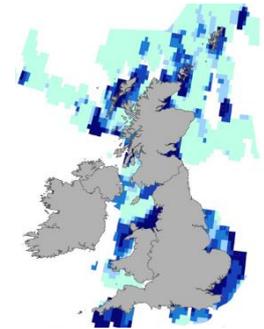


Using the Seabird Oil Sensitivity Index to inform contingency planning



Summary

The Oil Vulnerability Index (OVI) (JNCC 1999) has been updated using recent survey data (from 1995-2015) and includes an improved method to calculate a single measure of seabird sensitivity to oil pollution. This new index (**named the Seabird Oil Sensitivity Index or 'SOSI'**) identifies areas at sea where seabirds are likely to be most sensitive to oil pollution. It is intended to be employed by a range of users to inform contingency planning and emergency decision-making with regards to oil pollution incidents.

The quantity of data underlying the SOSI is considerably lower than that of the previous OVI. This has resulted in the SOSI having poor coverage in some months. Coverage gaps may cause issues when users try to obtain seabird sensitivity information for Oil and Gas Licence Blocks that lack data. This document provides guidance on how those gaps can be populated in order to inform environmental statements, oil pollution emergency plans and other environmental applications.

Background

The SOSI is a tool which aids planning and emergency decision-making for oil pollution by identifying areas at sea where seabirds are likely to be most sensitive to oil pollution. It precedes the previous OVI (JNCC 1999) by using recent survey data and an improved method (Certain *et al* 2015) to calculate the sensitivity of seabird concentrations to oil pollution. This updated method uses seabird survey data collected from 1995 to 2015, from a survey area extending beyond the UK Continental Shelf using boat-based, visual aerial, and digital video aerial survey techniques. This data was then combined with individual seabird species sensitivity index values (based on a number of factors considered to contribute towards seabird oil sensitivity) and combined (summed) at each location to create a single measure of seabird sensitivity to oil pollution. The index is independent of where oil pollution is most likely to occur; rather, it indicates where the highest seabird sensitivities might lie if there were to be a pollution incident.

The SOSI report is accompanied by a Geographical Information System (GIS) which users can download from the [JNCC SOSI webpage](#). The Median Sensitivity layer of the SOSI can be found on Defra's MAGIC interactive mapping tool, and multiple SOSI layers will soon be added to Marine Scotland's National Marine Plan Interactive.

SOSI coverage gaps

Whilst the SOSI provides a robust tool for identifying sensitive seabird concentrations to oil pollution in the waters around the UK, the amount of underlying data is considerably lower than that of the previous OVI. This has resulted in the SOSI having no coverage in some regions for a small number of months (namely April, October and November).

Offshore seabird survey data has declined around the UK after survey effort peaked in the 1980s and 90s (which provided data for the OVI (JNCC 1999)). The age of this data, coupled with the decline of new data collection offshore, has raised concerns on whether using outdated seabird data, like that found in the OVI, is appropriate when producing sensitivity indices for seabirds to oil pollution.

Webb *et al* (2014) examined the changes in offshore seabird abundance from data collected in 2013 when compared to historical European Seabirds at Sea (ESAS) data off the east coast of Aberdeenshire. The study concluded that the abundance of some seabird species had changed significantly and that the majority of the species assessed had shown declines since ESAS data collection some 30 years previous. Webb *et al* (2014) therefore recommended that data under 15 years old would be the most appropriate (with no data older than 20 years) when assessing sensitive seabird concentrations to oil pollution. Additionally, a number of differences in how sensitivity scores in the SOSI are calculated (further detail on the methods can be found in Certain *et al* 2014) means this new index offers a more sophisticated approach to mapping seabird sensitivity.

Guidance for using the SOSI in oil spill planning

JNCC does not envisage the following method of using the SOSI (Webb *et al* 2016) to take substantially more time to complete than past methods that used the OVI (JNCC 1999) for oil spill planning.

Method

Users of the SOSI should identify their activity location Block number (Oil and Gas Licence Blocks) and the eight immediately adjacent Blocks (Figure 1), i.e. a total of nine Blocks. These nine Blocks should be entered into a gridded table (Figure 1). Users can then use the Median Sensitivity layer in the SOSI to extract the Median Sensitivity for each month/Block combination.



Figure 1. Directly adjoining Blocks shown by the '✓' symbol.

Block	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1/7	1	1	1	1	1	5	3	4	4	1	1	1
1/8	1	1	1	1	1	5	2	3	4	2	2	1
1/9	4	3	4	4	4	5	3	4	2	2	2	1
1/12	1	1	5	5	1	3	3	3	2	2	2	1
1/13	1	1	5	5	1	4	4	2	2	2	3	2
1/14	4	1	4	4	1	2	2	2	2	3	3	2
1/17	3	1	2	4	4	3	3	2	2	3	2	2
1/18	3	1	1	5	5	3	3	3	5	3	2	1
1/19	1	4	5	5	N	4	4	4	3	4	3	3

Figure 2. Example of SOSI table showing installation Oil and Gas Licence Block (1/13) and the eight directly adjoining Blocks.

No coverage

In some cases, there may be no coverage for certain month/Block combinations. No coverage means the SOSI was unable to assess the sensitivity of seabird concentrations to oil pollution for a particular Block during a particular month. However, the solutions and examples detailed below provide guidance that helps to reduce the extent of coverage gaps.

The following method outlines three distinct steps and provides two examples of the process. The steps should be followed sequentially, with Step 1 being the priority. If some Blocks remain blank after Step 1 has been used, Step 2 may then be used, and if some Blocks still remain blank, then Step 3 is used.

It is recommended that the Median Sensitivity layer is used as it represents the most likely assessment of seabird sensitivity to oil pollution.

Blocks that have been populated using the following Steps (1, 2 or 3) should be **colour highlighted** in contingency planning documents to signify where an indirect assessment of SOSI scores has been made, in light of coverage gaps.

Step 1 - Adjacent months

Users of the SOSI that have no coverage for the Block(s) in question should first look at coverage for the **previous or next, directly adjoining months**. If either or both months have coverage, the **most sensitive category** from either adjoining month for the **same Block** should be used.

It is likely that there are few changes in seabird activity during some months (for example, December, January and February). By using the highest sensitivity category from adjacent months for that location, this method acts as a precautionary option for dealing with coverage gaps.

Step 2 – Adjoining Blocks

If adjoining months also lack coverage for the Block(s) in question, users of the SOSI should look to use the **most sensitive category** from **directly adjoining Blocks within the same month** (Figure 1).

A combination of Step 1 and Step 2 should be used concurrently where coverage gaps disallow for Step 1 alone. However, it should be remembered that **Step 1 is the priority method and should be attempted before Step 2 or Step 3 is used**.

Additionally, any Blocks that are populated in Step 1 **cannot be used as adjoining Blocks** in Step 2.

Step 3 – No coverage for adjacent months or Blocks

In the uncommon situation that neither adjacent months nor adjacent Blocks have coverage, and both Step 1 and Step 2 have been attempted but have not been enough to provide scores for each month/Block combination, users of the SOSI should note no coverage as 'N'.

Example 1. Populating Blocks 1/12, 1/13 and 1/18 in February

- We are trying to populate Blocks **1/12, 1/13 and 1/18** in **February**.

Block	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1/7	1	1	1	1	1	5	3	4	4	1	1	1
1/8	1	1	1	1	1	5	2	3	4	2	2	1
1/9	4	3	4	4	N	5	3	4	4	2	2	1
1/12	1	N	5	N	N	N	3	3	4	2	2	1
1/13	1	N	5	N	N	N	4	2	4	2	3	2
1/14	4	1	4	N	N	N	2	2	4	3	3	2
1/17	3	1	2	4	N	N	3	2	4	3	2	2
1/18	3	N	1	5	N	N	3	3	5	3	2	1
1/19	1	4	5	N	N	N	4	4	3	4	3	3

Figure 3. Example of SOSI table showing N (no coverage) in Feb. For legend see Figure 5.

- January and March both have full SOSI coverage, but vary in their degrees of sensitivity.
- The **most sensitive** category for 1/12 and 1/13 is found in **January**, whereas the most sensitive category for 1/18 is located in **March** (Figure 4).

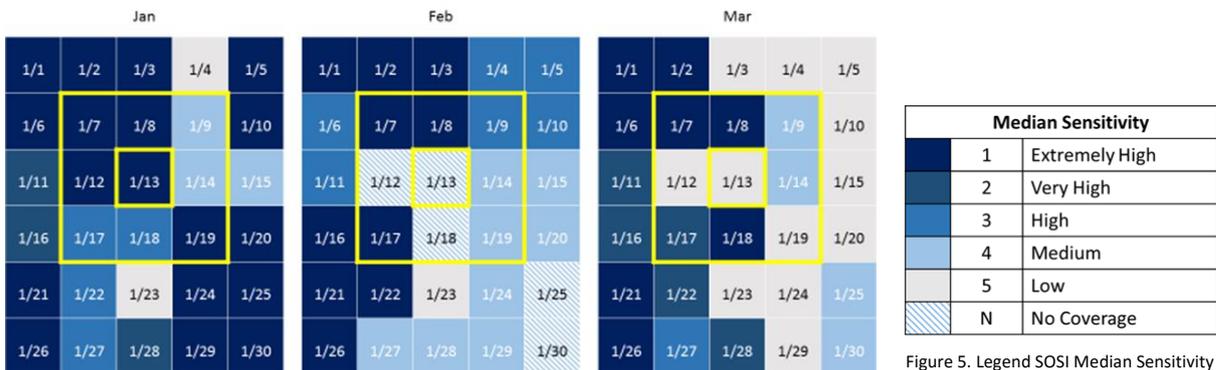


Figure 4. Example of SOSI Median Sensitivity for Jan, Feb and Mar. For legend see Figure 5.

- Therefore, Blocks 1/12, 1/13 and 1/18 in February adopt the sensitivity score of: **1/12 = 1, 1/13 = 1** from **January** and **1/18 = 1** from **March**.
- Figure 6 illustrates this.

Block	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1/7	1	1	1	1	1	5	3	4	4	1	1	1
1/8	1	1	1	1	1	5	2	3	4	2	2	1
1/9	4	3	4	4	N	5	3	4	4	2	2	1
1/12	1	1	5	N	N	N	3	3	4	2	2	1
1/13	1	1	5	N	N	N	4	2	4	2	3	2
1/14	4	1	4	N	N	N	2	2	4	3	3	2
1/17	3	1	2	4	N	N	3	2	4	3	2	2
1/18	3	1	1	5	N	N	3	3	5	3	2	1
1/19	1	4	5	N	N	N	4	4	3	4	3	3

Figure 6. Example of SOSI table showing the result of using Step 1 to inform coverage gaps in Feb: 1/12 = 1, 1/13 = 1 and 1/18 = 1. Note that Blocks populated using any Step should be colour highlighted.

Example 2. Populating Blocks 1/9, 1/12, 1/13, 1/14, 1/17, 1/18 and 1/19 in May

- We are trying to reduce the extent of no coverage for Blocks 1/9, 1/12, 1/13, 1/14, 1/17, 1/18 and 1/19 in May.

Block	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1/7	1	1	1	1	1	5	3	4	4	1	1	1
1/8	1	1	1	1	1	5	2	3	4	2	2	1
1/9	4	3	4	4	N	5	3	4	4	2	2	1
1/12	1	1	5	N	N	N	3	3	4	2	2	1
1/13	1	1	5	N	N	N	4	2	4	2	3	2
1/14	4	1	4	N	N	N	2	2	4	3	3	2
1/17	3	1	2	4	N	N	3	2	4	3	2	2
1/18	3	1	1	5	N	N	3	3	5	3	2	1
1/19	1	4	5	N	N	N	4	4	3	4	3	3

Figure 7. Example of SOSI table focusing on Apr, May and Jun showing N (no coverage).

- Blocks 1/9, 1/17 and 1/18 in the adjoining months have coverage (Figure 9). **Step 1 can be used for these Blocks** (Figure 8).

Block	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1/7	1	1	1	1	1	5	3	4	4	1	1	1
1/8	1	1	1	1	1	5	2	3	4	2	2	1
1/9	4	3	4	4	4	5	3	4	4	2	2	1
1/12	1	1	5	N	N	N	3	3	4	2	2	1
1/13	1	1	5	N	N	N	4	2	4	2	3	2
1/14	4	1	4	N	N	N	2	2	4	3	3	2
1/17	3	1	2	4	4	N	3	2	4	3	2	2
1/18	3	1	1	5	5	N	3	3	5	3	2	1
1/19	1	4	5	N	N	N	4	4	3	4	3	3

Figure 8. Example of SOSI table showing the result of using Step 1 to inform coverage gaps in May: 1/9 = 4, 1/17 = 4 and 1/18 = 5. Note that Blocks populated using any Step should be colour highlighted.

- However, neither adjoining months have coverage for Blocks 1/12, 1/13, 1/14 and 1/19 (Figure 9).

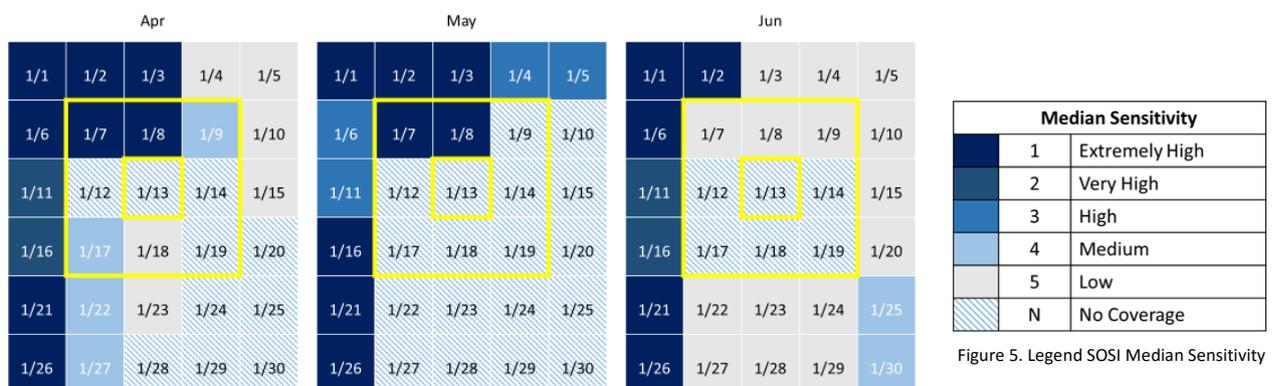


Figure 5. Legend SOSI Median Sensitivity

Figure 9. Example of SOSI Median Sensitivity for Apr, May and Jun. For legend, see Figure 5.

- **Step 1 is therefore unavailable** for these Blocks in May.
- Instead, we can use **Step 2** which adopts the **most sensitive category** from **directly adjoining Blocks** (see Figure 2) in **May**.
- Remember, Blocks that have been populated in Step 1 **cannot be used as adjoining Blocks** in Step 2.
- Block 1/19 remains blank (Step 3) whilst a combination of Step 1 and Step 2 has reduced the extent of no coverage in May (Figure 10).

Block	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1/7	1	1	1	1	1	5	3	4	4	1	1	1
1/8	1	1	1	1	1	5	2	3	4	2	2	1
1/9	4	3	4	4	4	5	3	4	4	2	2	1
1/12	1	1	5	N	1	N	3	3	4	2	2	1
1/13	1	1	5	N	1	N	4	2	4	2	3	2
1/14	4	1	4	N	1	N	2	2	4	3	3	2
1/17	3	1	2	4	4	N	3	2	4	3	2	2
1/18	3	1	1	5	5	N	3	3	5	3	2	1
1/19	1	4	5	N	N	N	4	4	3	4	3	3

Figure 10. Example of SOSI table showing the result of using Step 1, Step 2 and Step 3 to inform coverage gaps in May: 1/9 = 4, 1/12 = 1, 1/13 = 1, 1/14 = 1, 1/17 = 4, 1/18 = 5 and 1/19 = N. Note that Blocks populated using any Step should be colour highlighted.

Steps 1, 2 and 3 can also be used to populate Blocks with no coverage in April and June, as can be seen in Figure 11.

Block	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1/7	1	1	1	1	1	5	3	4	4	1	1	1
1/8	1	1	1	1	1	5	2	3	4	2	2	1
1/9	4	3	4	4	4	5	3	4	4	2	2	1
1/12	1	1	5	5	1	3	3	3	4	2	2	1
1/13	1	1	5	5	1	4	4	2	4	2	3	2
1/14	4	1	4	4	1	2	2	2	4	3	3	2
1/17	3	1	2	4	4	3	3	2	4	3	2	2
1/18	3	1	1	5	5	3	3	3	5	3	2	1
1/19	1	4	5	5	N	4	4	4	3	4	3	3

Figure 11. Example of SOSI table showing the result of using Step 1, Step 2 and Step 3 to inform coverage gaps in all months. Note that Blocks populated using any Step should be colour highlighted.

References

Certain, G., Jørgensen, L.L., Christel, I., Planque, B. & Bretagnolle, V., 2015. Mapping the vulnerability of animal community to pressure in marine systems: disentangling pressure types and integrating their impact from the individual to the community level. *ICES Journal of Marine Science*, 13pp.

JNCC. 1999. Oil Vulnerability Index. JNCC, Peterborough.

Webb A., Poot, M.J.M., Barton, C., Niner, H., Horssen, P.W. van, Fijn, R.C., Japink, M. and Pollock, C., 2014. Differences in species composition, distribution and abundance between historical ESAS data and contemporary survey effort. Unpublished report by HiDef Aerial Surveying Ltd. with Bureau Waardenburg bv and Cork Ecology to Oil & Gas UK: 158pp.

Webb, A., Elgie, M., Irwin, C., Pollock, C. and Barton, C. 2016. Sensitivity of offshore seabird concentrations to oil pollution around the United Kingdom: Report to Oil & Gas UK. Document No HP00061701.