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Supplying habitat maps: GIS tips





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¹ The disclaimer is needed when the document is published

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Contents

1	Cleaning the shapefile	4
2	How to translate many polygons.....	5
2.1	Using the Field Calculator	5
2.2	Using an attribute join	6

Supplying habitat maps: GIS tips

This document describes possible methods for performing GIS tasks required in the process of supplying data to EMODnet Seabed Habitats. The methods described are performed in the ArcGIS suite of applications, however similar processes can be undertaken using alternative software.

1 Cleaning the shapefile

To ensure that your map data can be properly integrated in composite datasets, and to allow the data to display properly, the shapefile should be cleaned to remove any geometry or topology errors.

1. Working with a copy of the shapefile, first **ensure the co-ordinate system is WGS84 unprojected** ([EPSG:4326](https://epsg.org/epsg/4326)).
2. **Split multi-part polygons** – this is beneficial so that each individual shape can be given a unique reference number. (ArcGIS tool: *Multipart to Singlepart*)
3. **Check topology** – topology refers to the geometry of polygons in a shapefile; some common topology errors are shown in **Figure 1**. Shapefiles with these errors are said to have complex topology, or to be unclean or non-simple (ArcGIS tools: *Check Geometry* and *Repair Geometry* tools)

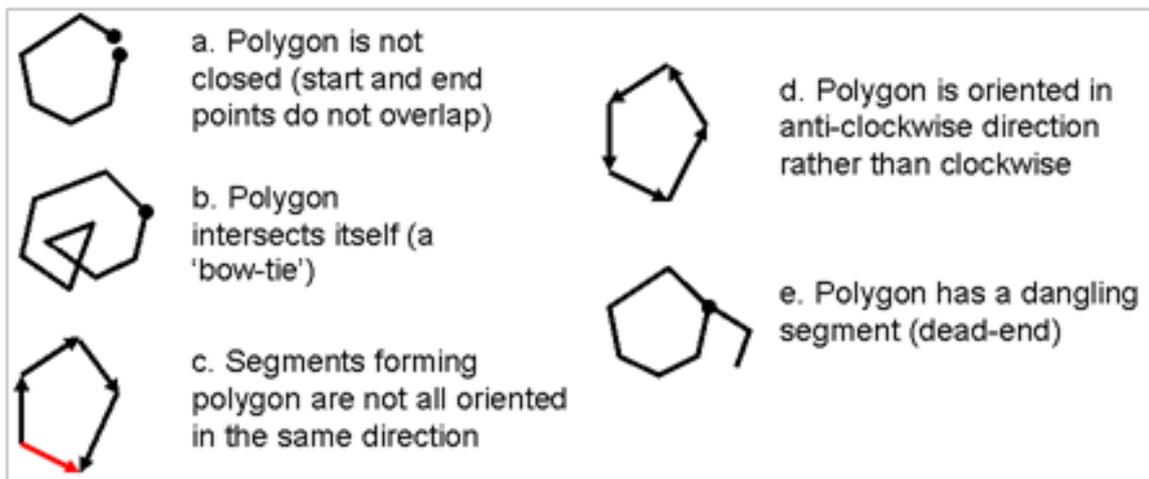


Figure 1: Illustrations of non-simple features according to ESRI™ topological rules for features.

4. **Check for overlaps** between polygons in a shapefile:

The following procedure is only possible with an ArcEditor or Advanced licence in ArcGIS:

- a) Import map into a file geodatabase dataset
- b) Create a topology within the dataset for the imported map with the rule “no overlaps”
- c) A layer is created showing overlapping areas in red (see <http://desktop.arcgis.com/en/arcmap/10.3/manage-data/editing-topology/geodatabase-topology-rules-and-topology-error-fixes.htm>).

A similar alternative solution is possible with QGIS's Topology Checker plugin²:

If any overlaps are identified that are errors and should not exist, then these should be removed.

If you have overlapping polygons within your dataset that are legitimate (i.e. representing areas where two or more habitats occur), then these must be conformed to EMODnet Seabed Habitats and INSPIRE rules. For guidance on how to do this please see Duncan, 2017³.

2 How to translate many polygons

If a habitat map contains many (50+) polygons/features comprising of a number of habitats, for example in a highly heterogeneous environment, it is often easier to translate in a semi-automated way to reduce the time needed for the translation.

There are numerous methods for this; two possibilities within ArcGIS are described below.

2.1 Using the Field Calculator

The [field calculator](#) within ArcGIS can be used to automatically update values within a field.

If a selection is made from the original feature class or shapefile, the field calculator will only change the values of the selected features. This provides a powerful combination for changing multiple features sharing a characteristic, such as habitat type.

The following method can therefore be used if a relatively low number of habitats are dispersed amongst multiple polygons:

1. Open the attribute table for the habitat map.
2. Open the "Select by attributes" dialogue box.
3. Make sure the method is set to "Create a new selection"
4. Double click the field containing the original habitat information in the list below.
5. Click the equals button
6. Click the "Get Unique Values" button
7. In the list that appears, double click the original habitat to be translated and press "Apply"
8. Right click the "HAB_TYPE" field and select "Field Calculator" (press Yes on any message boxes)
9. In the text box at the bottom of the dialogue screen, type in the translated habitat matching the habitat selected in step 7 contained within double quotes (e.g. "A5.3" and not A5.3) and press "Ok"
10. Right click the "T_RELATE" field and select "Field Calculator"
11. In the text box at the bottom of the dialogue screen, type in the relevant symbol for the translation as described in Table 3 contained within double quotes and press "OK"
12. Repeat steps 2 to 11 for each original habitat contained in the map

Translation comments, translation methods, and any other field can be entered in the same way.

² https://docs.qgis.org/3.4/en/docs/user_manual/plugins/plugins_topology_checker.html

³ **Duncan, G. 2017.** Conforming to EMODnet and INSPIRE feature overlap rules in 'Habitat maps from survey' data submissions. Available from: https://www.emodnet-seabedhabitats.eu/media/1671/step2_guidance_dealingwithoverlaps_v1_2.pdf

2.2 Using an attribute join

Alternatively, if the map contains both a large number of polygons/features AND a large variety of habitats, it may be quicker to undertake the following method:

1. Open the attribute table for the habitat map.
2. Export the attribute table as a dbf file.
3. Start ArcGIS's Delete Identical (Data Management) tool*.
4. Select the table created in **step 2** as the Input Dataset
5. Check the field containing the original habitat information and press "OK".
6. In the "HAB_TYPE" field of the table, enter a corresponding EUNIS habitat for each original habitat.
7. In the "T_RELATE" field of the table, enter a corresponding relationship symbol for the translation for each original habitat.
8. In the "TRAN_COM" field of the table, enter any comments relating to each habitat translation.
9. Save the edits and exit edit mode.
10. Right click the habitat map in the table of contents and select "Join" from the "Joins and Relates" sub-menu.
11. Select "Join attributes from a table" from the drop-down list, select the field as "ORIG_HAB", the table as the table created in **step 2**, and the table field as "ORIG_HAB".
12. Make sure "Keep all records" is checked, click "Validate Join" and if successful, click "OK".
13. Once the join has happened, copy the values from the joined columns into the "HAB_TYPE", "T_RELATE" and "TRAN_COM" columns in the shapefile using field calculator (newcolumn = oldcolumn).
14. Remove the join.

**If you do not have the Arc License to run the "Delete Identical" tool, then you can perform a similar process in Microsoft Excel below starting at step 3.*

3. Load the dbf table created in **step 2** into Excel.
4. Select all of the data and select Excel's ["Remove duplicates"](#) tool.
5. Check the "my data has headers" box, and in the list below, check the box next to "ORIG_HAB" and press OK.
6. In the "HAB_TYPE" column, enter a corresponding EUNIS habitat for each original habitat.
7. In the "T_RELATE" column, enter a corresponding relationship symbol for the translation for each original habitat.
8. In the "TRAN_COM" column, enter any comments relating to each habitat translation.
9. Save the dbf file in Excel and load it into ArcMap. Continue with **step 10** above.