

JOMOPANS Good Environmental Status (GES) Tool User's Guide

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Version	Author	Released	Contact
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It is live!

The JOMOPANS project is pleased to announce that our Good Environmental Status (GES) Tool is up and running at <https://jomopansgestool.au.dk>. There are three major functions of the tool: downloading Data Files, viewing Maps and Layers, and using our GES Calculator Tool.

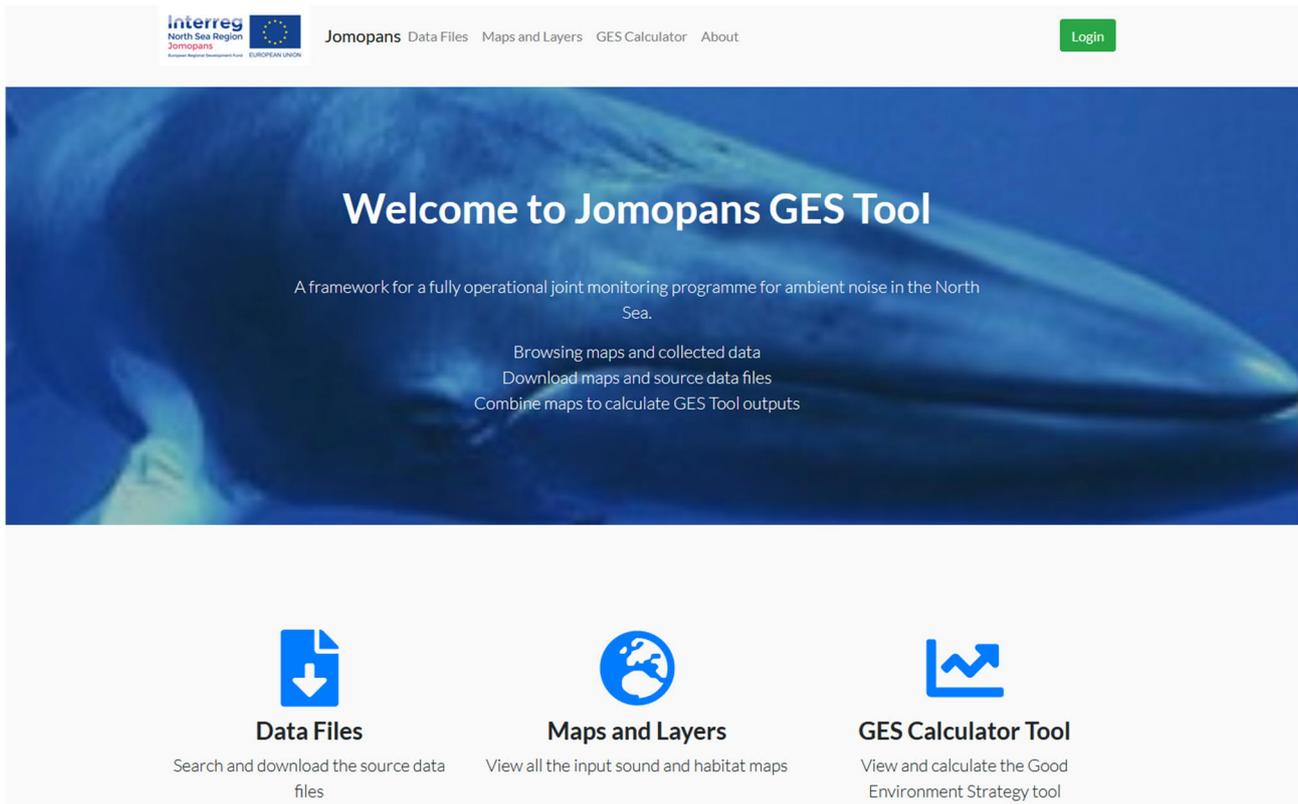


Figure 1. JOMOPANS GES Tool homepage.

Data Files

In the Data Files tab, all of our North Sea soundscape maps for 2019 by month are freely available to download. Under the annual tab, we also have provided regional area maps, such as Dogger Bank and Danish Waters, as well as distribution or density maps for important North Sea species. From Waggitt. et al. 2020, we have formatted their density maps for cetaceans, such as harbor porpoise, and sea birds, such as northern gannet. JOMOPANS partner, Institute of Marine Research (IMR) in Norway provided distribution and spawning maps for various fish species, such as cod and plaice.

The image shows a screenshot of a file list interface. On the left, under the heading '2019', there is a 'Monthly' section with a list of 12 items, each representing a month from January to December. Each item is followed by a file name and a 'Layers: 96' label. On the right, under the heading 'Annual', there is a list of 20 regional and species-specific maps, each followed by a file name and a 'Layers: 1' label. The files listed include regional maps like Belgium, Denmark, Germany, Netherlands, Norway, Sweden, and United Kingdom, as well as species-specific maps for Cod, Haddock, Harbour Porpoise, Herring, Minke Whale, Northern Gannet, Plaice, and Whitebeaked Dolphin.

- 2019
 - Monthly
 - 01
 - Jomopans sound maps 2019 January - jomopans_soundmaps_2019_01.nc4 Layers: 96
 - 02
 - Jomopans sound maps 2019 February - jomopans_soundmaps_2019_02.nc4 Layers: 96
 - 03
 - Jomopans sound maps 2019 March - jomopans_soundmaps_2019_03.nc4 Layers: 96
 - 04
 - Jomopans sound maps 2019 April - jomopans_soundmaps_2019_04.nc4 Layers: 96
 - 05
 - Jomopans sound maps 2019 May - jomopans_soundmaps_2019_05.nc4 Layers: 96
 - 06
 - Jomopans sound maps 2019 June - jomopans_soundmaps_2019_06.nc4 Layers: 96
 - 07
 - Jomopans sound maps 2019 July - jomopans_soundmaps_2019_07.nc4 Layers: 96
 - 08
 - Jomopans sound maps 2019 August - jomopans_soundmaps_2019_08.nc4 Layers: 96
 - 09
 - Jomopans sound maps 2019 September - jomopans_soundmaps_2019_09.nc4 Layers: 96
 - 10
 - Jomopans sound maps 2019 October - jomopans_soundmaps_2019_10.nc4 Layers: 96
 - 11
 - Jomopans sound maps 2019 November - jomopans_soundmaps_2019_11.nc4 Layers: 96
 - 12
 - Jomopans sound maps 2019 December - jomopans_soundmaps_2019_12.nc4 Layers: 96
 - Annual
 - Belgium - belgium.tif Layers: 1
 - Cod Distribution - cod.tif Layers: 1
 - Cod Spawning - cod_spawning.tif Layers: 1
 - Common Guillemot Density - common_guillemot.tif Layers: 1
 - Denmark - denmark.tif Layers: 1
 - Dogger Bank - dogger_bank.tif Layers: 1
 - Germany - germany.tif Layers: 1
 - Haddock Distribution - haddock.tif Layers: 1
 - Haddock Spawning - haddock_spawning.tif Layers: 1
 - Harbour Porpoise Density - harbour_porpoise.tif Layers: 1
 - Herring Distribution - herring.tif Layers: 1
 - Herring Spawning - herring_spawning.tif Layers: 1
 - Jomopans sound maps 2019 full year - jomopans_soundmaps_2019.nc4 Layers: 96
 - Kattegat - kattegat.tif Layers: 1
 - Minke Whale Density - minke_whale.tif Layers: 1
 - Netherlands - netherlands.tif Layers: 1
 - Northern Gannet Denisty - northern_gannet.tif Layers: 1
 - Northern North Sea - northern_north_sea.tif Layers: 1
 - Norway - norway.tif Layers: 1
 - Norwegian Trench - norwegian_trench.tif Layers: 1
 - Plaice Distribution - plaice.tif Layers: 1
 - Plaice Spawning - plaice_spawning.tif Layers: 1
 - Skagerrak - skagerrak.tif Layers: 1
 - Southern North Sea - southern_north_sea.tif Layers: 1
 - Sweden - sweden.tif Layers: 1
 - United Kingdom - uk.tif Layers: 1
 - Whitebeaked Dolphin Denisty - whitebeaked_dolphin.tif Layers: 1

Figure 2. List of files available to download and view in the GES Tool.

Maps and Layers

In the Maps and Layers tab, users can view all of the Data Layers. For example, a sound dominance map for the month of June.

Note: In order to view the dominance maps, the Data Period must be set to 'Monthly', as the maps are presented by month. In order to view the species or area maps, the Data Period must be set to Annual. This is because the area maps are stable throughout the year, and the provided species maps are general density/species range maps for the entire year. To view cetacean and bird maps, you should select 'Species Density' in Data Measure, as these maps came from Waggitt. et al. 2020 density estimates. To view the fish maps, select 'Area Mask' as these are flat range maps for both the spawning areas and general distribution.

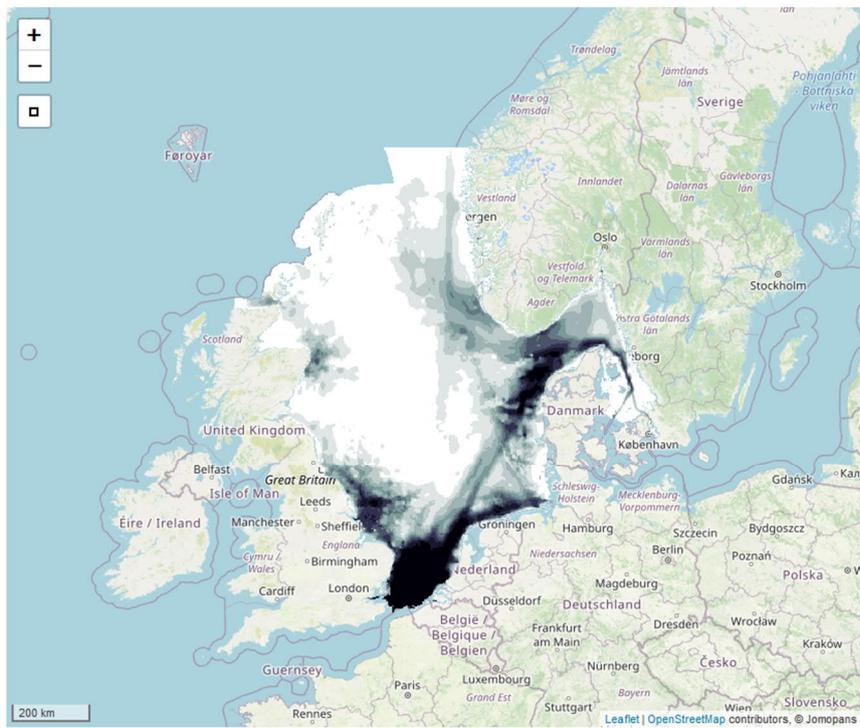
The screenshot displays the 'View Jomopans Maps' interface. At the top, there are logos for Interreg North Sea Region Jomopans and the European Union. Navigation links include 'Jomopans', 'Data Files', 'Maps and Layers', 'GES Calculator', and 'About'. A 'Login' button is in the top right. The main heading is 'View Jomopans Maps', followed by 'Search for Layer by type'. The search filters are: Data Period (Monthly), Year (2019), Month (Jun), Data Type (Sound Dominance), Data Measure (Median Wind), and Data Subtype (20db). There are also optional filters for Data Frequency and Data Percentile. A blue 'Find Layers' button is at the bottom right of the filter section. Below this, the 'Select Layer from available list:' section shows a dropdown menu with the following options: 'sounddominance_medianwind_20db_125hz_-_monthly_2019-06', 'sounddominance_medianwind_20db_63hz_-_monthly_2019-06', 'sounddominance_medianwind_20db_broadband_-_monthly_2019-06', 'sounddominance_medianwind_20db_decade1_-_monthly_2019-06', 'sounddominance_medianwind_20db_decade2_-_monthly_2019-06', and 'sounddominance_medianwind_20db_decade3_-_monthly_2019-06'. The first option is selected. A green 'Select Layer' button is to the right. A map of the North Sea region is visible in the background, showing 'Island', 'Sverige - Baltiska', and 'Suomi / Finland'.

Figure 3. JOMOPANS map layer page, selecting a sound dominance map for the month of June. This map uses the median wind as the reference ambient, with an excess noise threshold of 20dB at the 125 Hz third-octave level.

Select Layer from available list:

Available Layers:

Select Layer



Layer Details

Layer Name: Sound Dominance, Median Wind, 20db, 125Hz
Data Period: Monthly: June 2019
Original Layer Name: SoundDominance_MedianWind_20dB_125Hz
Source File: [Download File](#)
Upload Date: 23 June 2021

Legend

- Dominance (%)**
- ($x <= 10$)
 - ($10 < x$) & ($x <= 20$)
 - ($20 < x$) & ($x <= 30$)
 - ($30 < x$) & ($x <= 40$)
 - ($40 < x$) & ($x <= 50$)
 - ($50 < x$) & ($x <= 60$)
 - ($60 < x$) & ($x <= 70$)
 - ($70 < x$) & ($x <= 80$)
 - ($80 < x$) & ($x <= 90$)
 - ($90 < x$)

Figure 4. Display of map selected in Figure 3.

GES Tool

With the Good Environmental Status (GES) Tool, we can look at specific areas in the North Sea, such as the Southern North Sea, specific species distributions, such as harbor porpoise, and apply different noise dominance maps to those overlapping areas to calculate the total. In this example, the dominance layer models the median wind noise at the 125 Hz third-octave level, with a noise excess of 20 dB for the month of August in 2019.

GES Tool Input Layers

Dominance Layer	sounddominance_medianwind_20db_125hz_-_monthly_2019-08 
Species Habitat Suitability Layer (optional)	species_species-density_harbour-porpoise-area_-_annual_2019 
Area/Region Mask Layer (optional)	area_mask_area-mask_southern-north-sea-area_-_annual_2019 

GES Tool Input Maps

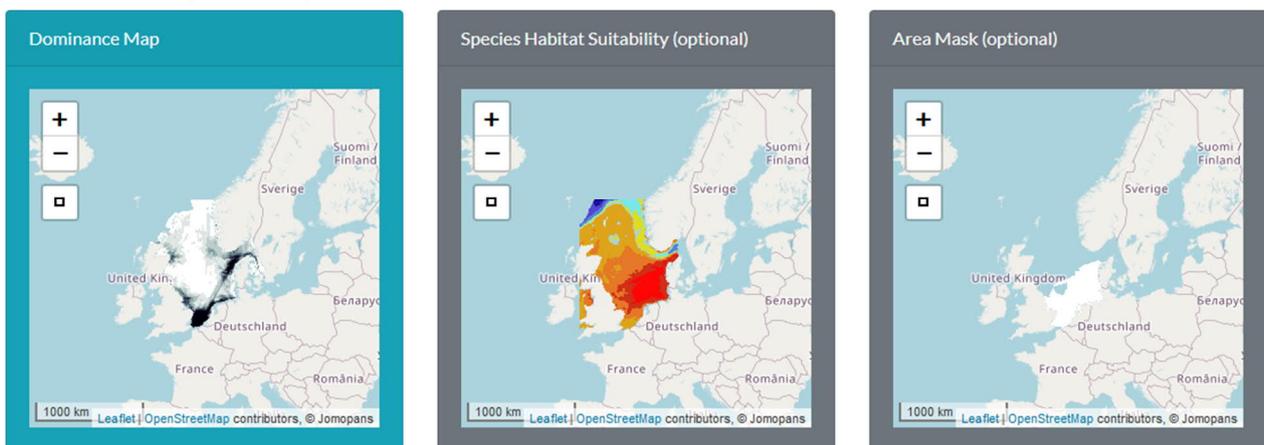


Figure 5. Choosing different layer, one dominance, one species, and one area, to run within the GES tool.

With these conditions, the pressure index for harbor porpoise in the southern North Sea is 0.25. In addition to this index number, there are three plots to help explain the context for the pressure index value:

- Dominance Histogram: Distribution of dominance in grid cells of the assessment area.
- Cumulative Distribution Function (CDF): A cumulative sum of the affected area from the high end of the distribution.
- The Pressure Curve: derived from the CDF. This is a very condensed expression of the conditions in the area under assessment.

Dominance Histogram

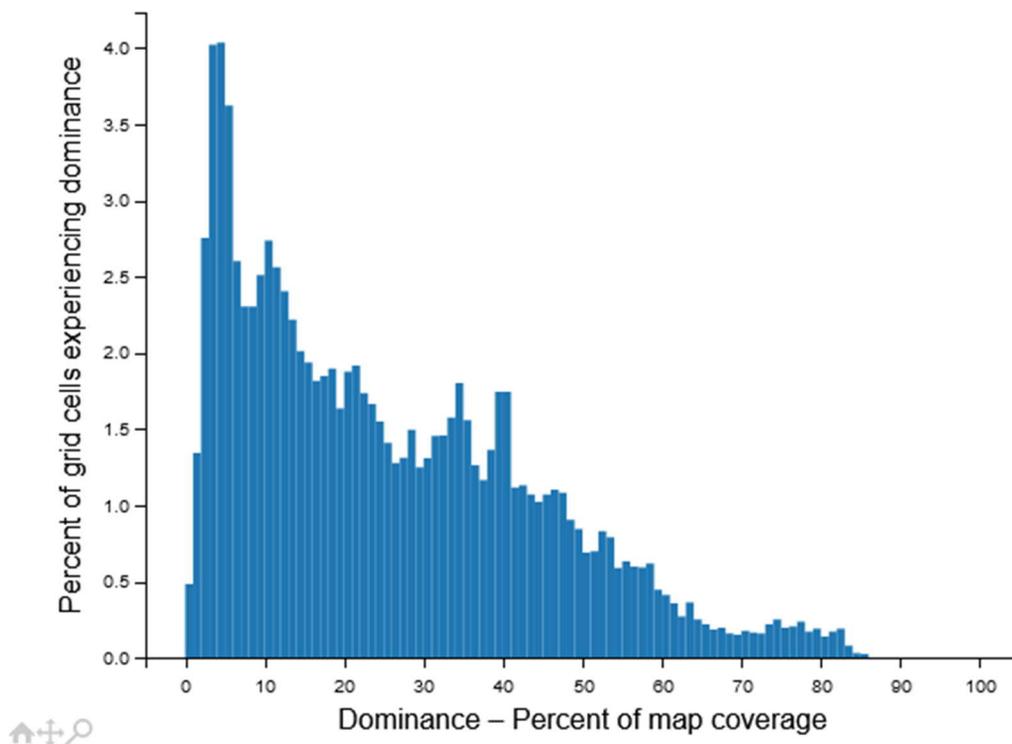


Figure 6. Dominance Histogram: Distribution of dominance in grid cells of the assessment area.

Exposure Function - Pressure Index: 0.25

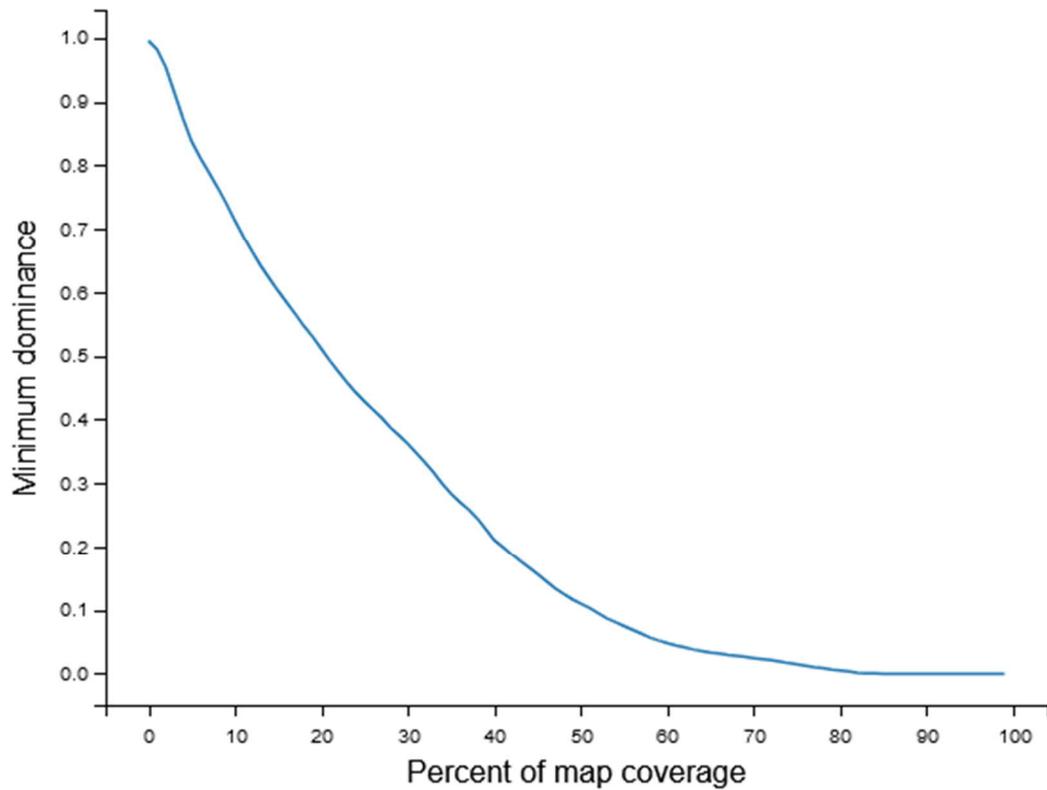


Figure 7. The Pressure Curve: derived from the Cumulative Distribution Function. This is a very condensed expression of the conditions in the area under assessment.

Reference:

Waggitt, J. J., Evans, P. G., Andrade, J., Banks, A. N., Boisseau, O., Bolton, M., ... & Hiddink, J. G. (2020). Distribution maps of cetacean and seabird populations in the North-East Atlantic. *Journal of Applied Ecology*, 57(2), 253-269.