

Paper for Consideration by NIPWG

S-122 conversion from IUCN data to S-122 dataset

Submitted by:	BSH
Executive Summary:	Describes the work done to generate an S-122 dataset for Germany. This development can be used as “best practice” by other HOs
Related Documents:	S-122 Product Specification
Related Projects:	S-122

Introduction / Background

Based on U.S. request, HSSC1 put an action item on SNPWG (the NIPWG predecessor) to develop a Marine Environment Protection Programme with low priority in 2009.

SNPWG developed an appropriate data model during the following years. The initially developed data model experienced several improvements with the introduction of S-100 and the extension of the available data model components.

Based on a HSSC5 decision in 2013, the future S-100 based product specification was named “Marine Protected Areas” (MPA) with the product specification number S-122.

The data model work was considered mature in 2016 and the development of an appropriate S-100 compliant product specification was contracted out in 2017. The contract was completed in time in Fall 2018. In late 2018 the product specification went successfully through the Member State approval process and was finally approved as an active standard (IHO CL to be published soon). The S-122 product specification is available online on the IHO website.

Germany offered at NIPWG5 to test a “best practice” process to produce an S-122 product and to provide the results to NIPWG6.

Discussion

Two options to generate an S-122 product have been considered. The first option was to reuse S-57 data and the second option was to use data provided by IUCN (International Union for Conservation of Nature and Natural Resources).

The reuse of S-57 RESARE (restricted area) in the available BSH hydrographic production database has been considered as inappropriate. The RESARE data model doesn't provide enough elements to extract the needed MPA elements.

The second option, the use of IUCN data, has been considered as the best option. The proposed process is based on two assumptions:

- the IUCN provides a comprehensive list of protected areas of the world
- the responsible German administrations provided their MPA information to IUCN.

It was intended to develop a semi-automatic process to limit future work on the MPA product updating by using QGIS (open source GIS) including Python Scripts, XMLSpy and ApacheFOP as XSLT-processor.

Acquisition of the data

The Marine Protected Areas dataset from IUCN has been selected and downloaded (<https://protectedplanet.net>).

Filtering of the data

The shape file has been loaded into QGIS and filtered with SQL statements by different attributes (Country, Marine and IUCN category) to filter national and marine dataset (Figure 1).

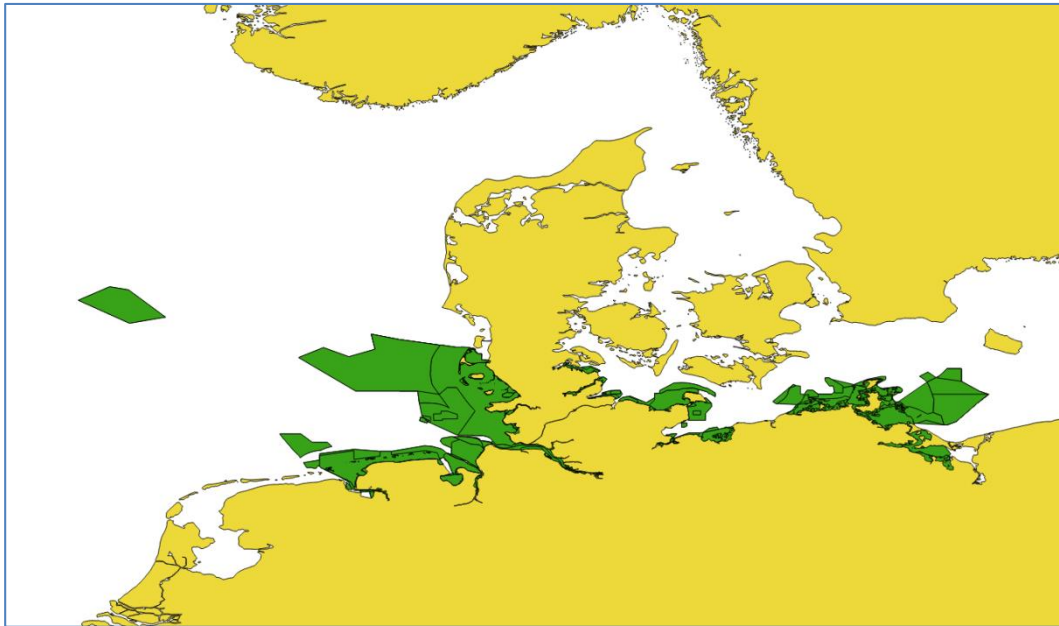


Figure 1: Protected Areas Germany

The downloaded file also provides additional information which describes the meaning of different attributes to simplify the filter procedure (Figure 2).

Table 2.1 Summarised description and allowed values for the WDPA attributes (version 3.1). For detailed descriptions see the WDPA Manual: http://wcmc.io/WDPA_Manual

No	Requirement	Provided by	Field Name	Type	Length	Accepted values
1	Minimum	UNEP-WCMC	WDPAID	Number (Double)	N/A	Assigned by UNEP-WCMC. Unique identifier for a protected Area.
2	Minimum	UNEP-WCMC	WDPA_PID	Number (Double)	N/A	Assigned by UNEP-WCMC. Unique identifier for parcels or zones within a protected area.
3	Minimum	Data provider	PA_DEF	Text (String)	20	Allowed values: 1 (meets IUCN and/or CBD PA definition); 0 (does not meet IUCN and/or CBD PA definition (currently stored outside WDPA)).
4	Minimum	Data provider	NAME	Text (String)	254	Name of the protected area (PA) as provided by the data provider.
5	Minimum	Data provider	ORIG_NAME	Text (String)	254	Name of the protected area in original language.
6	Minimum	Data provider	DESIG	Text (String)	254	Name of designation.
7	Complete	Data provider	DESIG_ENG	Text (String)	254	Designation in English. Allowed values for international-level designations: Ramsar Site, Wetland of International Importance; UNESCO-MAB Biosphere Reserve; World Heritage Site. Allowed values for regional-level designations: Baltic Sea Protected Area (HELCOM); Specially Protected Area (Cartagena Convention); Marine Protected Area (CCAMLR); Marine Protected Area (OSPAR); Site of Community Importance (Habitats Directive); Special Protection Area (Birds Directive); Specially Protected Areas of Mediterranean Importance (Barcelona Convention). No fixed values for protected areas designated at a national level.
8	Minimum	Data provider	DESIG_TYPE	Text (String)	20	Allowed values: National, Regional, International, Not Applicable
9	Complete	Data provider	IUCN_CAT	Text (String)	20	Allowed values: Ia, Ib, II, III, IV, V, VI, Not Applicable, Not Assigned, Not Reported
10	Minimum	UNEP-WCMC	INT_CRIT	Text (String)	100	Assigned by UNEP-WCMC. For World Heritage and Ramsar sites only.
11	Minimum	Data provider	MARINE	Text (String)	20	Allowed values: 0 (100% Terrestrial PA), 1 (Coastal: marine and terrestrial PA), and 2 (100 % marine PA).
12	Minimum	Data provider	REP_M_AREA	Number (Double)	N/A	Marine area in square kilometers.
13	Minimum	UNEP-WCMC	GIS_M_AREA	Number (Double)	N/A	Assigned by UNEP-WCMC.
14	Minimum	Data provider	REP_AREA	Number (Double)	N/A	Area in square kilometers.
15	Minimum	UNEP-WCMC	GIS_AREA	Number (Double)	N/A	Assigned by UNEP-WCMC.
16	Complete	Data provider	NO_TAKE	Text (String)	50	Allowed values: All, Part, None, Not Reported, Not Applicable (if Marine field = 0).
17	Complete	Data provider	NO_TK_AREA	Number (Double)	N/A	Area of the no-take area in square kilometers

Figure 2: Description of IUCN data

Enhancement of the quality of data

In certain places it was necessary to edit the data manually and semi-automatic (different spelling of same data content). In Figures 3 and 4 examples of errors are shown.

12	Northern Ireland Environment Agency	1 DEU	
13	načrtovalci in nosilci urejanja prostora	1 DEU	

Figure 1: Data error (wrong authority)

1	Bundesamt für Naturschutz Fg Meeres- Und Küstennaturschutz
2	Bundesamt für Naturschutz FG Meeres- und Küstennaturschutz
3	Bundesamt für Naturschutz
4	Bundesamt für Naturschutz FG Meeres- und Küstennaturschutz

Figure 2: Data error (different spelling)

A Cross check of existing S57 RESARE entries in the BSH HPD results in significant geometry discrepancies between the HPD and IUCN dataset (Figure 5). These discrepancies have to be investigated and cleaned at a later time as they were no subject of this study.

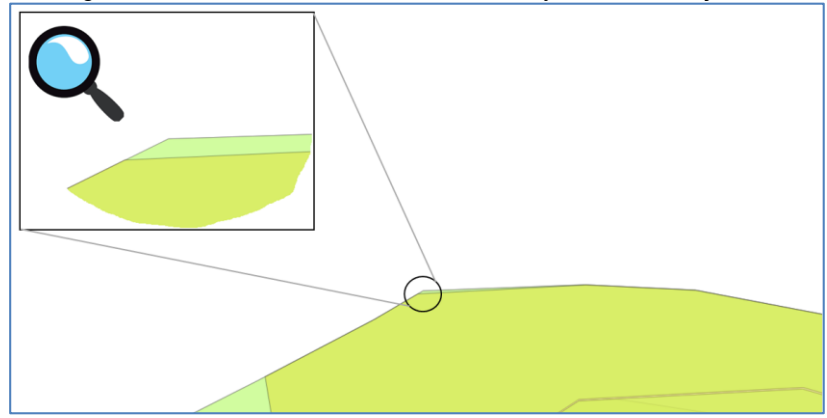


Figure 3: Discrepancies in geometry

Adding data

Due to missing data components in the IUCN dataset, new attributes to describe inter alia contact details have been created in QGIS (Figure 6).

id	Name	catOfAuth	email	phone
1	Staatliches Amt für Landwirtschaft und Umwelt Vorpommern	environmental	poststelle@staluvp.mv-regierung.de	+49(0)3831-696 0
2	Bundesamt für Naturschutz	environmental	info@bfn.de	+49(0)228-8491-0

Figure 6: Additional data

Generating S-122 parts

Python has been used to join and group the data in S-122 product parts as a native GML export.

Transform

XSLT has been used to transform the single GML parts into an S-122 GML product (Figure 7).

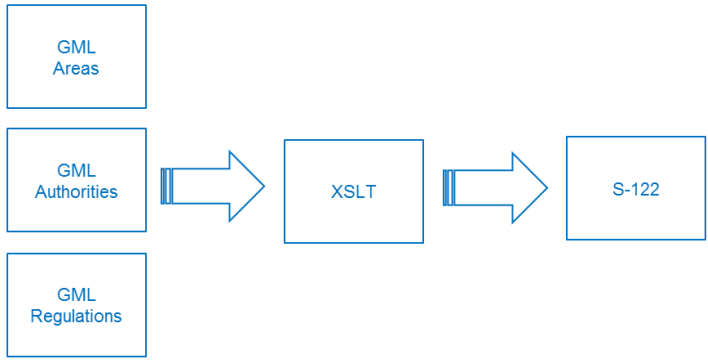


Figure 7: Discrepancies in geometry

Validation

The S-122 GML product has been put together with the S-122 XSD into XMLSpy to check the product against the schema.

Finalisation

An S-122 GML product containing all German MPA is available for further use (Figure 8).

```
<imember>
  <S122:Authority gml:id="DEAUTORI1">
    <featureName>
      <language>de</language><name>Bundesamt für Naturschutz</name>
    </featureName>
    <providesInformation xlink:href="#DENATINF01"   xlink:arcrole="http://www.iho.int/S-1
    <categoryOfAuthority>maritime</categoryOfAuthority>
    <theContactDetails xlink:href="#DEAUTORI1"   xlink:arcrole="http://www.iho.int/S-122/gm
  </S122:Authority>
</imember>
```

Figure 8: Part of S-122 GML

Perspective

BSH is investigating a possible QGIS plugin solution which improves and simplifies the creation, transformation, validation and export of the S-122 GML product directly without any additional manual actions.

On request, the BSH can provide a more detailed tutorial on the above mentioned S-122 data product production process.

Justification/Impact

The provided process has been developed with the purpose of offering a “best practice” semi-automatic process for the generation of an S-122 product.

The used software tools are Open Source and no extra budget to purchase software is needed. The update of the product can be easily scheduled as appropriate.

Recommendation

Hydrographic Offices should test the usefulness of the proposed “best practice”. The results of these tests should be discussed by NIPWG and lessons learnt should be collected for process improvements and future use.

Hydrographic Offices are invited to approach BSH if they need further assistance.

Action Requested of NIPWG6

The NIPWG6 is invited to:

- a. Note this paper.
- b. Invite HOs to generate S-122 products based on the provided “Best practice”.
- c. Add the collection and assessment of S-122 data production tests into the NIPWG work plan.
- d. Act as appropriate.