B1 Indicator analysis steps 2021

The following steps were used in the 2021 analysis of both breeding and wintering seabird abundance counts, as part of the B1 indicator.

Analysis guidelines are documented in OSPAR CEMP Guidelines. Common Indicator: Marine Bird Abundance (B1) (Agreement 2016-09) word document downloaded from CEMP website (OSPAR's Coordinated Environmental Monitoring Programme).

Steps

- Restrict abundance counts to year ranges

	Breeding	Non-breeding
Im: North Barents Sea	1991 - 2020	
In: South Barents Sea	1991 - 2020	1991 - 2020
Io: Norwegian Sea	1991 - 2020	1991 - 2020
I: Arctic Waters	**1991 - 2020**	**1991 - 2020**
IIa: Northeast coast of Britain	1991 - 2019	1991 - 2020
IIb: West coast of Norway	1991 - 2020	1991 - 2020
IIc: Skagerrak/Kattegat area	1991 - 2020	1991 - 2020
IId: Southern North Sea	1991 - 2019	1991 - 2020
	1991 - 2017 (20 species[1])	1991 - 2016 (39 species[2])
IIe: The Channel	1991 - 2019	1991 - 2020
IIf: North coast of Scotland and the Northern Isles	1991 - 2019	1991 - 2020
II: Greater North Sea	**1991 - 2019**	**1991 - 2020**
	1991 - 2017 (20 species[1])	**1991 - 2016 (39 species[2])**
III: Celtic Seas	**1991 - 2019**	**1991 - 2020**
IV: Bay of Biscay and Iberian Coast	**1991 - 2016**	
V: Wider Atlantic	**2010 - 2020**	

1. The following breeding species have important counts in the Wadden Sea area whose latest data has been supplied to 2017. Arctic Tern, Barnacle Goose, Black-Headed Gull, Common Gull, Common Tern, Dunlin, Eurasian spoonbill, Great Black-Backed Gull, Great Cormorant, Herring Gull, Kentish Plover, Lesser Black-Backed Gull, Little Tern, Mediterranean Gull, Oystercatcher, Pied avocet, Red-breasted Merganser, Ringed plover, Ruff, Sandwich Tern.
2. The following non-breeding species have important counts in the Wadden Sea area whose latest data has been supplied to 2016. Bar-tailed Godwit, Barnacle Goose, Black-Headed Gull, Brent Goose, Common Gull, Curlew, Curlew Sandpiper, Eurasian spoonbill, Golden plover, Great Black-Backed Gull, Great Cormorant, Great crested grebe, Greenshank, Grey Plover, Herring Gull, Kentish Plover, Lapwing, Lesser Black-Backed Gull, Mallard, Mute Swan, Oystercatcher, Pied avocet, Pintail, Red-breasted Merganser, Red Knot, Redshank, Ringed plover, Ruff, Sanderling, Shelduck, Shoveler, Slavonian grebe, Smew, Spotted Redshank, Teal, Turnstone, Whimbrel, Whooper Swan, Wigeon.

For both breeding and non breeding

- Set the baseline count

  - Exclude species in OSPAR regions or birds subdivisions where there are less than three year counts or all zero counts in the first 10 years.
  - Exclude non breeding species wintering offshore where land-based surveys are not representative for the species counts.
  - Apply log linear regression model to the first 10 years.

  Either

  - Take baseline as predicted start year abundance value where there is a significant trend in abundance counts over the first 10 year range (regression p value $<= 0.05$).
  - Take arithmetic mean abundance value over these 10 years, ignoring missing years, where there is no significant trend in the abundance counts over the 10 year range (regression p values > 0.05)

- Calculate the relative abundance values for each year by dividing the years abundance count by the predicted baseline abundance count.

- Calculate the six year rolling relative abundance geometric means, ignoring missing years. Handle zero year counts by adding one to all the year counts with the six year period and removing one from the resulting geometric mean. For example

  - 2020: take the geometric mean of relative abundance values 2020, 2019, 2018, 2017, 2016, 2015
  - 2019: take the geometric mean of relative abundance values 2019, 2018, 2017, 2016, 2015, 2014

- Plot both the yearly relative abundance values with six year rolling relative abundance geometric mean line for each species in each region and birds subdivision.

- Take the latest six year geometric mean relative abundance values as the assessment value for the species in each region and subdivision, using this assessment value to create the four colours of the traffic–light table plot.

  - above upper threshold if greater than 1.3 (dark green)
  - above threshold if greater than or equal to 0.7 for species laying more than one egg or 0.8 for species laying one egg. (green)
  - below threshold if less than 0.7 for species laying more than one egg or 0.8 for species laying one egg. (red)
  - incomplete information (grey)

- Compare the latest threshold status with the 2014 threshold status displaying status change with arrows in the traffic-light table plot.

  - vertical thick arrow pointing down for latest change from above upper threshold to below species threshold.
  - vertical thin arrow pointing down for either latest change from above upper threshold to between threshold or between thresholds to below species threshold.
  - vertical thin arrow pointing up for either latest change from below species threshold to between thresholds or between thresholds to above upper threshold.
  - vertical thick arrow pointing up for latest change below threshold to above upper threshold.

- Use the species six year rolling relative abundance geometric means to calculate the yearly proportion that are above the threshold values of 0.7 for species laying more than one egg and 0.8 for species that lay one egg for the following groups

- all species within OSPAR regions I, II, III
- all breeding species within OSPAR regions, I, II, III, IV
- all non-breeding species with OSPAR regions I, II, III
- all breeding, breeding surface feeders, breeding water column feeders, all non-breeding, non-breeding wader feeders for OSPAR Region I
- all breeding, breeding surface feeders, breeding water column feeders, all non-breeding, non-breeding wader feeders for OSPAR Region II
- all breeding, breeding surface feeders, breeding water column feeders, all non-breeding, non-breeding wader feeders for OSPAR Region III
- all breeding, breeding surface feeders, breeding water column feeders, all non-breeding, non-breeding wader feeders for OSPAR Region IV

- Use the species latest six year relative abundance geometric mean assessment value to calculate the percentage of species within each functional group, within each region, that is greater than or equal to 0.7 for species laying more than one egg or 0.8 for species laying one egg.

    - For breeding counts OSPAR regions I, II, III, IV and birds subdivisions Im, In, Io, IIa, IIb, IIc, IId, IIe, IIf

        * breeding species across all functional groups
        * breeding wading feeder species
        * breeding surface feeder species
        * breeding water column feeder species
        * breeding benthic feeder species
        * breeding grazing feeder species

    - For non-breeding counts OSPAR regions I, II, III and birds subdivisions In, Io, IIa, IIb, IIc, IId, IIe, IIf

        * non-breeding species across all functional groups
        * non-breeding wading feeder species
        * non-breeding surface feeder species
        * non-breeding water column feeder species
        * non-breeding benthic feeder species
        * non-breeding grazing feeder species