HavExtend, because there are modelled positions for the wind power plant and because the confidence in the substrate data is lower.	
Recommendations for data improvement: s. Sound propagation models can be made considerably more complicated and "heavy". Modulated data has been checked against validated model for Lillgrund and there is a slight difference due to the use of generalized sound propagation factors. In the case of wind turbines, noise levels are low, which may mean that this minor error is not considered to be so important for the analysis in Symphony. Note that the noise relates only to wind turbines without masking or other effects. In reality, many other sounds occur in the ocean. If you want to develop the data set, you can develop a site-specific sound spread factor and turbine-specific source noise for each wind farm, but this is much more time-consuming and costly.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	merchant shipping , environmental impact , noise pollutant
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Noise 125Hz wind power" dataset is a derived from source data provided by the Swedish National Grid (SK). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SK
Security Classification	no protection required
Maintenance	Review Planned 2018
Metadata Date	2017-12-01

Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Nitrogen background

Swedish Name	Kvävebakgrund
Symphony Theme	Eutrophication
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2018-09-25
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2018
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster dataset intends to show the predicted background nitrogen concentrations in Swedish inshore and offshore coastal surface waters. The source data consist of modelled water column nitrogen data in the form of NetCDF files for offshore areas and polygon shapefiles for inshore areas. Data were supplied by the Swedish Meteorological and Hydrological Institute. A cell value of zero is equivalent to zero nitrogen in surface waters and 100 is equivalent to 112mg/l of nitrogen (the highest recorded level). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad bakgrundsnivå av kvävekoncentrationer i ytvatten i svenska kust- och havsvatten. Källdata består av modellerad vattenkolumnsdata med kväve i form av NetCDF-filer för havsvattenområden och

	polygonshape-filer för kustområden. Data tillhandahölls av Sveriges meteorologiska och hydrologiska institut (SMHI). Ett cellvärde av 0 motsvarar inget kväve i ytvattnet, och ett cellvärde av 100 motsvarar 112 mg/l kväve (högsta uppmätta nivå). Resultatet normalisrades efter värdet för God ekologisk status från EU:s havsmiljödirektiv. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this data product consist of three datasets supplied by SMHI. The first two were surface Nitrogen concentrations were extracted from two NetCDF files provided by SMHI: BalticSea_Water_body_total_nitrogen_year.nc and NorthSea_Water_body_total_nitrogen_year.nc. These are modelled water column data created using the DIVA interpolation tool (https://github.com/gher-ulg/DIVA) and which can be downloaded from emodnet-chemstry.eu Average annual P values for the period 2005 to 2014 were extracted from the NetCDF files for surface waters. These data were reprojected from WGS84 to ETR89 and clipped to the Symphony standard grid. Data for the Baltic and North Sea regions were merged using a transitional mask around the Oresund area. These interpolated data are inaccurate in the coastal zone and therefore a third dataset detailing modelled nitrogen levels in the coastal zone were provided by SMHI (Swedish Costal zone Model version 1.0.4, revision 512, model data 1999-2008), these data were provided with a coarse spatial resolution - mapped to polygons matching the transitional waters of the water framework directive. Data are published here: https://vattenweb.smhi.se Mean average total nitrogen concentrations were extracted from the coastal zone model data. This annual average inshore data were then merged with the offshore datalayers using a mosiac function. The data were then normalised on a 0-100 scale using a linear rescale function. The highest value (100) equating to

	121.32mg/l of Nitrogen - the highest recorded average concentration in any of the 3 source datalayers. The result was then normalized to Good env. Status EU´s Marine strategy framework Directive. >0 = eutrophycation.
Limitations for use in Symphony: This 'annual average' dataset was created by merging data from two different temporal periods (offshore 2005-2014 and inshore 1999-2008). The inshore dataset is based on large polygon areas with very low spatial resolution yet spatial variance in nitrogen values are perhaps more likely inshore due to water column mixing caused by more complex land water interactions. For the offshore model SMHI recommend not using data with an error threshold higher than 50 percent however all data are included in this product.	
Recommendations for data improvement: The SMHI coastal zone model is strongly influenced by the prediction of driving mechanisms and uncertainties in this. In many aquatic environments, eutrophication is crucial - improvement in this would improve the quality of the model. Development of the biogeochemical components of the inshore model (as per the SCOBI model) would also be of great value - the inclusion of spatial data on drivers might also allow for improved spatial resolution in the inshore data. Any such modelling should include error levels and model validation. In general, the production of 'combined' national geodata products at source (i.e. by SMHI) would be highly valuable for national marine management objectives in Sweden. The inclusion of interpolated data with high error levels should be taken into account through the production of associated quality maps that are based on the error values presented by SMHI in their NetCDF data.	
Data authoring organisation: Medins Havs och Vattenkonsulter AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: martin.mattsson@medinsab.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	pollution effect , eutrophication, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Nitrogen background" dataset is a derived from source data provided by the Swedish Meteorological and

	Hydrological Institute (SMHI) in the form of aggregated data products generated by EMODnet Chemistry under the support of DG MARE Call for Tenders 2008/03 and 2012/10 and from the Swedish Coastal Zone Model. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMHI
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2018-09-25
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Phosphorus Background

Swedish Name	Fosforbakgrund
Symphony Theme	Eutrophication
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2018-09-25
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2018
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster dataset intends to show the predicted background phosphorus concentrations in Swedish inshore and offshore coastal surface waters. The source data consist of modelled water column phosphorus data in the form of NetCDF files for offshore areas and polygon shapefiles for inshore areas. Data were supplied by the Swedish Meteorological and Hydrological

	Institute. A cell value of zero is equivalent to zero phosphorus in surface waters and 100 is equivalent to 2.26mg/l of phosphorus (the highest recorded level). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknada bakgrundsnivåer av fosforkoncentrationer i ytvatten i svenska kust- och havsvatten. Källdata består av modellerad vattenkolumndata över fosfor i form av NetCDF-filer för havsvattenområden och polygonshape-filer för kustområden. Data tillhandahölls av Sveriges meteorologiska och hydrologiska institut (SMHI). Ett cellvärde av 0 motsvarar inget fosfor i ytvattnet, och ett cellvärde av 100 motsvarar 2.26 mg/l fosfor (högsta uppmätta nivå). Resultatet normalisrades efter värdet för God ekologisk status från EU:s havsmiljödirektiv. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this data product consist of three datasets supplied by SMHI. The first two were surface Phosphorus concentrations were extracted from two NetCDF files provided by SMHI: BalticSea_Water_body_Total_Phosphorus_year.nc and NorthSea_Water_body_Total_Phosphorus_year.nc. These are modelled water column data created using the DIVA interpolation tool (https://github.com/gher-ulg/DIVA) and which can be downloaded from emodnet-chemstry.eu Average annual P values for the period 2005 to 2014 were extracted from the NetCDF files for surface waters. These data were reprojected from WGS84 to ETR89 and clipped to the Symphony standard grid. Data for the Baltic and North

	Sea regions were merged using a transitional mask around the Oresund area. These interpolated data are inaccurate in the coastal zone and therefore a third dataset detailing modelled phosphorus levels in the coastal zone were provided by SMHI (Swedish Costal zone Model version 1.0.4, revision 512, model data 1999-2008), these data were provided with a coarse spatial resolution - mapped to polygons matching the transitional waters of the water framework directive. Data are published here: https://vattenweb.smhi.se Mean average total phosphorus concentrations were extracted from the coastal zone model data. This annual average inshore data were then merged with the offshore datalayers using a mosiac function. The data were then normalised on a 0-100 scale using a linear rescale function. The highest value (100) equating to 2.26mg/l of Phosphorus - the highest recorded average concentration in any of the 3 source datalayers. The result was then normalized to Good env. Status EU´s Marine strategy framework Directive.
Limitations for use in Symphony: This 'annual average' dataset was created by merging data from two different temporal periods (offshore 2005-2014 and inshore 1999-2008). The inshore dataset is based on large polygon areas with very low spatial resolution yet spatial variance in phosphorus values are perhaps more likely inshore due to water column mixing caused by more complex land water interactions. For the offshore model SMHI recommend not using data with an error threshold higher than 50 percent however all data are included in this product.	
Recommendations for data improvement: The SMHI coastal zone model is strongly influenced by the prediction of driving mechanisms and uncertainties in this. In many aquatic environments, eutrophication is crucial - improvement in this would improve the quality of the model. It is necessary to normalize data with respect to natural background levels. Development of the biogeochemical components of the inshore model (as per the SCOBI model) would also be of great value - the inclusion of spatial data on drivers might also allow for improved spatial resolution in the inshore data. Any such modelling should include error levels and model validation. In general, the production of 'combined' national geodata products at source (i.e. by SMHI) would be highly valuable for national marine management objectives in Sweden. The inclusion of interpolated data with high error levels should be taken into account through the production of associated quality maps that are based on the error values presented by SMHI in their NetCDF data.	
Data authoring organisation: Medins Havs och Vattenkonsulter AB	

Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: martin.mattsson@medinsab.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	habitat loss, environmental impacts of aquaculture
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Phosphorus Background" dataset is a derived from source data provided by the Swedish Meteorological and Hydrological Institute (SMHI) in the form of aggregated data products generated by EMODnet Chemistry under the support of DG MARE Call for Tenders 2008/03 and 2012/10 and from the Swedish Coastal Zone Model. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMHI
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2018-09-25
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Catch bottom trawl

Swedish Name	Fångst bottentrål
Symphony Theme	Fishing
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-12

Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2009 1015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the mean predicted catch of benthic fish by bottom trawling in Swedish coastal and offshore waters. A cell value of 0 is equivalent to no benthic fish catch by bottom trawling and a cell value of 100 is equivalent to high mean catch (SAR ≥ 8.196288). Underlying data are from two sources and consist of Surface Area Ratio (SAR) of trawling (OSPAR 2009-2013, and HELCOM 2009-2015) data. The surface area ratios (SAR) of trawling are produced by summing total swept area of trawling within a measurement area and then normalize the swept area to the measurement area. Assuming that within the measurement area the trawling is evenly distributed the surface area ratio is interpreted as the number of times per unit of time the measurement area is trawled over. The swept area for a specific fishing vessel is estimated using modelled trawl door spread (for a specific fishery/gear) multiplied by the vms (vessel monitoring system) speed and vms ping interval for a vms signal/position representing benthic trawling. The total swept area within a measurement area is then the sum of all swept area positions, from all vessels within a measurement area. For these data a linear relationship between trawl intensity SAR and catch is assumed this relationship is not modelled using logbook or landings data so this is a simplistic assumption. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa medeluppskattningen av fiskeansträngning genom bottentrålning i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar inget fiske genom bottentrålning, och ett cellvärde av 100 motsvarar hög

	ansträngning (SAR ≥ 8,196288). Underlagsdata härrör från två källor och består av SAR (Surface Area Ratio) från trålning (OSPAR 2009-2013 och HELCOM 2009-2015). SAR för trålning skapas genom att summera den totala arean som trålats inom ett mätområde och sedan normaliseras det trålade området till mätområdet. Det antas att trålningen inom mätområdet är jämnt fördelad, varvid SAR tolkas som antalet gånger per tidsenhet som området trålats. Det trålade området för ett specifikt fiskefartyg beräknas genom modellerad tråldörrsspridning (för ett specifikt fiske/redskap) multiplicerat vms-hastighet (vessel monitoring system) hastighet och vms-pingintervall för en vms-signal/position som representerar bentisk trålning. Det totala trålade området inom mätområdet är då summan av alla trålade områden, från alla fartyg inom mätområdet. För dessa data antas ett linjärt förhållande mellan trålningsintensitets-SAR och fångst, detta förhållande är inte modellerat med hjälp av loggbok eller fångstdata utan är ett förenklat antagande. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativ+L11a miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data are internationally collected data on bottom trawling impact produced by the ICES working group on spatial fisheries data (ICES WGSFD). Standardized products on surface area ratio (SAR) of trawling were downloaded from the working group link on ICES homepage. The method is described in the working group reports (ICES Working Group Spatial Fisheries Data report 2016), but in short the SAR of trawling are produced by summing total swept area of trawling within a measurement area and then normalize the swept area to the measurement area. Assuming that within the measurement area the trawling is evenly distributed the SAR is interpreted as the number of times per unit of time the measurement area is trawled over. The swept area for a specific fishing vessel is estimated using modelled trawl door spread (for a specific fishery/gear) multiplied by the vms speed and vms ping interval for a vms signal/position representing fishery. The total swept area within a measurement area is then the sum of all swept area positions, from all vessels within a measurement area.

	The underlying data has been aggregated yearly on a geographic grid of resolution 0.05 degree (approximately 1.5 x 3 nm square at 57 N). Yearly data on total SAR are produced in the HELCOM (the Baltic including Kattegat) and OSPAR (North East Atlantic incl. Kattegat) region respectively. Data are available for the years 2009 – 2013 in the HELCOM region and 2009-2015 in the OSPAR region. Data are available as spatial polygons. Each year's polygon dataset were projected into the Symphony projection ETRS1989 LAEA. Further the polygons were rasterized on the symphony grid using mean values if several polygons overlay the same raster grid cell. Averages of SAR values are calculated (introducing zero values in NA raster cells) over the time periods (2009-2015 for OSPAR and 2009-2013 for HELCOM) and the Kattegat area where masked from the HELCOM data set. Finally the two data sets were added and save as 'Bottom_trawling_intensity_mean_SAR.tif' From this underlying data set, representing swept area of bottom trawlers, a linear response proxy was derived representing outtake of bottom fish. The raster was normalized by dividing the data set by the maximum SAR value in the Swedish exclusive economic zone (EEZ): maxEEZ SAR = 8.196288 Uncertainty of this layer is set to 0.5 representing a "good" model, in the whole region as the data are almost complete international data (representing vessels >12 m), they are averages over several years and thus represent a large part of the total trawling effort and resource outtake but aggregated into larger cells (0.05 degree resolution) and partly validated. Also compared to traditional proxies for bottom trawling like kW*fishing hours, the SAR values takes into account typical trawl widths for different fishing fleets.

Limitations for use in Symphony:

For these data a linear relationship between trawl intensity SAR and catch is assumed this relationship is not modelled using logbook or landings data so this is a simplistic assumption (more fishing effort will not necessarily lead to more catch - this could easily be the inverse).

Discards have not been included in the layer but with the introduction of the landing obligation, this potential source of error is of minor importance.

Recommendations for data improvement:

Investigate the possibility of modelling the between benthic trawling effort and catch (for both Swedish and foreign fleet activity) to enable an improved understanding of where species are caught.

Investigate if there is a possibility to have consistent data (temporal periods) for OSPAR and HELCOM fisheries datasets.	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.jonsson@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	fishery, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Catch bottom trawl" dataset is a derived from fisheries monitoring data collected by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua). This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Catch gillnet

Swedish Name	Fångst garnfiske
Symphony Theme	Fishing
Symphony Category	Pressure

Symphony Data Type	Normalised
Date Created	2016-10-12
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2011 2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the mean predicted catch of fish by passive fishing gear in Swedish coastal and offshore waters. A cell value of 0 is equivalent to no fish catch and a cell value of 100 is equivalent to high mean catch (gear effort ≥ 230 km/day). Underlying data are from two sources (logbook and journal) and include gear effort data (km/day, 2011-2015). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa fiskeansträngning från passiva fiskeredskap i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar inget fiske, och ett cellvärde av 100 motsvarar hög fiskeansträngning (”gear effort” ≥ 230 km/dag). Underlagsdata härrör från två källor (loggbok och journal) och inkluderar ”gear effort data” (km/dag, 2011-2015). Denna data skapades som ett data input layer för ’Symphony’ verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Spatially detailed information of passive gears, which are often conducted within the small scale fishing fleets, is generally lacking. Passive gears are not well covered by the official data sets produced by ICES WGSFD for the OSPAR and HELCOM region. The Swedish logbook however provides a source of information as passive gears also are

	reported on a degree and minute scale in the logbook. A large part of the passive gear fleet however does not use the fishermen logbook but report monthly and thus only monthly mean positions. Gear effort expressed as net length * soaking days are also reported and assuming that passive gears are mostly used in the coastal waters or close to home ports one can produce maps of gear effort and hence resource outtake from these gears in Swedish exclusive economic zone (EEZ) using Swedish data only. Using both coastal journal information and logbook information one layer of total gear effort, expressed as km* days, was produced. All gillnet types are included except drift gillnets targeting mackerel. These are mostly found outside Swedish EEZ in the Skagerrak representing rather small effort but relatively high landings. Data were aggregated on a 5 x 5 km grid and averaged over the time period 2011-2015. The raster was normalized by dividing the data set by the maximum gear effort value in the Swedish EEZ. maxEEZ gear effort = 230.2943 km/day The uncertainty of this layer is set to 0.5 in the Swedish EEZ and to 1 outside because the Swedish passive fishery is small and not assumed to represent the passive fisheries in the EEZs of other countries. The value 0.5 corresponds to a "good" model and relates to the fact that the data covers all available passive fishing types in Sweden averaged over several years, however the dataset is not validated nor modelled at a high resolution.
Limitations for use in Symphony: Spatially detailed information of passive gears, which are often conducted within the small scale fishing fleets, is generally lacking. Passive gears are not well covered by the official data sets produced by ICES WGSFD for the OSPAR and HELCOM region. Swedish logbook and journal data provides improved data for Swedish vessels but this does not detail foreign fleet activity in Swedish waters.	
Recommendations for data improvement: Investigate using AIS data to gather additional spatial information. Gather data for validation and higher resolution modelling.	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.jonsson@slu.se	
Data Owner	Swedish Agency for Water and Marine Management

	(Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	fishery, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Catch gillnet" dataset is a derived from fisheries monitoring data collected by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Catch pelagic trawl

Swedish Name	Fångst pelagisk trål
Symphony Theme	Fishing
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-12
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2010 2015
Resource Type	dataset

Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the mean predicted catch of pelagic fish by pelagic trawling and seining in Swedish coastal and offshore waters. A cell value of 0 is equivalent to no pelagic fish catch and a cell value of 100 is equivalent to high mean catch (trawler effort ≥ 2104 kWh). Underlying data are from two sources and consist of AIS derived pelagic trawler effort data (kWh, 2014), and purse seiner and pelagic trawler effort data (kWh, 2010-2015). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa fiskeansträngning från pelagisk trålning och notfiske i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar ingetn pelagiskt fiske, och ett cellvärde av 100 motsvarar hög fiskeansträngning (”trawler effort” ≥ 2104 kWh). Underlagsdata härstammar från två källor och består av ”pelagic trawler effort data” (kWh, 2014) från AIS data, och notfiske- och ”pelagic trawler effort data” (kWh, 2010-2015). Denna data skapades som ett data input layer för ’Symphony’ verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data are from pelagic trawling and seining are used as a proxy for outtake of pelagic fish resources. Due to lack of updated and reliable data on pelagic fishery from the ICES / HELCOM data produced by ICES WGSFD and total lack of pelagic data in the available ICES / OSPAR data set, two different unofficial data sets where used to produce the pelagic fishing layer. A one year (2014) AIS derived data set on international pelagic trawlers (OTM / PTM) from the Baltic including the Kattegat area were combined with Swedish logbook data from the Skagerrak area including purse seiners (PS) and pelagic trawlers (OTM / PTM). The AIS data set represented kW*hours aggregated on a 1 km x1 km grid.

	The Skagerrak data used where positioned (each fishing event, i.e. trawl haul is reported to degree minute precision) logbook reported fishing hours multiplied with engine size. The data where aggregated on a 5 km x 5 km grid and averages over time period 2010-2015 where produced. The larger scale is due to the lower spatial resolution of the logbook information compared to the AIS data used in the Baltic. The pelagic trawling effort in the Skagerrak where then raised to total effort per ICES statistical rectangle to account for Danish pelagic fishing hours using official numbers of trawling effort per ICES rectangle reported by the EU. This procedure excluded seining as this is mainly a coastal fishery to which Danish fishermen don't have access. Finally the Skagerrak layer was disaggregated to a 1 km x 1 km sized grid and added to the Baltic AIS layer. Before normalization the OTM_1km_grid date where disaggregated into the symphony grid (250 m x 250 m). The raster was normalized by dividing the data set by the maximum trawler effort value in the Swedish exclusive economic zone (EEZ): maxEEZ trawler effort = 2103.768 kWh After normalizing data with maxEEZ all values >1 where set to 1. Pelagic fishery outtake is assumed to be linearly proportional to the pelagic effort, expressed as kW*fishing hours. This relationship is also assumed to be similar for seiners and pelagic trawler. Despite the relatively high spatial resolution of data, the uncertainty of this layer is set to 0.75 representing a "bad" model, not validated. The reason to place a higher uncertainty here compared to the Bottom trawling is the fact that, only one year of data is used in the Baltic and the AIS data are not official positional data (like VMS) coupled to logbook information on gear, métiers etc, several gears are combined using simple assumptions, different scales of the underlying data are combined. Also the Skagerrak data are produce based on the total fishery in the area, assuming that the Danish fishery is located exactly where the Swedish vessels operate.
Limitations for use in Symphony: In the Baltic this data links AIS records (rather than VMS) of pelagic trawl activity to Swedish logbook (landings) data. Only one year of AIS records are used (from 2014). AIS are only required to be carried on vessels over 15m (in contrast to 12m for VMS) and the activity is only linked to Swedish catch data.	

This is corrected in the Skaggerak where there is significant Danish fleet activity in Swedish waters by utilising ICES landing data. However, these ICES catch data in contrast have a significantly lower spatial resolution. In the Kattegat no spatial data are utilised other than the logbook data (60x60nm).	
Recommendations for data improvement: Investigate using AIS data to gather additional spatial information in the Skaggerak. Gather data for validation and higher resolution modelling.	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.jonsson@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	fishery, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Catch pelagic trawl" dataset is a derived from fisheries monitoring data collected by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and automatic vessel identification system data supplied by the Swedish Maritime Authority. This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua, SMA
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Turbidity bottom trawl

Swedish Name	Grumling bottentrål
Symphony Theme	Fishing
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-12
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2009 1015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show turdbidity as a consequnce of bottom trawling in Swedish coastal and offshore waters. A cell value of 0 is equivalent to no turbidity due to bottom trawling and a cell value of 100 is equivalent to high turbidity. Underlying data are from two sources and consist of Surface Area Ratio (SAR) of trawling (OSPAR 2009-2013, and HELCOM 2009-2015) data. The surface area ratios (SAR) of trawling are produced by summing total swept area of trawling within a measurement area and then normalize the swept area to the measurement area. Assuming that within the measurement area the trawling is evenly distributed the surface area ratio is interpreted as the number of times per unit of time the measurement area is trawled over. The swept area for a specific fishing vessel is estimated using modelled trawl door spread (for a specific fishery/gear) multiplied by the vms (vessel monitoring system) speed and vms ping interval for a vms signal/position representing benthic trawling. The total swept area within a measurement area is then the sum of all swept area positions, from all vessels within a measurement area. For these data a linear relationship between trawl intensity SAR and turbidity is assumed. This relationship is not validated empirically so it is a simplistic assumption. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative

	environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa bottentrål grumlighet i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar inget bottentrålning, och ett cellvärde av 100 motsvarar intensiv bottentrålning (SAR ≥ 8,196288). Underlagsdata härrör från två källor och består av SAR (Surface Area Ratio) från trålning (OSPAR 2009-2013 och HELCOM 2009-2015). SAR för trålning skapas genom att summera den totala arean som trålats inom ett mätområde och sedan normaliseras det trålade området till mätområdet. Det antas att trålningen inom mätområdet är jämnt fördelad, varvid SAR tolkas som antalet gånger per tidsenhet som området trålats. Det trålade området för ett specifikt fiskefartyg beräknas genom modellerad tråldörrsspridning (för ett specifikt fiske/redskap) multiplicerat vms-hastighet (vessel monitoring system) hastighet och vms-pingintervall för en vms-signal/position som representerar bentisk trålning. Det totala trålade området inom mätområdet är då summan av alla trålade områden, från alla fartyg inom mätområdet. För dessa data antas ett linjärt förhållande mellan trålningsintensitets-SAR och grumling, detta förhållande är inte testad. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativ+L11a miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Data are internationally collected data on bottom trawling impact produced by the ICES working group on spatial fisheries data (ICES WGSFD). Standardized products on surface area ratio (SAR) of trawling were downloaded from the working group link on ICES homepage. The method is described in the working group reports (ICES Working Group Spatial Fisheries Data report 2016), but in short the SAR of trawling are produced by summing total swept area of trawling within a measurement area and then normalize the swept area to the measurement area. Assuming that within the measurement area the trawling is evenly distributed the SAR is interpreted as the number of times per unit of time the measurement area is trawled over. The swept area for a specific fishing vessel is estimated using

	modelled trawl door spread (for a specific fishery/gear) multiplied by the vms speed and vms ping interval for a vms signal/position representing fishery. The total swept area within a measurement area is then the sum of all swept area positions, from all vessels within a measurement area. The underlying data has been aggregated yearly on a geographic grid of resolution 0.05 degree (approximately 1.5 x 3 nm square at 57 N). Yearly data on total SAR are produced in the HELCOM (the Baltic including Kattegat) and OSPAR (North East Atlantic incl. Kattegat) region respectively. Data are available for the years 2009 – 2013 in the HELCOM region and 2009-2015 in the OSPAR region. Data are available as spatial polygons. Each year's polygon dataset were projected into the Symphony projection ETRS1989 LAEA. Further the polygons were rasterized on the symphony grid using mean values if several polygons overlay the same raster grid cell. Averages of SAR values are calculated (introducing zero values in NA raster cells) over the time periods (2009-2015 for OSPAR and 2009-2013 for HELCOM) and the Kattegat area where masked from the HELCOM data set. Finally the two data sets were added and save as 'Bottom_trawling_intensity_mean_SAR.tif' From this underlying data set, representing swept area of bottom trawlers, a linear response proxy was derived representing outtake of bottom fish. The raster was normalized by dividing the data set by the maximum SAR value in the Swedish exclusive economic zone (EEZ): maxEEZ SAR = 8.196288 Uncertainty of this layer is set to 0.5 representing a "good" model, in the whole region as the data are almost complete international data (representing vessels >12 m), they are averages over several years and thus represent a large part of the total trawling effort and resource outtake but aggregated into larger cells (0.05 degree resolution) and partly validated. Also compared to traditional proxies for bottom trawling like kW*fishing hours, the SAR values takes into account typical trawl widths for different fishing fleets.
Limitations for use in Symphony: For these data a linear relationship between trawl intensity SAR and turbidity is assumed but this is a simplistic assumption which does not for example take into consideration benthic sediment type. Discards have not been included in the layer but with the introduction of the landing obligation, this potential source of error is of minor importance.	

Recommendations for data improvement: Investigate the relationship between benthic trawling effort, sediment type and turbidity.	
Data authoring organisation: Sveriges Lantbruksuniversitet Department of Aquatic Resources (SLU Aqua)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.jonsson@slu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	fishery, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Turbidity bottom trawl" dataset is a derived from fisheries monitoring data collected by Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua). This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to Swedish University of Agricultural Sciences Department of Aquatic Resources (SLU Aqua) and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SLU Aqua
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Oilspill wreck

Swedish Name	Ojleläckage vrak

Symphony Theme	General Pollution
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-09
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the probability of exposure to an oil spill from shipwrecks in Swedish inshore and offshore waters under meteorological conditions equivalent to a drift speed of 0.2 knots. A cell value of 0 is equivalent to low probability of exposure and a cell value of 100 is equivalent to a high probability of exposure. Underlying data consists of shipwreck presence data that has been modelled. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa sannolikheten att drabbas av oljespill från skeppsvrak under meteorlogiska förhållanden som motsvarar en drifthastighet av 0,2 knop. Ett cellvärde av 0 motsvarar låg sannolikhet för oljespill, och ett cellvärde av 100 motsvarar hög sannolikhet. Underlagsdata består av skeppsvraksförekomstsdata som har modellerats. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The method is based on a fixed residence time and current/drift speed for oil spills. The likelihood of a spill has been calculated from two ship wrecks (Harburg, east coast, Skytteren, west coast), the results of which have been

	applied to all ship wrecks within their respective sea areas (i.e. west coast and east coast). Shipwrecks that pose a risk have been assembled by Chalmers University of Technology. The likelihood that a spill spreads to surrounding grid cells has been calculated with the assumption of a linear decrease to a likelihood/probability of 0 at a distance that is reached during a 24 hour period with a wind speed of 0.2 knots. The results should be interpreted as a conservative estimate.
Limitations for use in Symphony: The method is based on a conservative residence time and operating speed for oil spills. Estimated probabilities of oil spills from two wrecks (Harburg, West Coast and Skyttern , East Coast) have been used for all wrecks in each sea area. The wrecks that constitute a risk have been identified by Chalmers. The probability that a spill enters the surrounding grid cell has been calculated by assuming a linear decrease with probability 0 at the distance reached during 24 h with a wind speed of 0.2 knots. The results should be interpreted as conservative estimates.	
Recommendations for data improvement: The likelihood of spillage from all potentially hazardous wrecks should be determined.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	wreck, environmental impact , oil pollution
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Oilspill wreck" dataset is a derived from source data provided by the Swedish Maritime Authority (SMA). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMA
Security Classification	no protection required

Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Heavy metals background

Swedish Name	Tungmetaller sedimentbakgrund
Symphony Theme	General Pollution
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-11-14
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	1984 2014
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer shows the predicted mean concentration of 9 heavy metals in marine benthic substrates around Sweden. A cell value of 0 is equivalent to mean pre-industrial background concentrations of the 9 heavy metals and a cell value of 100 is equivalent to mean very high concentrations (Class 5, Naturvårdsverket rapport 4914). Underlying data are from two sources and consist of historical heavy metal concentration data (1984-2014) and benthic substrate data (1975-2015). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt visar beräknad medelkoncentration av nio tungmetaller i marina sediment kring Sverige. Ett cellvärde av 0 motsvarar medelvärdet av pre-industriella bakgrundskoncentrationer av de nio tungmetallerna, och ett

	cellvärde av 100 motsvarar höga medelkoncentrationer (Klass 5, Naturvårdsverket rapport 4914). Underlagsdata härrör från två källor och består av historiska tungmetallskoncentrationer (1984-2014) och bentisk substratdata (1975-2015). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	SGU data was sourced from their data archive and covers the period 1984 to 2014. The data processing was as follows: 1. Data downloaded from ICES dome monitoring database and imported into a MS access database for processing 2. Data exported to ArcGIS and a spatial query undertaken to select data within the Symphony area of interest and reimported to Access 3. SGU data imported from the national sediment data archive (including data from national monitoring by SGU, regional and local monitoring by County Administrations, the Swedish EPA and SWAM and from historical ad-hoc surveys undertaken by SGU (including some commercial data). All data reformatted to fit the ICES data specification. 4. ICES and SGU data combined into a single data table using append queries in MS Access. 5. All data units standardised to mg per kg. 6. All data exported to ArcGIS and reprojected into ETRS 1989 LAEA from WGS84 7. Only data points coinciding with the marine area represented in the Symphony Grid maintained in the dataset. 8. Data reimported to MS Access and cross-tab queries undertaken to select the maximum value from the latest records at each site for each toxin parameter. 9. Outliers 2% winsorized after which data checked for normality and log transformed when required. 10. Variograms modelled individually for each heavy metal, best fit model chosen using cross validation. 11. Data interpolated (gridded) for each heavy metal to a 5km grid using ordinary kriging algorithm (Geostatistical

	Analyst in ArcGIS). Associated standard deviation layers created. 12. All data layers transformed to the same scale using the background (0) and high (1) values from the Swedish Environment protection agency report No. 4914. 13. Transformed data layers combined into mean data layer using cell statistics tool in ArcGIS (set so that null values ignored) 14. Mean data layer normalised to the estimated predicted frequency of organic mud (gyttja) in marine sediments by using a multiplication function in ArcGIS raster calculator. 15. Final data layer rescaled to 0-1 risk layers in ArcGIS using raster calculator so that negative values (below background levels) are reset to zero and values above 1 are reset to one. 16. Combined standard deviation plots created by scaling standard deviation layers for each heavy metal to a 0-1 scale, combining into a mean layer using cell statistics in ArcGIS and reclassifying the data into four quantiles in ArcGIS. Data where the mean error is below 50% are assumed to represent a good model (without validation). Data where the mean error is above 50% are assumed to represent a poor model / interpolation, cells with sample data are included as being highly reliable. The steps above are described in more detail in a data processing log created by SGU and provided to SWAM. This can be provided on request.

Limitations for use in Symphony:

There are a number of key limitations users should be aware of when using this dataset:

1) Data collected by SGU after 2010 were not available to be included in this model. This includes data from fiberbank surveys undertaken by SGU in Northern Sweden between 2010 and 2016.

The impact of this limitation has been limited by incorporating an additional modelled layer into Symphony consisting of known / surveyed fiberbanks and fibre rich sediments as toxic areas (scoring 100) with a linear decrease within 10km distance however this is known to highly simplistic (in some areas there is very little heavy metal increase with distance) - it also ignores fiberbanks that have not been mapped.

2) The geostatistical interpolation method used does not take into account that land will act as a barrier.

3) The data is a historical average for all records in the ICES Dome and SGU databases and as such this may not reflect current sediment conditions. 4) There is a lack of offshore samples so in general offshore areas have a much higher uncertainty. 5) Data are combined based on their historical concentration and not their toxicity.	
Recommendations for data improvement: Produce an update to this model with data from SGU post 2010. Model with a tool that can handle land as a barrier. Determine if specific time frame is more appropriate than a historical average or if a max level is more appropriate. Determine if a toxicity based index is more appropriate.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: duncan.hume@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	chemical pollution , heavy metal, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Heavy metals background" dataset is a derived from source data provided by the International Council for Exploration of the Sea (ICES) and the Geological Survey of Sweden (SGU). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	ICES, SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01

Swedish Agency for Marine and Water Management

Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Heavy metals fiber bank

Swedish Name	Tungmetaller fiberbankar
Symphony Theme	General Pollution
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-04-19
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The dataset intends to show the predicted risk of organic and inorganic toxin contamination in sediment from legacy paper and sawmill waste dumping sites (fiber banks) and associated areas which are affected by this dumping (fiber rich sediments) in Swedish coastal waters. The process chemicals contained within these sediments are often highly toxic containing both organic and inorganic toxins which have been measured at contamination levels that are significantly higher than background levels. This raster is based on data from sites which were surveyed by the Geological Survey of Sweden between 2010 and 2014 in Västernorrland (Northern Sweden). A limitation of this data is the lack of data from unsurveyed sites. A value of 100 represents a high risk for high levels of organic and inorganic toxins in sediments and a value of 0 represents toxins at background levels. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.

Summary (Swedish)	Detta rasterskikt avser att visa beräknad risk för organiska och oorganiska miljögifter i sediment från pappersbruks- och sågverksindustriområden med deposition av fiberrester (fiberbankar), och närliggande områden vilka påverkas av denna dumpning (fiberrika sediment) i svenska kustvatten. Processkemikalierna inom dessa sediment är ofta mycket giftiga, innehållande både organiska och oorganiska miljögifter vilka har uppmäts till föroreningsnivåer som är signifikant högre än bakgrundsnivåer. Lagret är baserat på data från områden undersökta av Sveriges geologiska undersökning (SGU) mellan 2010 och 2014 i Västernorrland. En begränsning är brist på data från ej undersökta områden. Ett värde av 100 motsvarar hög risk för höga nivåer av organiska och oorganiska miljögifter i sediment, och ett värde av 0 motsvarar miljögifter på bakgrundsnivå. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset was created using polygon data delineating the position of fiberbanks surveyed by the Geological Survey of Sweden between 2010 and 2014. The data processing was as follows: 1) Import polygons into ArcGIS 2) Create a concentric ring buffer around each polygon with a 10km radius and 2km step. 3) Allocate a stepwise score with distance 100 for 2km, 80 for 4km, 60 for 6km, 40 for 8km, 20 for 10km- 4) Apply a spatial filter (focal statistics with 5km search) to blur the modelled data 5) Manually edit obvious errors caused by land barriers. 6) Clip the output to the Symphony Grid 7) Linear stretch from 0-100
Limitations for use in Symphony: This data is a simplistic model that makes the assumption that metal concentrations decrease with distance 10km from known fiberbanks. Empirical data collected by SGU demonstrates that the reality is far more complex and in many cases toxicity can be low in	

sites adjacent to fiberbanks if the sediments are undisturbed. However this model is intended to be conservative and indicate risk. The data used is only known (2015) fiberbanks however, there is a database of possible fiberbanks and paper mill pulp processing facilities available and maps of fiberbanks in southern Sweden have recently been published. These data are not included	
Recommendations for data improvement: Incorporate field sample data into the interpolated map of toxins. Include new data on fiberbanks in southern Sweden. Consider the inclusion of additional unsurveyed sites into a future risk model.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: duncan.hume@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	chemical pollution , ocean dumping , environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Heavy metals fiber bank" is attributed to the Geological Survey of Sweden and it was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Heavy metals mercury dump

Swedish Name	Kvicksilverdumpning
Symphony Theme	General Pollution
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-04-20
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2006
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the predicted risk of inorganic toxin (mercury) contamination in sediments associated with licenced mercury waste dumping. In the 1960s and 1970s an estimated 23,000 barrels containing contaminated mercury waste were legally (at that time no regulation was in place) dumped in a deep water dumping site in aproximately 80m of water outside of Sundsvall in Northern Sweden. In 2006 the Geological Survey of Sweden undertook a survey of this dumping site and identified approximately 3500 barrels. This raster is modelled based on the positional data from that survey (the site and barrels in surrounding waters buffered by 1km) to provide an indication of the risk of mercury contamination. A value of 100 represents a high risk for high levels of organic and inorganic toxins in sediments and a value of 0 represents toxins at background level. Note that only 3500 barrels were found in the 2006 survey so there is uncertainty surrounding the location of the remaining barrels. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad risk för oorganiska miljögifter (kvicksilver) i sediment i samband med licensierad kvicksilverdumpning. Under 1960- och 1970-

	talet dumpades uppskattningsvis 23 000 tunnor innehållande förorenat kvicksilveravfall lagligt (vid denna tidpunkt fanns ingen reglering av dumpning) i ett djupvattensområde på ungefär 80 meters djup utanför Sundsvall i norra Sverige. Under 2006 genomförde Sveriges geologiska undersökning (SGU) en undersökning av detta dumpningsområde och identifierade uppskattningsvis 3500 tunnor. Detta rasterskikt är modellerat baserat på positionsdata från undersökningen (plats och tunnor i omgivande vatten i en buffertzon av 1 km) för att ge en indikation på risken för kvicksilverförorening. Ett värde av 100 motsvarar hög risk för höga nivåer av organiska och oorganiska miljögifter i sediment, och ett värde av 0 motsvarar miljögifter på bakgrundsnivå. Observera att endast 3500 tunnor återfanns under undersökningen från 2006, så osäkerhet finns angående position av återstående tunnor. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset was created using point data delineating the position of mercury barrels dumped in the Sundsvall dumpsite which were surveyed by the Geological Survey of Sweden in 2006. The data processing was as follows: 1) Buffer points 2) Create a concentric ring buffer around each polygon with a 10km radius and 2km step. 3) Allocate a stepwise score with distance 100 for 2km, 80 for 4km, 60 for 6km, 40 for 8km, 20 for 10km- 4) Clip the output to the Symphony Grid 5) Linear stretch from 0-100
Limitations for use in Symphony: This data is a simplistic model that makes the assumption that the risk of metal toxicity is high where a barrel has been observed and decreases with distance 1km from the mercury barrels. Only 3500 of the estimated 23,000 barrels dumped were found so this is likely to be a significant underestimate of the risk, however without additional surveys it is impossible to predict the location outside of the dumpsite.	
Recommendations for data improvement: Undertake additional surveys to gather more data.	

Ensure that all sample data collected is updated to the next iteration of the interpolated map of toxins	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: duncan.hume@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	chemical pollution , ocean dumping , environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Heavy metals mercury dump" is attributed to the Geological Survey of Sweden and it was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM).This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Heavy metals mine dump

Swedish Name	Tungmetaller minområden
Symphony Theme	General Pollution
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-11-14

Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the predicted risk of inorganic toxin contamination in marine sediments as a consequence of historical mines laid in Swedish offshore waters. The underlying data shows areas which were mined during world war two as polygon data. This derived dataset makes the assumption that some sediment contamination may have resulted from this activity. A cell value of 100 represents a high risk for high levels of inorganic toxins in sediments, due to uncertainty associated with impact of mining activity these data are down weighted so a historical presence of a mined area will score 30 (i.e. low risk) and a value of 0 represents toxins at background level. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad risk för oorganiska miljögifter i marina sediment som en följd av tidigare utvinning i svenska havsvatten. Underlagsdata visar utvinningsområden från andra världskriget som polygondata. Detta rasterskikt gör antagandet att viss sedimentförorening kan ha orsakats av denna aktivitet. Ett cellvärde av 100 motsvarar hög risk för höga nivåer av oorganiska miljögifter i sediment, på grund av osäkerhet i samband med effekter av utvinningsaktivitet nedgraderas denna data så att förekomst av ett historiskt utvinningsområde ger ett värde av 30 (dvs. låg risk) och ett värde av 0 motsvarar bakgrundsnivåer av miljögifter. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra

	ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset was created using polygon data delineating the position of post WW2 mined sea areas provided by Swedish Agency for Marine and Water Management The data processing was as follows: 1) Import polygons into ArcGIS 2) Allocate polygons a score of 30 and convert data to raster 3) Clip the output to the Symphony Grid
Limitations for use in Symphony: This dataset is highly simplistic and assumes that there is a low risk of some toxic metal impact from mined areas post WW2.	
Recommendations for data improvement: Empirical validation is required.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: duncan.hume@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	chemical pollution , heavy metal, military activities , environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Heavy metals mine dump" dataset is a derived from source data provided by the Swedish Armed Forces (Försvarsmakten). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	FM

Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Toxic munition dump

Swedish Name	Kemiska stridsmedel
Symphony Theme	General Pollution
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-04-17
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the predicted risk of organic and inorganic toxin contamination in marine sediments as a result of the dumping of munitions in areas in and surrounding Swedish coastal and offshore waters at the end of the second world war. The underlying data was sourced from HELCOM in the form of point, line and polygon shapefiles detailing the location of dumping grounds, risk areas and dredged munitions. The dataset is modelled using a simplistic assumption of decreasing risk with distance from the dump sites. value of 100 represents a high risk for high levels of organic and inorganic toxins in sediments and a value of 0 represents toxins at background level. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area

	scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad risk för organiska och oorganiska miljögifter i marina sediment som ett resultat av dumpning av krigsmateriel i slutet av andra världskriget. Underlagsdata kommer från HELCOM i form av punkter, linjer och polygonshape-filer vilka specificerar dumpningsområden, riskområden och områden med dumpat kemiska stridsmedal. rasterskiktet är modellerat och gör ett förenklat antagande att risk för förorening minskar med avståndet från dumpningsområde. Ett värde av 100 motsvarar hög risk för höga nivåer av organiska och oorganiska miljögifter i sediment, och ett värde av 0 motsvarar bakgrundsnivåer av miljögifter. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset was created using polygon, line and point data delineating the position of chemical munitions. The data were provided by Helcom and consisted of: Ammunition dumping sites (polygons) Reported encounters with chemical munitions (points) Chemical munition transport routes (lines) 1) All data Import polygons into ArcGIS 2) Buffer points with a 10km concentric ring buffer 3) Allocate a stepwise score with distance 100 for 2km, 80 for 4km, 60 for 6km, 40 for 8km, 20 for 10km for points 4) Allocate a 100 impact for all dumpsites 5) Buffer lines with a 10km concentric ring buffer 6) Allocate a stepwise score with distance 50 for 2km, 40 for 4km, 30 for 6km, 20 for 8km, 10 for 10km for points (assuming some but less risk during transport) 7) Combine all datasets into a single raster 8) A spatial smoothing filter (mean average over 5km) 9) Clip the raster output to the Symphony Grid
Limitations for use in Symphony:	

This data is a simplistic model which is based on a number of unverified assumptions. It should therefore be treated as a risk layer which should be validated.	
Recommendations for data improvement: A number of research papers and studies have been published which detail the concentrations of toxins in the sediments in and surrounding chemical weapons dumpsites. The raw data from these studies has not been incorporated into SGUIs or ICES DOME database. It would be highly recommended to gather these data and to update the SGU interpolation models with these updates. The production of a more reliable model with empirical validation would be highly recommended.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: duncan.hume@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	chemical pollution , military activities , environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Toxic munition dump" dataset is a derived from source data provided by the Swedish Armed Forces (Försvarsmakten). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	FM
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Synthetic toxins background

Swedish Name	Giftiga ämnen bakgrund
Symphony Theme	General Pollution
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-04-17
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	1984 2014
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the predicted mean concentration of 32 organic toxins in marine benthic substrates in Swedish coastal and offshore waters. A value of 0 is equivalent to a mean concentration of 0 for the 32 organic toxins and a value of 1 is equivalent to mean very high concentrations (Class 5, Naturvårdsverket rapport 4914). The data has been normalised to the likelihood of mud content in surrounding sediments based on the assumption that organic toxins will bind with organic matter in sediment. Outliers have been modelled separately and reintroduced into the dataset. These areas all have recorded organic toxin concentrations at levels significantly above the very-high level and are mapped with a buffer of approximately 15km based on the assumption that proximity to these sites equates to a higher risk of organic toxin pollution. This raster is based on historical sediment data from the Geological Survey of Sweden and International Council for the Exploration of the Sea. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad medelkoncentration av trettiotvå organiska miljögifter i marina bentiska substrat i svenska kust- och havsvatten. Ett

	värde av 0 motsvarar en medelkoncentration på 0 för de trettiotvå organiska miljögifterna och ett värde av 1 motsvarar mycket höga medelkoncentrationer (Klass 5, Naturvårdsverket rapport 4914). Data har normaliserats till sannolikhet av lerinnehåll i intilliggande sediment baserat på antagandet att organiska miljögifter binder till organiskt material i sediment. Outliers har modellerats separat och återinförts till rasterskiktet. Dessa områden har alla uppvisat signifikant högre koncentrationer av organiska miljögifter än mycket höga nivåer och är kartlagda med en buffertzon på ungefär 15 km, baserat på antagandet att närhet till dessa områden motsvarar högre risk för organiska miljögifter. Lagret är baserat på historisk sedimentdata från Sveriges geologiska undersökning och ICES (International Council for the Exploration of the Sea). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	SGU data was sourced from their data archive and covers the period 1984 to 2014. The data processing followed the following steps: 1. Data downloaded from ICES dome monitoring database and imported into a MS access database for processing 2. Data exported to ArcGIS and a spatial query undertaken to select data within the Symphony area of interest and reimported to Access 3. SGU data imported from the national sediment data archive (including data from national monitoring by SGU, regional and local monitoring by County Administrations, the Swedish EPA and SWAM and from historical ad-hoc surveys undertaken by SGU (including some commercial data). All data reformatted to fit the ICES data specification. 4. ICES and SGU data combined into a single data table using append queries in MS Access. 5. All data units standardised to mg per kg. 6. All data exported to ArcGIS and reprojected into ETRS 1989 LAEA from WGS84

	7. Only data points coinciding with the marine area represented in the Symphony Grid maintained in the dataset. 8. Data reimported to MS Access and cross-tab queries undertaken to select the maximum value from the latest records at each site for each toxin parameter. 9. Outliers winsorized above the 99th percentile after which data checked for normality and log transformed when required. 10. Variograms modelled individually for each synthetic toxin, best fit model chosen using cross validation. 11. Data interpolated (gridded) to a 5km grid for each synthetic toxin using ordinary kriging algorithm (Surfer - Golden Software). Associated standard deviation layers created. 12. All data layers transformed to the same scale using the high (1) values from the Swedish Environment protection agency report No. 4914. 13. Transformed data layers combined into mean data layer using grid mosaic in Surfer. 14. Mean data layer normalised to the estimated predicted frequency of organic mud (gyttja) in marine sediments by using a multiplication function in ArcGIS raster calculator. 15. Final data layer rescaled to 0-1 risk layers in ArcGIS using raster calculator so that values above 1 are reset to one. 16. Combined standard deviation data layer created by scaling standard deviation layers for each synthetic toxin to a 0-100 scale, combining into a mean layer using grid mosaic in Surfer and reclassifying the data into four quantiles in ArcGIS. Data where the mean error is below 50% are assumed to represent a good model (without validation). Data where the mean error is above 50% are assumed to represent a poor model / interpolation, cells with sample data are included as being highly reliable.
Limitations for use in Symphony: There are a number of key limitations users should be aware of when using this dataset: 1) Data collected by SGU after 2010 were not available to be included in this model. This includes data from fiberbank surveys undertaken by SGU in Northern Sweden between 2010 and 2016. The impact of this limitation has been limited by incorporating an additional modelled layer into Symphony consisting of known / surveyed fiberbanks and fibre rich sediments as toxic areas (scoring 100) with a linear decrease within 10km distance however this is known to	

highly simplistic (in some areas there is very little heavy metal increase with distance) - it also ignores fiberbanks that have not been mapped. 2) The geostatistical interpolation method used does not take into account that land will act as a barrier. 3) The data is a historical average for all records in the ICES Dome and SGU databases and as such this may not reflect current sediment conditions. 4) There is a lack of offshore samples so in general offshore areas have a much higher uncertainty. 5) Data are combined based on their historical concentration and not their toxicity.	
Recommendations for data improvement: Produce an update to this model with data from SGU post 2010. Model with a tool that can handle land as a barrier. Determine if specific time frame is more appropriate than a historical average or if a max level is more appropriate. Determine if a toxicity based index is more appropriate.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: duncan.hume@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	chemical pollution , ocean dumping , environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Synthetic toxins background" dataset is a derived from source data provided by the International Council for Exploration of the Sea (ICES) and the Geological Survey of Sweden. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.

Map Acknowledgement	ICES, SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Synthetic toxins harbor

Swedish Name	Giftiga ämnen hamnar
Symphony Theme	Industry
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-02-14
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2012
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show areas with potential synthetic toxin contamination associated with harbours in Swedish coastal waters. A cell value of 0 is equivalent to low potential water contamination (> 1000 m from harbour) and a cell value of 100 is equivalent to potential water contamination (≤ 1000 m from harbour). Underlying data consists of harbour site presence data in the form of shapefiles. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa hamnområden i svenska kustvatten som potentiellt är förorenade med syntetiska miljögifter. Underlagsdata består av hamnförekomstdata i

	form av shape-filer. Ett cellvärde av 0 motsvarar låg potentiell vattenförorening (> 1000 m från hamn), och ett cellvärde av 100 motsvarar potentiell vattenförorening (≤ 1000 m från hamn). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset was created using point data showing harbours which were sourced from Helcom and which in turn are based on Automatic Identification System (AIS) data, the Baltic Port List 2012, and maps available in Port's official websites. The derived dataset was created based on the following process: 1. Ports inside Symphony land boundary were moved to the coastline using a nearest neighbour join. 2. All sites within the marine area were selected and a 1000 buffer was applied. 3. A value of 100 was applied to the buffer polygons. 4. The data were converted to a raster and with the Symphony grid specification.
Limitations for use in Symphony: The 1000 buffer this is a simplistic risk estimate. There is no definition of what constitutes a 'harbour' in this dataset and at present this dataset does not include small scale docks (brygga) which might constitute a cumulative impact similar (or larger) than small harbours.	
Recommendations for data improvement: Define what a 'habour' means. Scale habours based on size. Develop a clear rationale for applying any buffer. Represent larger harbours as buffered polygon features rather than buffered points (they are much larger areas). Use a graduated reduction in impact risk with distance (rather than a binary high/no impact. Gather empirical data and information (e.g. from SEPA/County Admin monitoring) which can be used to develop and validate a better model of spatial risk of organic toxin pollution. Gather attribute information on for example the area, number of vessel berths, type of shipping etc that could be used to modify the risk levels) and environmental criteria such as data on currents / sediments to model risk depending on site location.	
Data authoring organisation: Dansk Hydraulisk Institut (DHI) Sverige AB	

Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: johan.kling@dhi.se; christin.eriksson@dhi.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	chemical pollution , harbour, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Synthetic toxins harbor" dataset is a derived from source data provided by Swedish County Administration Boards (Länsstyrelse). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	LS
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Synthetic toxins industry

Swedish Name	Giftiga ämnen industri
Symphony Theme	Industry
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-12-09
Status	Completed
Data Format	32-bit floating point Tagged Image File Format

Temporal Period	2013
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show areas with potential synthetic toxin contamination associated with industrial sites in Swedish coastal waters. Underlying data consists of water industrial site presence data in the form of shapefiles. A cell value of 0 is equivalent to low potential water contamination (> 1000 m from industrial site) and a cell value of 100 is equivalent to potential water contamination (≤ 1000 m from industrial site). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa industriområden i svenska kustvatten som potentiellt är förorenade med syntetiska miljögifter. Underlagsdata består av industriförekomstdata i form av shape-filer. Ett cellvärde av 0 motsvarar låg potentiell vattenförorening (> 1000 m från industri), och ett cellvärde av 100 motsvarar potentiell vattenförorening (≤ 1000 m från industri). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset is based on vector data sourced from the Swedish County Administration Boards known as "SE.US Miljöförvaltningsanläggningar" which is published as an open INSPIRE compliant dataset on Sweden's INSPIRE geodata portal: www.geodata.se. This data shows permitted environmentally hazardous activities. This data includes wastewater treatment plants and other industrial activities and their operational status. This dataset was last compiled in 2013. All licenced industrial activities within 500m of the coast (identified with a spatial query) were extracted and these

	selected point records were buffered with a 1000m buffer. This buffered dataset was then converted to a raster format.
Limitations for use in Symphony: The 1000 buffer is a simplistic risk estimate. The data includes only sites within 500m of the coast and does not therefore include the influence of upstream effluent releases.	
Recommendations for data improvement: Use a spatially graduated reduction in impact risk with distance (rather than a binary high/no impact. Model the influence of upstream effluent release locations (for example by scaling river mouth locations depending on number of upstream sites). Gather empirical data and information (e.g. from SEPA/County Admin monitoring) which can be used to develop and validate a better model of spatial risk of organic/synthetic toxin pollution. Water quality monitoring data can be downloaded from http://viss.lansstyrelsen.se and sediment pollution data is available from SGU https://www.sgu.se/produkter/geologiska-data/oppna-data/maringeologi-oppna-data/marina-data-i-atomfloden/ Gather attribute information on for example from the county admin boards that could be used to modify risk levels (based on data such as volumes permitted to be released) and environmental criteria (such as data on currents / sediments).	
Data authoring organisation: Dansk Hydraulisk Institut (DHI) Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: johan.kling@dhi.se; christin.eriksson@dhi.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	chemical pollution , industrial pollution, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Synthetic toxins industry" dataset is a derived from source data provided by the Swedish County Administration Boards (Länsstyrelse). This derived dataset is licenced under a Creative Commons

	Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	LS
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Habitat loss sand extraction

Swedish Name	Habitatförlust sandutvinning
Symphony Theme	Mineral Mining
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-05-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2017
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show areas where potential habitat loss can occur from the presence of mining (sand extraction) in Swedish coastal and offshore waters. Underlying data consists of the polygon data detailing the extent of mining (sand extraction) licenced areas and is in the form of a shapefile. A cell value of 0 is equivalent to no risk of habitat loss due to of mining (sand extraction) and a cell value of 100 is equivalent to a risk habitat loss due to mining (sand extraction). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the

	cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa områden där habitatförlust potentiellt kan förekomma på grund av förekomst av sandutvinning i svenska kust- och havsvatten. Underlagsdata består av polygondata som specificerar utbredningen av licensierade områden för sandutvinning i form av en shape-fil. Ett cellvärde av 0 motsvarar ingen risk för habitatförlust på grund av sandutvinning, och ett cellvärde av 100 motsvarar risk för habitatförlust på grund av sandutvinning. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset is based on a polygon dataset showing licenced sand and gravel extraction sites in Swedish waters. These data were provided by the Geological Survey of Sweden. The vector data in shapefile format were converted to were converted to binary raster format using SAGA GIS.
Limitations for use in Symphony: No information is included which details the sediment type or volume of material extracted and the precise location of material removed.	
Recommendations for data improvement: Gather more precise footprint information on the location and volume of aggregates extracted that can be included as source data attribution. These data would allow impact scaling.	
Data authoring organisation: Dansk Hydraulisk Institut (DHI) Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: johan.kling@dhi.se; christin.eriksson@dhi.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	habitat loss, mining, environmental impact

Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Habitat loss sand extraction" dataset is a derived from source data provided by the Geological Survey of Sweden. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Turbidity sand extraction

Swedish Name	Grumling sandutvinning
Symphony Theme	Mineral Mining
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-05-05
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2016
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show areas where potential habitat loss can occur from the presence of mining (extraction) in Swedish coastal and offshore waters. Underlying data consists of mining (sand extraction) licensed site data in the form of a polygon shapefile. A cell value of 0 is equivalent to no presence of mining (extraction) and a cell value of 100 is

	equivalent to presence of mining (extraction). Underlying data consists of mining (extraction) presence data in the form of shape files. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa områden där habitatförlust potentiellt kan förekomma på grund av förekomst av gruvdrift (extraktion) i svenska kust- och havsvatten. Underlagsdata består av sandextraktionsdata för licensierade områden i form av en polygonshape-fil. Ett cellvärde av 0 motsvarar ingen förekomst av extraktion, och ett cellvärde av 100 motsvarar förekomst av extraktion. Underlagsdata består av extraktionsförekomstdata i form av shape-filer. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	This dataset is based on the location of the only licensed sand extraction site in Swedish waters. The source data was provided by the Geological Survey of Sweden. No attribution is available detailing the precise location, volume or type of material extracted so this model makes the simplistic assumption that impact within the site is high (i.e. 100). and everywhere else there is no impact. In reality the spatial footprint of the impact is more than likely to be lower than predicted.
Limitations for use in Symphony: This model does not take into account the influence of currents on the dispersal of sediments. No information is included which details the sediment type or volume of material extracted and the precise location of material removed.	
Recommendations for data improvement: Include data on dominant current strength and direction to improve the spatial impact model. If data on the sediment type, volume and location of material extracted are available the impact model could be made more sophisticated.	

Data detailing dominant currents in the Symphony region are publically available for example data from SMHI: http://cmems-resources.cls.fr/documents/PUM/CMEMS-BAL-PUM-003-008.pdf and data from the 2006 Balance project http://helcom.fi/baltic-sea-trends/data-maps/biodiversity/balance	
Data authoring organisation: Dansk Hydraulisk Institut (DHI) Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: johan.kling@dhi.se; christin.eriksson@dhi.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	turbidity, mining, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Turbidity sand extraction" dataset is a derived from source data provided by the Geological Survey of Sweden (SGU). This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to DHI Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Bird hunt

Swedish Name	Fågeljakt
Symphony Theme	Recreation

Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-02-28
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the intensity of bird hunting in Swedish coastal and offshore waters. The source data details statistics for two bird species (the Common Eider, Goldeneye) killed in various regions in 2015 in the form of an excel spreadsheet. This data was combined with spatial data for coastal regions assuming hunting occurs all the way to the edge of the territorial limits and these spatial data were used to transform the data to number of individuals killed per hectare. The data were adjusted to be proportional to the whole population for each species, then aggregated and transformed. A cell value of zero represents no individual birds hunted and a cell value of 100 represents the equivalent of 0.001 individuals killed per hectare. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa intensiteten av fågeljakt i svenska kust- och havsvatten. Källdata visar statistik för två fågelarter (ejder, knipa) skjutna i olika regioner under 2015 i form av ett Excel-ark. Denna data kombinerades med rumslig data för kustregioner och gör antagandet att jakt förekommer hela vägen ut till territorialhavets gräns, och dessa rumsliga data användes för att transformera data till antal individer skjutna per hektar. Data justerades för att bli proportionell

	till hela populationen för varje art, sedan aggregerad och transformerad. Ett cellvärde av 0 motsvarar inga enskilda fåglar skjutna, och ett cellvärde av 100 motsvarar 0,001 enskilda fåglar skjutna per hektar. Detta data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The source data for this data product consist of two data layers. Bird hunting data for two species (Eider and Knipa) were downloaded from the Swedish Hunting Association's website: https://rapport.viltdata.se and detail hunting activity for 2015. Boundaries data are open data (overview maps) downloaded from the Swedish land registration authority (Lantmäteriet). The data were normalised to the 2015 national population level for each species determined by the 2016 report "ORNIS SVECICA 26:3–54, 2016" thereby producing a proportion of the national population depleted by hunting activity. The species data were applied to the boundary polygons from Lantmäteriet according to the location described in the hunting data. The surface area of the polygons was determined using geometry calculator and the normalised value for hunting was divided by the surface area of the relevant polygon in order to produce a proportion of the population killed per hectare. A linear min-max stretch was then applied to these normalised data and based on a 0-100 scale. More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: The most significant limitation of these data is the lack of spatial resolution. The data assumes that bird hunting is occurring right out the EEZ in some instances - which is perhaps unlikely. The data is also limited to two reported species and the level of reporting is unknown.	
Recommendations for data improvement:	

Gather participatory information from the hunters association to highlight areas where they are operational or through environmental preferences (do hunters generally hunt from shore or boats for example?). Identify if there are additional species that are hunted which are not recorded. Determine what the quality (e.g. requirement for reporting) are of hunting data in general.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	Hunting, Environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Bird hunt" dataset is a derived from source data provided by the Swedish hunters association (Svenska Jägareförbundet) and the Swedish mapping, cadastral and land registration authority (Lantmäteriet). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SJF, LM
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Pollution boating

Swedish Name	Fritidsbåtar föroreningar

Symphony Theme	Recreation
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-05-30
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2009
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster data intends to show predicted pollution associated with recreational boating activity in Swedish inshore and offshore waters. The source data are voluntarily transmitted automatic identification system (AIS B) beacon data and locations and size of recreational boat harbours from 2009. A cell value of zero represents no noise from recreational vessels based on the absence of boat traffic and a cell value of 100 represents maximum vessel activity and therefore pollution impact. The actual pollution level has not been estimated and this data assumes a linear relationship (between activity and pollution levels). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad förorening associerad med fritidsbåtaktivitet i svenska kust- och havsvatten. Källdata är från frivilligt utsänd AIS B (Automatic Identification System) data, samt data över plats och storlek på fritidsbåtshamnar (2009). Ett cellvärde av 0 motsvarar ingen förorening från fritidsbåtar, baserat på ingen förekomst av båttrafik, och ett cellvärde av 100 motsvarar maximal fartygsaktivitet och därmed föroreningspåverkan. De faktiska föroreningsnivåerna har inte uppskattats och denna data antar ett linjärt förhållande (mellan aktivitet och föroreningsnivå). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV).

	Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	1. 2009 AIS recreational boating density data for the busy summer period (June and July) and point data detailing the position of recreational boat harbours and nature harbours were sourced from the Swedish Environmental Protection Agency (see report - https://www.naturvardsverket.se/Documents/publikationer/978-91-620-6376-4.pdf.) 2. AIS polygon data were classed 1-5 within 10 nautical miles from coast. 2. Buffer polygons around ”guest harbours” according to berths and distance, and natural harbours according to distance. Classed 1-5 to approximately correspond to the classes used for the AIS data. 3. Merge 1 and 2 “highest value wins” (1+5 = 5, 5+5 =5, 3+4=5 etc.) More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: This data includes an element of expert assessment so in the absence of relevant data and the results should therefore be interpreted with caution. Recreational boat traffic far from the coast has been excluded from data. 18.52 km = 10 distance minutes (Nautical miles). Data were selected to remove bad input. The impact of ports has been classified based on the size of the port and the distance to the port. The actual pollution level has not been estimated and this data assumes a linear relationship between boating activity and pollution levels. There is no legal requirement for boats to carry an AIS B beacon so the traffic data outside of ports is very likely a underestimate (perhaps a significant underestimate).	
Recommendations for data improvement: Use AIS data over a longer time period and produce an average layer to allow for variability in data quality. Attempt to validate the number of vessels carrying AIS B using external observations (e.g. SAR satellite data), additional data (e.g. insurance company reports). Look for data or studies which can validate the link between recreational vessel activity to pollution impacts.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management

	(Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	boating, environmental impact , pollution effect
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Pollution boating " dataset is a derived from source data provided by the Swedish Environmental Protection Agency (SEPA). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SEPA
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Noise boating

Swedish Name	Fritidsbåtar buller
Symphony Theme	Recreation
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-05-30
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area

	http://epsg.io/3035
Summary	This raster data intends to show predicted noise associated with recreational boating activity in Swedish inshore and offshore waters. The source data are voluntarily transmitted automatic identification system (AIS B) beacon data and locations and size of recreational boat harbours from 2009. A cell value of zero represents no noise from recreational vessels based on the absence of boat traffic and a cell value of 100 represents maximum vessel activity and therefore noise impact. The actual noise level has not been estimated and this data assumes a linear relationship (between activity and noise levels). These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa ljud i samband med fritidsbåtaktivitet i svenska kust- och havsvatten. Källdata är från frivilligt utsänd AIS B (Automatic Identification System) data, samt data över plats och storlek på fritidsbåtshamnar (2009). Ett cellvärde av 0 motsvarar inget ljud från fritidsbåtar, och ett cellvärde av 100 motsvarar maximal fartygsaktivitet och därmed ljudpåverkan. De faktiska ljudnivåerna har inte uppskattats och denna data antar ett linjärt förhållande (mellan aktivitet och ljudnivåer). Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	1. 2009 AIS recreational boating density data for the busy summer period (June and July) and point data detailing the position of recreational boat harbours and nature harbours were sourced from the Swedish Environmental Protection Agency (see report - https://www.naturvardsverket.se/Documents/publikationer/978-91-620-6376-4.pdf.) 2. AIS polygon data were classed 1-5 within 10 nautical miles from coast.

	2. Buffer polygons around ”guest harbours” according to berths and distance, and natural harbours according to distance. Classed 1-5 to approximately correspond to the classes used for the AIS data. 3. Merge 1 and 2 “highest value wins” (1+5 = 5, 5+5 =5, 3+4=5 etc.) More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: This data includes an element of expert assessment, or best guess, in the absence of relevant data and the results should therefore be interpreted with caution. Recreational boat traffic far from the coast has been excluded from data. 18.52 km = 10 distance minutes (Nautical miles). Data were selected to remove bad input. The impact of ports has been classified based on the size of the port and the distance to the port. The actual noise level has not been estimated and this data assumes a linear relationship between boating activity and noise levels. There is no legal requirement for boats to carry an AIS B beacon so the traffic data outside of ports is very likely a underestimate (perhaps a significant underestimate).	
Recommendations for data improvement: Use AIS data over a longer time period and produce an average layer to allow for variability in data quality. Attempt to validate the number of vessels carrying AIS B using external observations (e.g. SAR satellite data), additional data (e.g. insurance company reports). Look for data or studies which can validate the link between recreational vessel activity to noise impacts.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	boating, environmental impact , noise pollution
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Noise boating " dataset is a derived from source data provided by the Swedish Environmental Protection Agency (SEPA). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of

	the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SEPA
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Turbidity shipping

Swedish Name	Grumling sjöfart
Symphony Theme	Shipping
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2017-02-21
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2009 -06 2009-07
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show the predicted effect of erosion as a consequence of shipping in Swedish inshore and offshore waters. The dataset is modelled and is based on combined annual 2015 AIS shipping intensity and depth data from the Swedish Maritime Administration and the probability of soft bottom substrate occurrence from the Geological Survey of Sweden. The data is based on a range of simplifications and assumptions which will introduce errors and uncertainty into the data product. The model is not validated however observational data in the form of publically available multibeam survey data in harbour areas predicted to have high levels of erosion around Skåne in southern Sweden does provide some data to support the model prediction in heavy

	traffic areas. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad effekt av erosion på grund av fartygstrafik i svenska kust- och havsvatten. Detta rasterskikt är modellerat och är baserat på kombinerat årlig AIS data (2015), djupdata från Sjöfartsverket och data över trolig förekomst av mjukbottnar från Sveriges geologiska undersökning. Denna data är baserad på en rad förenklingar och antaganden vilket ger felkällor och osäkerhet. Modellen är inte validerad, dock finns observationsdata i form av offentligt tillgänglig mulitbeam-data från undersökningar i hamnområden som förutspås ha höga nivåer av erosion runt Skåne i södra Sverige, vilket ger viss data som stöd till modellen i tungt trafikerade områden. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	The dataset is based on combined annual 2015 AIS vessel tracking data created by WSP for SWaM's Symphony project. Calculation of induced flow rate at the bottom is based on [Fuehrer M. and Romisch K. 1987. Propeller jet erosion and stability criteria for bottom protection of various constructions. PIANC, Bulletin No. 58.] Erosion has been assumed to occur at current velocities> = 0.3 m / s. Above the critical erosion level (0.3 m / s), erosion has been assumed linearly following the increasing induced flow velocity (closer to deeper propellers). Furthermore, a simplified assumption has been made where erosion increases linearly to the soft bottom / transport bottom portion within each cell of 250 x 250 m. Also, erosion increases linearly to the annual vessel frequency within each corresponding cell. Processing steps are as follows:

	1. The combined proportion of the transport base and softbottom was calculated from the SGU basis SUBSTRATKARTOR_V1_SYMPHONY_20160919. 2. AIS data on the vessel classes of tankers, passenger ships, cargo vessels in 2015 were pooled into one layer with the total vessel intensity per 250 x 250 m grid cell. 3. Max speed (Vdmax) at a certain depth (d) was calculated with the equation Vdmax = 10.565 * d-1. Where depth values were collected from SGU DJUP_SYMPHONY_V2_20160919. 4: The equation is based on a power function matched to the results of calculations of Vdmax using the relationship set by Fuehrer & Romisch (Fuehrer M. and Romisch K. 1987. Propeller jet erosion and stability criteria for bottom protection of various constructions. PIANC, Bulletin No. 58.). When calculating Vdmax, a standard vessel has been used for which the following assumptions have been made: Propeller diameter: 7.5 m (no rudder).,Propeller location: 4.15 m below water level, Rotation speed: 80 rpm (equivalent to about 14.5 knots), Vessel size: L 330 m, W 50m, D 15 m, E (constant): 0.21 (applicable to ships without rudders), Thrust coefficient: 0.45 (chart for advance no J 0.45) (MAN, Basic Principles of Ship Propulsion) According to Hjulströms diagram, flow rates above 5 m / s can move all types of sediments (up to blocks). Values above 5 m / s are not relevant why a threshold was applied at 5 m / s (all values above the threshold were given value 5 m / s. Erosion on semi-finite sediment bottoms can occur at induced current velocities of about 0.3 m / s (wheel flow diagram), why a lower threshold was placed at this flow rate. 4. All components in the model affect the degree of erosion of bottom sediment, i.e.: intensity of vessel traffic, proportion of fine / half-sediment and deep-specific potential flow rate were pooled by multiplying. 5. The final grid was normalized linearly between min 0 and max 100 "
Limitations for use in Symphony: The model is constructed to predict vessel thrust velocities that are likely to cause erosion and this calculation is based on a set of simple assumptions. The first is that all vessels have the same characteristics, the second, that erosion is assumed to occur at current velocities> = 0.3 m / s. Thirdly, that above the critical erosion level (0.3 m / s), erosion linearly decreases	

with depth (i.e. increasing induced flow velocity closer to deeper propellers). Furthermore, a simplified assumption has been made whereby erosion increases as the probability of soft bottom substrate increases and erosion increases linearly to the annual vessel frequency within each corresponding cell. The substrate and depth datasets used are also subject to limitations which should be investigated in further detail.	
Recommendations for data improvement: The model could be further refined by adding addition criteria on vessel dimensions. Additional observational data could be collected to validate the model assumptions. The substrate dataset could be refined (for example consideration of the morphology of the substrate and compaction of sediments). Data on currents and exposure could be introduced (however it is assumed that the sediment data would be collinear). A more advanced form of modelling based (e.g. a GAM) might prove a different relationship between the different variables so this might be valuable to test.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	merchant shipping, turbidity, environmental impact
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Turbidity shipping " dataset is a derived from source data provided by the Swedish Environmental Protection Agency. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SEPA
Security Classification	no protection required

Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Noise 125Hz shipping

Swedish Name	Undervattensbuller 125 Hz sjöfart
Symphony Theme	Shipping
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-19
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster intends to show predicted sound level exposure at a frequency of 125 Hertz from shipping (i.e. passenger, cargo, and tanker) in Swedish coastal and offshore waters. A cell value of 0 is equivalent to low exposure (<100 dB re 1 uPa) and a cell value of 100 is equivalent to high exposure (>150 dB re 1 uPa). Underlying data are from several sources and consist of shipping traffic data, bottom substrate data, and depth data that have been combined and modelled. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad ljudexponering från fartygstrafik (dvs. passagerar-, frakt- och tankfartyg) i frekvensområdet 125 Hertz i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar låg exponering (<100 dB re 1 uPa), , och ett cellvärde av 100 motsvarar hög exponering

	(>150 dB re 1 uPa). Underlagsdata härrör från flera olika källor och består av trafikdata, bottensubstratsdata och djupdata som har kombinerats och modellerats. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	With the assistance of a generalised spreading model (RL = SL – TL) the Received Level (RL) of sound was calculated for all cells in the SYMPHONY area at two frequencies (125 Hz and 2000 Hz). SL = Source level. Transmission loss (TL) was calculated as a function of the distance from the source (distance) as well as bottom substrate character at the source. For shallow (<30m) bottoms with hard sediment character the function 15 × log(distance) was used and for deep (>30m) bottom or soft sediment character the function 20 × log(distance) was used. Bottom substrate classification was based on maps of bottom substrate purpose produced by the Geological Survey of Sweden (SGU) for SYMPHONY. Bottom substrates where the proportion of soft bottom was > 50% were defined as having soft sediment character. The aggregated sound from all ships within a particular ship class over a year were combined and converted to sound intensity. The yearly average was calculated and then converted to sound volume expressed in average decibels (dBavg), which was calculated as follows: dBavg = 10 × log10(∑Δt/T×(10)^((RL intensity/10)) summed over all Δt under the whole time period T (1 year alternatively 6 months). Source sound volumes that were applied for different ship classes were as follows: 125 Hz Passenger ships – 150 dB 125 Hz Cargo ships – 180 dB 125 Hz Tanker ships – 185 dB 2000 Hz Passenger ships – 150 dB 2000 Hz Cargo ships – 153 dB 2000 Hz Tanker ships – 160 dB Data were linear normalized between 100 and 150 dB yearly average. Schematic source strengths for different ship types and frequency ranges have been determined by a literature study. In cases where source strengths of 1/3 octave band at

	125 and 2000 Hz have not been identified, the closest value found in the literature is used. More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: The generalized sound propagation model is not externally validated so the results of the modelling should be interpreted with caution. Attention should be paid to the underlying quality and accuracy of the sediment substrate data. In particular the Geological Survey of Sweden (SGU) provided data on the probability of occurrence of soft sediment substrates for these modelling, these data are based on both on dominant grain size and categorical maps based on hydroacoustic data. The model does not include information on sediment compaction and morphology which will certainly affect sound propagation. This model should therefore be used with caution and should not be used for detailed studies of smaller areas.	
Recommendations for data improvement: Produce data on seabed geomorphology (e.g. depth metrics) and sediment compaction may be useful for improvement of the model At present little data is available for model validation so identification of additional sources of acoustic monitoring data would be useful.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	merchant shipping, environmental impact , noise pollution
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Noise 125Hz shipping" dataset is a derived from source data provided by the Geological Survey of Sweden (SGU), the Swedish Maritime Authority (SMA). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was

	produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SGU, SMA
Security Classification	no protection required
Maintenance	Review Planned 2018
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Noise 2000 Hz shipping

Swedish Name	Undervattensbuller 2000 Hz sjöfart
Symphony Theme	Shipping
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-19
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show predicted sound level exposure at a frequency of 2000 Hertz from shipping (i.e. passenger, cargo, and tanker) in Swedish inshore and offshore waters. A cell value of 0 is equivalent to low exposure (<100 dB re 1 uPa) and a cell value of 100 is equivalent to high exposure (>150 dB re 1 uPa). Underlying data are from several sources and consist of shipping traffic data (AIS 2015), bottom substrate data, and depth data that have been combined and modelled. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human

	activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa beräknad ljudexponering från fartygstrafik (dvs. passagerar-, frakt- och tankfartyg) i frekvensområdet 2000 Hertz i svenska kust- och havsvatten. Ett cellvärde av 0 motsvarar låg exponering (<100 dB re 1 uPa), och ett cellvärde av 100 motsvarar hög exponering (>150 dB re 1 uPa). Underlagsdata härrör från flera olika källor och består av trafikdata (AIS 2015), bottensubstratsdata, och djupdata som har kombinerats och modellerats. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Lineage: With the assistance of a generalised spreading model (RL = SL – TL) the Received Level (RL) of sound was calculated for all cells in the SYMPHONY area at two frequencies (125 Hz and 2000 Hz). SL = Source level. Transmission loss (TL) was calculated as a function of the distance from the source (distance) as well as bottom substrate character at the source. For shallow (<30m) bottoms with hard sediment character the function 15 × log(distance) was used and for deep (>30m) bottom or soft sediment character the function 20 × log(distance) was used. Bottom substrate classification was based on maps of bottom substrate purpose produced by the Geological Survey of Sweden (SGU) for SYMPHONY. Bottom substrates where the proportion of soft bottom was > 50% were defined as having soft sediment character. The aggregated sound from all ships within a particular ship class over a year were combined and converted to sound intensity. The yearly average was calculated and then converted to sound volume expressed in average decibels (dBavg), which was calculated as follows: dBavg = 10 × log10(∑Δt/T×(10)^((RL intensity/10)) summed over all Δt under the whole time period T (1 year alternatively 6 months). Source sound volumes that were applied for different ship classes were as follows: 125 Hz Passenger ships – 150 dB

	125 Hz Cargo ships – 180 dB 125 Hz Tanker ships – 185 dB 2000 Hz Passenger ships – 150 dB 2000 Hz Cargo ships – 153 dB 2000 Hz Tanker ships – 160 dB Data were linear normalized between 100 and 150 dB yearly average. Schematic source strengths for different ship types and frequency ranges have been determined by a literature study. In cases where source strengths of 1/3 octave band at 125 and 2000 Hz have not been identified, the closest value found in the literature is used. More detailed information on the lineage and methodology is available and can be supplied on request to the data owner.
Limitations for use in Symphony: The generalized sound propagation model is not externally validated so the results of the modelling should be interpreted with caution. Attention should be paid to the underlying quality and accuracy of the sediment substrate data. In particular the Geological Survey of Sweden (SGU) provided data on the probability of occurrence of soft sediment substrates for these modelling, these data are based on both on dominant grain size and categorical maps based on hydroacoustic data. The model does not include information on sediment compaction and morphology which will certainly affect sound propagation. This model should therefore be used with caution and should not be used for detailed studies of smaller areas.	
Recommendations for data improvement: Produce data on seabed geomorphology (e.g. depth metrics) and sediment compaction may be useful for improvement of the model At present little data is available for model validation so identification of fadditional sources of acoustic monitoring data would be useful.	
Data authoring organisation: WSP Sverige AB	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features

GEMET keywords	merchant shipping, environmental impact , noise pollution
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Noise 2000Hz shipping" dataset is a derived from source data provided by the Geological Survey of Sweden (SGU), the Swedish Maritime Authority (SMA). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SGU, SMA
Security Classification	no protection required
Maintenance	Review Planned 2018
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Oilspill shipping

Swedish Name	Oljespill sjöfart
Symphony Theme	Shipping
Symphony Category	Pressure
Symphony Data Type	Normalised
Date Created	2016-10-09
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	2015
Resource Type	dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	The raster layer intends to show the probability of exposure to an oil spill from shipping over the course of a year in

	Swedish coastal and offshore waters under meteorological conditions equivalent to a drift speed of 0.2 knots. A cell value of 0 is equivalent to low probability of exposure and a cell value of 100 is equivalent to a high probability of exposure. Underlying data are from two sources and consist of shipping traffic data (AIS 2015) and illegal oil discharge data (HELCOM, 2015) that have been combined and modelled. These data were created as a data input layer for 'Symphony' tool developed by the marine planning unit at the Swedish Agency for Marine and Water Management (SwAM). Symphony is used by SwAM to assess the cumulative environmental impact of human activity in Swedish waters and this informs the formulation of policy at plan area scales. Re-use of these data for other purposes is only advisable with the guidance and advice of the data sources.
Summary (Swedish)	Detta rasterskikt avser att visa sannolikheten att drabbas av oljespill från fartyg under ett år, under meteorlogiska förhållanden som motsvarar en drifthastighet av 0,2 knop. Ett cellvärde av 0 motsvarar låg sannolikhet för oljespill, och ett cellvärde av 100 motsvarar hög sannolikhet. Underlagsdata härrör från två källor och består av trafikdata (AIS, 2015) och data över illegala oljeutsläpp (HELCOM, 2015) som har kombinerats och modellerats. Denna data skapades som ett data input layer för 'Symphony' verktyget utvecklat av enheten för havsplaneringen på Havs- och vattenmyndigheten (HaV). Symphony används av HaV för bedömning av den kumulativa miljöpåverkan av mänsklig aktivitet i svenska vatten och används vid havsplanering. Återanvändning av denna data för andra ändamål är endast lämpligt efter vägledning och rådgivning av datakällorna.
Lineage	Based on data of ship traffic (AIS 2015) and detected oil spills (HELCOM, 2015, http://helcom.fi/baltic-sea-trends/data-maps/) the likelihood that an oil spill would occur in an area with a certain level of ship traffic intensity was established. The likelihood of an oil spill was calculated for 10 classes of ship traffic intensity. A focal statistics filter was applied on the generated raster to simulate areas that could be impacted by a spill. The impact area was estimated for an oil spill with a residence time of 24 h and a spreading distance equivalent to the distance that a spill can travel with a speed of 0.2 or 0.5 knots (i.e. two spreading scenarios with wind speeds of approx. 4.5 m/s and 8.5 m/s, in accordance with the Swedish Meteorological and Hydrological Institute's (SMHI) report 2007-8, Fairways in the Baltic Sea, Oil spill risk assessment). A sensitivity analysis was undertaken whereby detected spills moved a distance equivalent to that of the drift speed under 12h in a random direction. The sensitivity analysis indicated high sensitivity for the spills

	reported location. To simulate the oil spill weathering (i.e. dissolution, dilution, dispersion, sedimentation and evaporation) a linear decrease with respect to increasing distance from the source cell was applied. Discussion on the method occurred between WSP (consultant) and SwAM (client) as well as Linnaeus University (expert).

Limitations for use in Symphony:

The model used requires a connection between vessel intensity and likelihood of an oil spill but there are a number of other explanatory factors with great or greater relevance with are currently omitted. The sensitivity analysis indicated high sensitivity to the spill's reported location. The spill may have moved in the period between occurrence of the spill to the Coast Guard's discovery which introduces major uncertainties in the model. Data on seabirds killed by oil spills indicates that the actual amount of spills that are happening are likely to be greater than reported. This gives further uncertainty and implies that the model probably underestimates the likelihood. The probability that a spill enters the surrounding grid cell has been calculated by assuming a linear decrease with probability 0 at the distance reached during 24 h with a wind speed of 0.2 knots. The results should be interpreted as standard estimates.

Recommendations for data improvement:

There are insufficient data on actual spill occurrences so the model results should be interpreted with caution.

These model could be significantly improved with higher rates of detection. It is unclear if reporting to the maritime authority is based on real time satellite data. Surface Aperture Radar (SAR) equipped satellite sensors are becoming increasingly capable of detecting spills. Further investigations should be undertaken to identify potential data gathering opportunities.

Data authoring organisation: WSP Sverige AB

Contact organisation: Swedish Agency for Marine and Water Management

Data Author Contact: patrik.lindstrom@wspgroup.se; martin.rask@wspgroup.se

Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	merchant shipping , environmental impact , oil pollution
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Oilspill shipping" dataset is a derived from source data provided by the Swedish Maritime Authority

	(SMA). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to WSP Sverige AB and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMA
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Background

Depth	
Swedish Name	Djup
Symphony Theme	Source Data
Symphony Category	Source Data
Symphony Data Type	Source Data
Date Created	2016-09-19
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	Dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster layer shows a compiled depth grid of Swedish marine waters. A cell value of 0 is equivalent to land and a cell value of -400 is equivalent to a depth of seabed depth 400 m, and a map showing variations in source data quality based on the criteria of Symphony uncertainty maps. Data are from several sources and consist of bathymetry data (Baltic sea bathymetry database (BSBD) 2013), EMODNET

	bathymetry (2015), and the Swedish Maritime Authority (SMA)).
Summary (Swedish)	Detta rasterskikt visa en sammanställd djupgrid av svenska havsvatten. Ett cellvärde av 0 motsvarar land, och ett cellvärde av -400 motsvarar havsbotten på 400 meters djup, och en karta visar variationer i kvalitet av källdata baserat på Symphonys osäkerhetskartors kriterier. Data härrör från flera olika källor och består av batymetridata (Baltic Sea bathymetry database (BSBD) 2013), EMODNET bathymetry (2015) och Sjöfartsverket.
Lineage	The depth grid designed for use in the SYMPHONY framework is a compilation of two publicly available datasets: the Baltic Sea Bathymetry Database (BSBD) 500m grid (published in 2013 at http://data.bshc.pro/), EMODNET Bathymetry (published 2015 at http://portal.emodnet-bathymetry.eu/), as well as a number of declassified datasets produced by Aquabiota Water Research AB for the Swedish Agency for Marine and Water Management (SwAM) (dnr 2749-16 including areas in Västra Götaland, Östergötland, Västerbotten, Norrbotten, Västernorrland, Skåne, Stockholm, Södermanland as well as data from Hanöbukten (from the project Marmoni). Data layers were produced as follows: 1. The 500m BSBD grid was downloaded as an ASCII grid from http://data.BSBD.pro/#3/57.90/19.98 on 01/09/2015 in the WGS 1984 geographic reference system. The dataset used was created on 06/09/2013. 2. EMODNET Bathymetry (grid C2, C3, D2) was downloaded from the EMODNET bathymetry portal http://portal.emodnet-bathymetry.eu/ as ASCII grids in the WGS84 geographic reference system on 16/05/2016. According to the EMODNET sites the last major release of this data was 08/09/2015 and this was based on updated GEBCO http://www.gebco.net/ bathymetry from 2014. 3. The EMODNET data were combined into a single ASCII dataset and re-projected to ETRS 1989 LAEA. 4. These EMODNET data were then re-sampled to match the SYMPHONY 250 m grid using the resample function in ArcGIS 10 (bicubic interpolation setting). 5. The BSBD data were also up sampled to 250m grid by inserting nodes using a spline function. 6. A difference grid was calculated where the two grids overlapped. Since the BSBD grid was the source for the EMODNET grid it was deemed to be of higher quality for the

	overlap areas, except a relatively small area on the Norwegian/Swedish border which was masked due to obvious interpolation problems in the BSBD grid. 7. Simple kriging was used to extrapolate the differences between the grids to achieve a smooth transition in the edge zones between the BSBD grid and the EMODNET grid. 8. The simple kriging raster from step 7 was combined with the EMODNET data from step 4 and a conditional statement in ArcGIS was used to substitute the up sampled BSBD grid (step 5) so it would be used in preference. 9. Interpolation: The stacked grid was interpolated using the elevation void fill function in ArcGIS to fill small gaps along the shoreline (the shoreline used was produced for the Symphony project by the Geological Survey of Sweden (SGU) and in Sweden is primarily sourced from the Swedish mapping, cadastral and land registration authority's (Läntmäteriet) 1:50000 vector shoreline "terrängkartan" which was downloaded on 29/01/2016. 10. Higher resolution (between 15m and 300m) depth data for Västra Götaland, Östergötland, Västerbotten, Norrbotten, Västernorrland, Skåne, Stockholm, Södermanland and Hanöbukten were provided by Aquabiota AB on behalf of Swedish Agency for Marine and Water Management (SwAM). These data were created between 2010 and 2016 using data provided by the Swedish Maritime Agency (SMA) using a mix of modern high resolution multibeam data and legacy depth data from charts. Each data grid was imported as a geoTIFF and combined and resampled to a 250 meter resolution geoTIFF using bicubic resampling in the ETRS 1989 LAEA coordinate reference system. 11. Using the same method as described in step 6, a difference grid was calculated between the new data and the combined EMODNET/BSBD depth grid. This was exported at 250m resolution and simple kriging was used to extrapolate this difference grid at the edges (to produce a smooth transition to zero difference between the grids). 12. The depth grid from step 9 was combined with the simple kriging output (step 11) and the original high resolution grid (step 10). 13. The final grid was exported as a geoTIFF The depth grid is a compilation of two published publically available bathymetry datasets and a number of currently unpublished but derestricted bathymetry datasets from national sources. Interpolation techniques have been used to

	fill gaps between available data and the shoreline and to smooth transitions between data from differing sources. The two published international data sources are the Baltic Sea Bathymetry Database (BSBD) which is a 500m grid (published in 2013 at http://data.bshc.pro/) and Emodnet Bathymetry which is a one eighth arc minute grid - approximately 230m (published 2015 at http://portal.emodnet-bathymetry.eu/). It should be noted that the true resolution of these bathymetric grids are dependent on the quality and resolution of the source data, for example the Emodnet source in the Kattegat is a mix of General Bathymetric Chart of the Ocean (GEBCO) data (approx. 1km grid) as well as higher resolution open data from Norwegian sea charts, while in the Baltic Sea the primary source is the BSBD dataset (500m). Due to gridding artefacts discovered in the Emodnet dataset, the source BSBD data was used when available. For coastal areas a number of declassified datasets produced by Aquabiota Water Research AB for the Swedish Agency for Marine and Water Management (SwAM) covering areas in Västra Götaland, Östergötland, Västerbotten, Norrbotten, Västernorrland, Skåne, Stockholm, Södermanland along with data from Hanöbukten (from the project Marmoni) are also included in the dataset. These data were originally gridded at a variety of spatial scales ranging from 15m to 300m and were provided by SwAM. The data were re-sampled to match the Symphony grid (250m), and then integrated with the underlying datasets (BSBD, Emodnet).

Limitations for use in Symphony:

The primary source for soundings used to create grid products in Swedish waters is the Swedish Maritime Authority (SMA). Their database contains both historical data and modern data (e.g. multibeam records) collected from a range of sources.

Distribution of high resolution depth data from Swedish waters is heavily restricted by the military as well as subject to copyright. For this reason only publicly available and declassified data is included in this data product.

All data have been re-sampled to 250m resolution to fit the Symphony standard grid template. The quality of the data varies significantly depending on the data source and age so in addition to the depth grid a dataset showing data quality is also provided. This has been compiled and interpreted from information provided by BSBD and Emodnet.

Because of the gridding scale and dependence on multiple data sources of varying quality use of these data for local scale decision making may be inappropriate. Users are advised to determine this based on the data quality layer and to check with SGU or with the SMA if higher resolution data is required.

Recommendations for data improvement: The Swedish Maritime Administration are currently in the process of updating the Emodnet dataset which will become the best available public depth dataset. It is recommended that future iterations of this product are based upon these data.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	elevation
INSPIRE theme	hydrography
GEMET keywords	Bathymetry, abiotic factor
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "depth" dataset is derived from data originally provided by the Swedish Maritime Authority (SMA) and sourced from SwAM (16-00206, 16-00377, 11-03461, 13-02473, 13-02136, 15-03629) Emodnet Bathytmetry (EMODNET-BATY), the Baltic Sea Bathymetry Database (http://data.bshc.pro/). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SMA, SwAM, EMODNET-BATY
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Complex Bottom Uncertainty

Swedish Name	Komplex botten osäkerhet
Symphony Theme	Source Data
Symphony Category	Source Data
Symphony Data Type	Uncertainty Data
Date Created	2018-12-01
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	Dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster shows the uncertainty associated with the complexity source data used to model 'Bottom Complexity' in deep, aphotic shallow (<60m) and aphotic deep (>60m) depth zones. The interpretation is based on expert judgement using information on source data quality from the Swedish Maritime Administration (SMA) downloaded in November 2018. The data is classified into 5 classes: 0,0.25, 0.5,0.75 and 1. A value of 1 refers to data gaps (no-data), 0.75 refers to low quality modelled data, 0.5 refers to high quality modelled data without validation, 0.25 refers to a high quality validated model and 0 refers to cells which contain source data.
Summary (Swedish)	Detta skikt visar osäkerheten i samband med komplexitetskälldata som används för att modellera "bottenkomplexitet" i djupa, apotiska grunda (<60m) och aphotiska djup (> 60m) djupzoner. Tolkningen bygger på expertbedömning med information om källkvalitetsdata från Sjöfartsverket (SMA) som hämtades i november 2018. Uppgifterna är indelade i 5 klasser: 0,025, 0,5, 0,75 och 1. Ett värde av 1 avser datafelter (ingen data), 0,75 hänvisar till lågkvalitativa modellerade data, 0,5 avser högkvalitativa modellerade data utan validering, 0,25 hänvisar till en kvalitetsvaliderad modell och 0 avser celler som innehåller källdata.
Lineage	The data were sourced from a WMS feed provided by the Swedish Maritime Adminstration:

	https://geokatalog.sjofartsverket.se/mapservice/wms.axd/DjupdatatsKvalitet? 1) A WMS layer for each quality category was saved as a high resolution (4000dpi) GEOTIFF in ArcGIS. 2) Each GeoTIFF was then reprojected to ETRS89_LAEA (bilinear) in ArcGIS 3) Each raster was then resampled (250m) and snapped to the Symphony Grid in ArcGIS 4) FSIS 44 data were recalassified as 0.25 (high quality model) 5) Surveys after 1940 and not to FSiS 44 standard: were reclassified as 0.5 (high quality model without validation) 6) Older surveys which dont fullfill FSIS 44 standards were reclassified as 0.75 (low quality data) 7) The layers from 4,5 and 6 were combined into a single raster using cell statistics (MAX) 8) No data cells were scored 1 (High uncertainity: no-data)
Limitations for use in Symphony: This interpretation of data quality is based on data (sourced from the Swedish Maritime Administration) which descibes the source of the bathymetric surveys undertaken. This data describes the age and standards of the survey into three classes. 1) FSIS 44: which refers to the Finish/Swedish interpretation of the IHO S44 survey standard and which is interpreted as 0.25 (high quality and validated model), 2) surveys after 1940 and not to FSiS 44: which are interpreted as 0.5 (high quality model without validation) and 3) older surveys which dont fullfill FSIS 44 standards which are interpreted as low quality data. There is flexibility interpretation - particularly for the medium (0.5) scored data. These data may be anything from multibeam surveys to single beam sonar surveys and positional accuracy would have depended on what type of system was used.	
Recommendations for data improvement: For the purposes of mapping seabed complexity it would be useful to be able to differentiate based on survey method because full coverage data would produce a far more reliable result (even if not useful for hyrdographic survey purposes).	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: duncan.hume@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment

INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Complex Bottom Uncertainty" dataset is a derived from source data provided by the Swedish Maritime Adminstration (SMA). This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SwAM, SMA, SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2018-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Symphony Photic Zone

Swedish Name	Symphony fotisk zon
Symphony Theme	Source Data
Symphony Category	Source Data
Symphony Data Type	Source Data
Date Created	2017-03-23
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	Dataset

Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster dataset is a modelled dataset which predicts the photic zone boundary in Swedish waters based on obeservation data detailing water transparency (secci depth) provided by SMHI, NVV, HELCOM and ICES and the prescence of photosynthsis dependant algae (for validation) from Aquabiota AB and SMHI.
Summary (Swedish)	Detta rasterskikt är ett modellerat rasterskikt vilken förutser gränsen för den fotiska zonen i svenska vatten baserat på observationsdata av vattnets transparens (secchidjup) tillhandhållet av SMHI, Naturvårdsverket, HELCOM och ICES samt förekomst av fotosyntesberoende alger (för validering) från Aquabiota AB och SMHI.
Lineage	Primary secci depth obeservation data were source from ICES "Secchi disk data collection for the North Sea and Baltic Sea" http://ocean.ices.dk/Project/SECCHI/Default.aspx, data downloaded 28.01.2016. The dataset description is here: Aarup, T. (2002) Transparency of the North Sea and Baltic Sea: a Secchi depth data mining study. Oceanologia, 44(3), 323-337 This sample data from ICES was supplemented with secci depth point data sourced from SMHIs shark database and from the ViSS classifcation system for water framework directive reporting and from Helcom (collated for Balance 2006). The data were processed as follows: 1.All secci depth data from ICES, SHARK, ViSS and HELCOM reprojected to the ETRS89LAEA coordinate system 2.Spatial Join water bodies (SVAR2012) to decadal averages of ICES data offshore and SMHI (Shark) and ViSS data inshore 3.Merge data from the inshore and coastal zone datasets with HELCOMs data to create a mean secci depth point dataset. 4. These data were interpolated using a diffusion kernal kriging method with land as a mask and barrier. 5. Approximate the threshold for the photic zone digitised using EUSeaMap and salinity as a guide and create a raster.

	6. Create a quotient layer - calculate ratio between photic zone dataset and bathymetry from Symphony depth grid 7. Create a euphotic and aphotic binary dataset based on the difference between the quotient value and the threshold raster 8- Validate the model using epibenthos data from SHARK and iterate 5-7 until 95% of samples within the photic zone. A log file detailing this prcoess is available upon request.
Limitations for use in Symphony: The dataset is based on data from a long time series and as consequence it is limited in accuracy for 2015.	
Recommendations for data improvement: Satellite based techniques might provide improvements in the prediction if accuracy for the present year is important.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	abiotic factor, abiotic environment
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Symphony Photic Zone" dataset is a derived from data originally provided by the Swedish Meteorological and Hydrological Institute, the Swedish Environmental Protection Agency, Aquabiota AB, HELCOM and ICES. This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SEPA, SMHI, HELCOM, ICES

Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Symphony Standard Grid

Swedish Name	Symphony standardrutnät
Symphony Theme	Source Data
Symphony Category	Source Data
Symphony Data Type	Source Data
Date Created	2016-05-26
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	Dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster is a standard grid developed by the Swedish geological survey (www.sgu.se) for a marine spatial planning tool known as SYMPHONY which is currently under development by Sweden's Agency for Marine and Water Management (www.havochvatten.se). The raster is based on a 250 meter grid compatible with the European standard grid (ETRS 89 LAEA) and contains 5 classes: 1. Hav (Swedish baseline to edge of the EEZ), 2. Kust (Swedish coastline to baseline), 3. HavExtend (ocean areas outside the Swedish EEZ that can be of interest), 4. HavExclude (Ocean areas that are outside the area of interest), 5. Land (all land areas).

	Since the location of the Swedish EEZ is pending this grid was created using a combination of several EEZ versions which were combine to a 'maximum area EEZ', this was to ensure that the principal area of interest (class 1, Hav) for SYMPHONY is covered. The Swedish baseline was used to define the inner limit of the ocean planning area to ensure overlap with the coastal planning area which extends one nautical mile outside the baseline.
Summary (Swedish)	Detta rasterskikt är en standardgrid framställd av Sveriges geologiska undersökning (www.sgu.se) för det marina havsplaneringsverktyget Symphony, vilket för närvarande är under utveckling av Havs- och vattenmyndigheten (www.havochvatten.se). Rastret är baserat på en 250 meters grid som är kompatibel med den europeiska standardgriden (ETRS 89 LAEA) och består av 5 klasser: 1. Hav (svenska baslinjen till kanten av EEZ) 2. Kust (svenska kustlinjen till baslinjen) 3. HavExtend (havsområden utanför den svenska EEZ som kan vara av intresse) 4. HavExclude (havsområde utanför områden av intresse) 5. Land (alla landområden) Eftersom läget för den svenska EEZ inte är fastställd, skapades denna grid genom en kombination av flera EEZ-versioner vilket kombinerades till ”maximala områdes-EEZ”, detta gjordes för att säkerställa att huvudområdet av intresse (klass 1, Hav) för Symphony täcks. Den svenska baslinjen användes för att definiera inre begränsning av havsplaneringsområdet, för att säkerställa överlapp med kustplaneringsområdet vilket sträcker sig en nautisk mil utanför baslinjen.
Lineage	Four main areas are defined in this file, mainland, land(i.e. islands), coastal waters (coastline - baseline) and offshore waters (baseline to edge of EEZ). The coastline was defined by combining SMHI definition of marine waters (smhi_kustvatten_och_havsomraden_SVAR_2012_2) see metadata available here:- https://www.geodata.se/GeodataExplorer/GetMetaData?UUID=7b52fbdd-2e5f-4c4e-b335-e335f89b1aaa and from water (VY) referenced in Lantmäteriets Terrängkartan (open data downloaded 2016-02) - see QA information and metadata here: https://www.lantmateriet.se/globalassets/kartor-och-geografisk-information/kartor/produktbeskrivningar/terrshmi.pdf some manual adjustments were made to include extra areas around Gothenburg harbour and Nordre Älv as well as Torneälv.

	The baseline was extracted from "Gränser i havet SOU 2015:10" , which is still under consideration - see http://www.regeringen.se/rattsdokument/statens-offentliga-utredningar/2015/02/sou-201510/. The EEZ used is a combination of the EEZ extracted from "Gränser i havet SOU 2015:10", SGUs own EEZ (2011), SMHIs version of the EEZ (2012), and Lantmäteriets data from Sverigekartan 1:1milj. The final EEZ was developed by combing all the EEZ version to get a maximum extent EEZ.
Limitations for use in Symphony: The EEZ for Sweden is not finalised so users should be aware that the EEZ represented is a 'maximum extents' EEZ developed by combining data from multiple sources.	
Recommendations for data improvement: Once a EEZ is agreed for Sweden this dataset should be updated.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	administrative boundary,
INSPIRE theme	administrative units
GEMET keywords	gridding
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Symphony Standard Grid" dataset is a derived from data originally provided by the Swedish Meteorological and Hydrological Institute and the Swedish Cadastral Agency (Läntmateriet). This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes. Do not use for determination of any offical boundaries - refer to the source organisations for the most up to date boundary information and for advice on boundary definition.

Map Acknowledgement	LM, SMHI
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Symphony Geological Surface Substrate

Swedish Name	Symphony ytsubstrat
Symphony Theme	Source Data
Symphony Category	Source Data
Symphony Data Type	Source Data
Date Created	2016-09-19
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	Data Series
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	These raster layers intend to show the predicted distribution of geological substrates in marine benthic sediments. The individual geological component classes include mud (gyttja), clay (lera), silt (silt), sand (sand), gravel (grus), cobbles (sten), boulders (block), and bedrock (berg). These individual components have been combined into three layers based on estimated grain size: 1) Softbottom - mud, clay, silt, 2) transport bottom sediments: sand and gravel, and 3) hard bottom - cobbles, boulders and exposed bedrock. A cell value of 100 is equivalent to high mean relative proportion of a seabed type and a cell value of 0 is equivalent to low mean relative proportion of a seabed type. Data are from several sources and consist of sediment sample data (SGU 1970-

	2014) and categorical geological maps (Emodnet 2016 and SGU), and depth data (Symphony Depth Grid).
Summary (Swedish)	Detta rasterskikt avser att visa beräknad relativ medelproportion av geologiska komponentklasser eller havsbottentyper i svenska marina bentiska sediment. De individuella geologiska komponentklasserna inkluderar gyttja, lera, silt, sand, grus, sten, block och berg. Detta rasterskikt har kombinerats till 1) mjukbotten: gyttja, lera, silt, 2) transport botten: sand och grus, och 3) hårdbotten: – sten, block och berg. Ett cellvärde av 100 motsvarar hög relativ medelproportion av en bottentyp, och ett cellvärde av 0 motsvarar låg relativ medelproportion av en bottentyp. Data härstammar från flera olika källor och består av sedimentprovsdata (SGU 1970-2014), geologiska kartor (Emodnet 2016 och SGU) och djupdata (Symphony Djup).
Lineage	The data products are a reclassification of the 'best available' categorical geological maps covering Swedish waters and the best publicly available maps from surrounding countries. This geological map data combines the latest edition of Emodnet's geology maps (draft of Emodnet 2, downloaded June 2016 from project ftp) with higher resolution data from the Geological Survey of Sweden's (SGU) geological maps (scales ranging from 1:25,000 to 1:1,000,000) and merges classes from several different classification schemes. In order to compile a best available thematic surface geology map product, the maps of the highest resolution and quality were clipped into a master shapefile, all raster layers attached to this metadata are based on this shapefile (unpublished due to military restrictions in some areas). This raster was combined with depth zone data (0-30 m, 30-60 m, > 60 m) and sea basin data (The West Sea (Västerhavet), Baltic Sea proper, and the Bothnian Sea and Gulf of Bothnia) The reclassification of the thematic surface geology map product to the geological component classes mud (gyttja), clay (lera), silt (silt), sand (sand), gravel (grus), cobbles (sten), boulders (block), and bedrock (berg) was achieved by examining SGUs historical archive of approximately 7800 sediment samples (collected between 1970 and 2014) together with the available maps products. Geological component classes were defined according to the Swedish Geotechnical Society (SGF) scale which defines classes by sediment fraction dimensions. The exceptions were the classes mud (gyttja, refers to sediment containing organic matter) and bedrock (berg). The principle geological components were determined for each sediment sample (recorded as presence/absence data). Presence absence records were then transformed to relative proportions of

	geological components (%) e.g. if a sediment sample showed the presence of the geological components mud and clay then the sample received values of 50% mud and 50% clay and the remaining geological components were assigned values of 0%. Summary statistics (means) of the relative proportions (%) of geological components were calculated for each geological thematic class within each map scale (local 1:25000-1:250000 and regional >1:250000), depth zone (0-30 m, 30-60 m, >60 m), sea basin (The West Sea (Västerhavet), Baltic Sea proper, and Bothnian Sea and Gulf of Bothnia) and combination of these. If the mean within a subclass (i.e. geological thematic class split by a combination of map scale, depth zone, and sea basin) was calculated from less than 20 sediment samples, or produced illogical results (based on expert opinion), mean values from other subclasses within that geological thematic class were used instead. If mean values from other subclasses did not stem from 20 sediment samples or more then relative proportion values of geological components from the corresponding EMODNET geological thematic class in the same map scale, depth zone, and sea basin were used. After mean relative proportions values of geological components had been calculated for combinations of each thematic class, depth zone, sea basin and map scale (local 1:25 000 - 1:250 000 and regional >1:250 000), a spatial join was made to connect relative mean proportion of geological component values with the master shapefile containing the best available thematic maps. In the next step 50 meter resolution raster maps where produced with the thematic information, as well as all sediment proportions. Finally this information was up sampled to 250m using the mean value of the 50 meter cells for all sediment proportion layers. Once the relative proportions of individual geological components had been calculated they were combined into soft (mud, clay, silt), transport (sand and gravel), and hard (cobbles, boulders, bedrock) seabed types.
Limitations for use in Symphony: Once the relative proportions of individual geological components had been calculated they were combined into soft (mud, clay, silt), transport (sand and gravel), and hard (cobbles, boulders, bedrock) seabed types. These three combined classes where the main result of this data series and SGU strongly recommends that users avoid doing detailed analyses on the	

individual geological components due to the uncertainties involved – see user limitations for more details. There are a number of additional key limitations users should be aware of when using this dataset: 1) Only presence/absence data is available for sediment fractions in SGUs legacy sample inventory. Equal proportionality is assumed between the recorded sediment fractions but this may be invalid. 2) It was assumed that at least 20 replicates would be required to define the proportional makeup of each sediment class (in each sea area / depth / mapscale) . However, a power analysis was not undertaken to ensure sufficient sample availability for each surface substrate class and there is a significant range in replicate numbers between classes. 3) Where insufficient sample replication occurred to enable classification by depth, sea area and map scale data were averaged across depth ranges and between sea areas so certain classes are more reliable than others. 4) Surface substrates which form a veneer cover a smaller area of the seabed and consequently for some classes insufficient replicates were available for analysis. In this event the underlying sediment class was used for reclassification instead. In some classes on larger scale maps this might cause veneered sediments to be depicted as mixed proportions of the underlying substrate & veneer sediment fractions.	
Recommendations for data improvement: Apply a sensitivity analysis approach to determine the overall consequence of misclassification. Review the approach to proportionality by validating the model predictions with empirical data (e.g. particle size analysis data). Undertake an expert review. Gather additional source data from surrounding countries to produce better harmonisation.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: gustav.kågesten@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	geology
INSPIRE theme	geology
GEMET keywords	abiotic environment, abiotic factor, geology, marine environment
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode

Other Restrictions	This "Symphony Geological Surface Substrate " dataseries is a derived from data originally provided by the Symphony Geological Surface Substrate cal Survey of Sweden (SGU) and Emodnet Geology (EMODNET-GEOLOGY), the Swedish Agency for Marine and Water Management (SwAM) and Aquabiota AB . This derived dataset is licenced under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Symphony Geological Surface Substrate cal Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.
Map Acknowledgement	SGU, EMODNET-GEOLOGY
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2017-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se

Symphony Geological Surface Substrate Uncertainty

Swedish Name	Symphony ytsubstrat osäkerhet
Symphony Theme	Source Data
Symphony Category	Source Data
Symphony Data Type	Uncertainty Data
Date Created	2016-09-19
Status	Completed
Data Format	32-bit floating point Tagged Image File Format
Temporal Period	Not available
Resource Type	Dataset
Coordinate Reference System	European Terrestrial Reference System 1989 - Lambert Azimuthal Equal Area http://epsg.io/3035
Summary	This raster shows the uncertainty associated with the source data used to model 'Geological Surface Substrates'. The interpretation is based on expert judgement using information on source data quality from the Geological

	Survey of Sweden (SGU). The data is classified into 5 classes: 0,0.25, 0.5,0.75 and 1. A value of 1 refers to data gaps (no-data), 0.75 refers to low quality modelled data, 0.5 refers to high quality modelled data without validation, 0.25 refers to a high quality validated model and 0 refers to cells which contain source data.
Summary (Swedish)	Detta skikt visar osäkerheten i samband med komplexitetskälldata som används för att modellera "Geologiska Ytsubstrat". Tolkningen bygger på expertbedömning med information om källkvalitetsdata från Svergies Geologiska Undersökningar (SGU). Uppgifterna är indelade i 5 klasser: 0,025, 0,5, 0,75 och 1. Ett värde av 1 avser datafelter (ingen data), 0,75 hänvisar till lågkvalitativa modellerade data, 0,5 avser högkvalitativa modellerade data utan validering, 0,25 hänvisar till en kvalitetsvaliderad modell och 0 avser celler som innehåller källdata.
Lineage	These data were created by the Geological Survey of Sweden (SGU)and Emdonet Geology. The interpretation of quality for this dataset is based on map scale. SGU data are produced at four scales 1:20,000, 1:100,000 and 1:500,000 and 1:1,000,000. Emdonet data are produced at 1:100,000 and 1:500,000 scale. 1:20,000 scale data was scored 0.25 data at 1:100,000 is scored lower:: 0.5 and data >1:100,000 scale is scored 0.75. In areas with no data available (some coastal areas) the data are scored 1 (high uncertainty) 1) The footprint of maps from each scale were collated into polygon datasets in ArcGIS for the three quality levels. 2) These footprints were converted to rasters in ArcGIS (polygon to raster) 3) Each raster was then resampled (250m) and snapped to the Symphony Grid in ArcGIS 4) 1:20,000 scale data was scored as 0.25 (high quality model) using the reclassify tool in ArcGIS spatial analyst 5) 1:100,000 is scored 0.5 (high quality model without validation) using the reclassify tool in ArcGIS spatial analyst 6) Data >1:100,000 scale is scored 0.75 (low quality model) using the reclassify tool in ArcGIS spatial analyst 7) The layers from 4,5 and 6 were combined into a single raster using cell statistics in ArcGIS spatial analyst (MAX) 8) No data cells were scored 1 (High uncertainity: no-data)
Limitations for use in Symphony:	

Geological data quality depends on a range of factors including the survey method and coverage, sampling intensity, positioning, analytical method and legacy (date) of the data. This is not accounted for in the quality interpretation. In addition some data detailing survey data quality (particularly on older maps) are applied to the area of the map product and not the area covered by the survey data. This may therefore lead to overestimation of quality of these data. This interprtation of quality only refers to the categorical map source data and not point sample data used to reinterpret these data. These data are also of varying quality and coverage. This is not accounted for in the data quality map.	
Recommendations for data improvement: An improved method for calculating data confidence was developed during the MESH (Mapping European Seabed Habitats) project in 2006 - this approach is now used as standard in Emodnet Geology products. It would be beneficial to revist the source data and update the quality maps building on this methodology. For example an allocation of confidence in the translation from sediment class to sediment proportions could also be esimated based on the availability of sediment data for that specific class translation combined with a kernal density analysis of available point samples. This could also be weighted based on knowledge of the quality (legacy and accuracy) of the samples.	
Data authoring organisation: The Geological Survey of Sweden (SGU)	
Contact organisation: Swedish Agency for Marine and Water Management	
Data Author Contact: duncan.hume@sgu.se	
Data Owner	Swedish Agency for Water and Marine Management (Hav och Vattenmyndighten)
Data Owner Contact	Thomas.johansson @havochvatten.se
INSPIRE topic category	oceans, biota, environment
INSPIRE theme	oceanographic geographical features
GEMET keywords	marine ecosystem, marine biota, benthic ecosystem
Access Use Restrictions	Licence
Use Limitations	https://creativecommons.org/licenses/by/4.0/legalcode
Other Restrictions	This "Symphony Geological Surface Substrate Uncertainty" dataset is a derived from source data provided by the Swedish Geological Survey and Emodnet Geology. This derived dataset is licensed under a Creative Commons Attribution 4.0 International Licence (CC BY 4.0). It is attributed to the Geological Survey of Sweden and was produced on behalf of the Swedish Agency for Marine and Water Management (SwAM). Data sources should be acknowledged. This data set and any data derived from it are not to be used for safety or navigation purposes.

Map Acknowledgement	SwAM, Emdonet-Geology, SGU
Security Classification	no protection required
Maintenance	Not Planned
Metadata Date	2018-12-01
Metadata Organisation	Swedish Agency for Marine and Water Management
Metadata Contact	Linus.hammar@havochvatten.se