COORDINATING WORKING PARTY ON FISHERY STATISTICS
Intersessional Aquaculture and Fishery Subject Groups Meetings
Copenhagen, Denmark 19-22 June 2017
Concept Note & Recommendations Proposal
Author: FAO

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Concept Note & Recommendations Proposal
for CWP Intersessional Fishery Group (19-22 June 2017)

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Document changes

Date	Version	Auteur/Relecteur	Description
29/05/2017	1.0	E. Blondel (FAO)	First draft document including survey and discussion results, recommendation proposals for discussion with GIS working group on Activity 1
06/06/2017	1.0	M. Taconet (FAO)	Review (Paragraph on Activity 1)
07/06/2017	1.0	E. Blondel (FAO)	Review Activity 1 paragraph. Finalize first draft of activity 2 and 3 paragraphs. Add GIS data survey template in annex.
07/06/2017	1.0	M. Taconet (FAO)	Review for circulation to CWP.

Background

The CWP 25 plenary meeting held in FAO headquarters (Rome, 2016), adopted the intersessional work plan for the Fishery Group. Amongst the tasks in this work plan, the further refinement of the GIS section is one of the first priority tasks concurring to the broader goal of develop and publish the CWP handbook. The development of the GIS section should build on the Concept Note presented and agreed during the last FS-Group and that has been jointly reviewed by the CWP Members.

For this purpose, an ad-hoc working group on GIS has been created. The activities and discussions of the working group are primarily based on the content and recommendations circulated as concept note at the last CWP 25 Plenary session (part of the CWP 25 meeting report), with the objective to expand and develop a GIS Section of the CWP Handbook.

For information and record, the Terms of Reference of the GIS working group are enumerated early in the present document.

Executive summary

The present document reports the outputs and findings of the working group, and mentions proposals of recommendations for adoption by the CWP Fishery group in view of the new CWP Handbook review and GIS section development.

Working group activities:

- Due to the respective duties of the working group members, no working group e-meeting could have been planned. However, the activities of the working group were presented at web call of the related ad-hoc working group of fishery data harmonization. Other exchanges were done on individual-basis, through web calls and emails.
- A data survey, oriented on GIS and data geo-referencing, was shared to members in particular ICES, IOTC, ICCAT, GFCM and SEAFO. Information was collected from ICES, IOTC, GFCM and ICCAT.
- When relevant, collected information was shared with/from the ad-hoc working group on fishery data harmonization.
- Finally, additional information was collected through the Research Data Alliance (DATA) Fishery Data Interoperability (FDI) working group, in particular IRD (French Research & Development Institute) for their valuable information on Tuna geo-referenced data exchange.

GIS TWG Terms of Reference

Three main working areas are identified as terms of reference for the GIS working group, to be carried out to develop the GIS section and for which FAO as task leader seeks for the collaboration of other relevant agencies.

Activity 1: Spatial gridded systems for fishery data reporting
This activity consists in the following tasks:

1. To analyze the different grid systems in used by CWP member agencies, expand their comparative description and pros/cons analysis, as initiated in the above mentioned concept note. This includes also comparison of grid vs. Area/zone approaches.
2. To distinguish and cover the three following core aspects of grid systems: i) grid reporting systems, ii) grid coding systems, iii) grid exchange formats.
3. To interact, with the CWP ad-hoc task Group on Reference harmonization for capture fisheries and aquaculture statistics, if deemed necessary.
4. To produce a final set of recommendations for the use of spatial gridded systems for fishery data reporting, and circulate it to next CWP intersessional meeting.

Activity 2: Strengthening promotion and implementation of geographic information standards & best practices
This activity consists in the following tasks:

1. To identify, inventory and illustrate internationally-recognized standards and best practices for geographic information, and their actual or potential use for fishery and aquaculture geographic information.
2. To distinguish and cover the following categories, for both data and metadata: i) description and exchange formats, ii) exchange protocols and web-services
3. To produce a final set of recommendations, standards and best practices to be circulated to next CWP intersessional meeting.

Activity 3: Establish a list of GIS reference datasets and layers relevant for fishery & aquaculture
This activity will consist in exploring the possibility to list a set of GIS reference datasets and layers relevant for fishery & aquaculture, made available through the CWP web portal.

Survey on data geo-referencing

A data survey template was prepared by FAO and shared with several organizations including:

- Members of the GIS working group: ICES, IOTC, GFCM
- Members of the ad-hoc working group on fishery data harmonization: ICCAT, SEAFO

The survey template is available in Annex 1.
Until now, information was collected from IOTC, ICES, GFCM and ICCAT. A survey summary is available for reading and comments at:
https://docs.google.com/spreadsheets/d/15A30t4gtvtXsysdZz4FKDcOgt7ueI_sTxnlii1p_Akk/edit?usp=sharing .

Activity outputs & recommendation proposals

1. Activity 1: Spatial gridded systems for fishery data reporting

1.1. Definition needs & proposals for adoption

In the initial CWP GIS concept note, the recommendation was made to distinguish between three levels of draft definitions. According to the authors, these three levels of definitions constitute the main points to consider for recommending an appropriate grid system(s) for collecting and reporting catch and effort statistics.

The three levels of definitions, here below with **tentative definitions for discussion**, still need to be addressed, possibly improved and adopted by CWP Fishery group, for inclusion in the CWP Handbook glossary.

- **Grid reporting system**: System defined by a regular geo-referenced grid characterized by (i) a maximum geographic extent or scale (global, regional, local), (ii) a grid unit/cell shape (e.g. square, rectangle), (iii) a grid resolution (e.g. 1 x 1deg, 5 x 5 deg). In practice, such system may be used for on-board data collection and underlying data aggregation, specifically for Tuna RFMOs.

- **Grid coding system**: Logic that allows converting a pair of geographic coordinates (Longitude / Latitude) into a string-based code, and vice-versa. In the computing field, coding will mean both *encoding* and *decoding*.

  Examples of grid coding systems: Areal grid system (CWP), C-square. For certain grid resolution, these two coding systems correspond to two different mechanisms to encode/decode for a same *Grid reporting system*.

- **Data exchange format**: Digital format used for exchanging geo-referenced fishery data. A distinction can be made between the specific format of the spatial dimension (e.g. grid or area code string, pair of Longitude/Latitude coordinates as number of string e.g. Well-Known-Text string) and the fishery data exchange format).

  Note: The scope of the latter *data exchange format* terminology may be broader than the specific scope of spatial gridded systems, but rather for a complete fishery dataset (geo-referenced or not). Generally speaking, it is recommended to use this terminology with caution.

1.2. Promoting of existing CWP Areal Grid coding system

Current Status

Presently, the CWP promotes a unique Grid reporting and coding system, named *Areal Grid System*, described at http://www.fao.org/fishery/cwp/handbook/G/en .

A primary set of comments can be enumerated, unless otherwise stated, resulting for information collated from RFMOs, the data survey shared with CWP members, and through interactions with the Research Data Alliance (RDA) Fishery Data Interoperability (FDI) working group:

- Spatial square grid systems are mainly used by Tuna RFMOs, i.e. CCSBT, IATTC, ICCAT, IOTC, and WCPFC, for *catch-and-effort* and *catch-at-size* datasets, for resolutions of 1° or 5° (depending on the fishing gear type).
- The way the grid cells are expressed (or codified) differs according to the Tuna RFMO, in particular, the following can be highlighted:
    - CCSBT does use grid square reporting systems of resolution 1 x 1 deg and 5 x 5 deg, but using grid cell top-left geographic coordinates.
    - IATTC does provide geographic coordinates (latitude/longitude) corresponding to the center of the square.
    - ICCAT does mention and promote the use of CWP Areal grid coding system in their online geographical definitions (https://www.iccat.int/Data/ICCAT_maps.pdf), but does not explicitly use it for their data exchange, and use grid cell geographic coordinates instead, *i.e.*:
        - Lat and Lon giving the coordinates to the point closest to (0,0)
        - ColQuadrant gives the number of the CWP globe quadrant (1 to 4)
        - ColSquareSize gives the CWP code of the square size
    - IOTC is explicitly using the CWP Areal grid coding system for data exchange, but with some exceptions to the standard coding system definition:
        - Quadrangle size code 3 in IOTC is equivalent to CWP code 7
        - Quadrangle size Code 4 in IOTC is equivalent to CWP code 8
    - WCPFC does provide geographic coordinates (latitude/longitude of the south-west corner of the square) and the grid unit size as data column (for example: “LAT5” for 5°, “LAT1” for 1°)

- Other (regional) grid reporting and coding systems:
    - The ICES rectangles system, limited to ICES competence area, is used by ICES for 3 regional databases. The reporting system is defined by rectangles of 1° x 30' resolution; and provides a specific *grid coding system*.
    - The GFCM grid system (http://www.fao.org/gfcm/data/map-statistical-grid/en/), limited to the GFCM competence area, is defined by squares of 30' x 30' resolution, and provides a specific *grid coding system*. A discussion was started with GFCM to understand the choice done to develop a custom grid cod system instead of using existing coding systems.

Recommendations Proposal

1. In the case of Tuna RFMOs, the main recommendation of the working group to be discussed for adoption by the CWP Fishery group is **to fasten the adoption and implementation of the existing CWP Areal *grid coding system*.** This recommendation may be justified by:

- A common *grid reporting system* (except few exceptions) used by RFMOs, *i.e.* in most of cases a global, square-based grid of resolution 1° or 5°, and other exceptions of datasets for which the resolution is also managed by the CWP Areal *grid coding system*.
- A set of minimal requirements already fulfilled, although different depending on each RFMO, that provide all the base data to obtain the equivalent grid codes:
    - A partial adoption/implementation of CWP areal grid system by IOTC, with the need to align some quadrangle codes on the standard definition.
    - The presence of geographic coordinates in the data reporting, although attached with specific characteristics (grid cell corner or center).
- A minimum of effort required for adoption by RFMOs (to discuss and confirm with each RFMO separately), where the need is the addition of a single tabular data column to handle the CWP grid code.
- The knowledge in FAO, related infrastructures (e.g. i-Marine platform), and working groups (e.g. RDA FDI), and the availability of CWP grid codes *encoding/decoding* functions in several programming languages. Knowledge transfer and eventual capacity building shall facilitate its adoption and implementation.

2. In case of CWP members using specific regional grid reporting and coding systems (*i.e.* ICES, GFCM), and depending on the regional fishery datasets or databases considered**, it may be difficult (if not impossible) to promote the adoption of existing CWP Areal Grid system**, in particular if the grid reporting system is used and adopted by the country members themselves to report to the CWP member.

- It must be recognized however that the ICES and GFCM statistical grids are compatible with the CWP Areal *grid coding system*, given their resolution (respectively 1° x 30' and 30'x 30'). A

partial adoption at data reporting level may be facilitated through one-to-one code mappings.

1.3. Promoting of alternative reporting coding systems

Background

The CWP GIS concept note was mentioning alternate *grid coding systems* such as the C-Square (http://www.cmar.csiro.au/csquares/) system, created by the Australian CSIRO Institute. At now, the CWP does not give recommendations on alternate *grid coding systems*, and does refer only to the

Recommendations Proposal

At this stage, it seems premature to promote the adoption and implementation of alternate *grid coding systems* other than the adopted CWP areal grid system. This may be reconsidered later within the scope of CWP ad-hoc GIS and fishery reference harmonization working groups.

2. Activity 2: Strengthening promotion and implementation of geographic information standards & best practices

In order to cover a broader range of fishery data use cases, the sections below suggest approaching the promotion and implementation of geographic information standards for fishery data interoperability and exchange by distinguishing six levels of geo-referencing, for discussion and possible adoption by CWP. These GIS recommendations may apply to different categories of geo-referenced *fishery data* including:

- Fishery information & knowledge management
    - Reference geographic datasets
    - Derivate datasets & information
- Fishery-dependent data from commercial / recreational sources. E.g. *Amount (catch, landings), Effort*, *By-catch, Discarded species*
- Fishery-independent data: Scientific surveys, e.g. *Biological data, Acoustic data, Environmental data*

The six levels of geo-referencing considered are:

1. Coordinate Reference systems
2. Geographic (raw) coordinates
3. Classification systems
4. Coding systems
5. (Meta)data Formats in support to geo-referencing
6. Web-Services in support to geo-referencing

2.1. Coordinate Reference Systems

Current Status

From the GIS data survey, it appears that the coordinate reference system generally used for geo-referencing fishery data is the *World Geodetic System 1984,* referenced as *EPSG:4326* (according to the official EPSG registry https://www.epsg-registry.org/) and used as reference system for the Global Positioning System (GPS). Information about this reference system can be found at https://epsg.io/4326. Although it is used in practice, at now there is no CWP recommendation regarding the use of a spatial reference system or another.

Recommendations Proposal

1. The *World Geodetic System 1984* (EPSG:4326) should be recommended as main spatial reference system for geo-referencing fishery data.

2. In case another spatial reference system is required for geo-referenced datasets, such spatial reference system should be well identified at least by means of one of the three spatial reference system representations:
    a. EPSG numeric identifier
       Example: **EPSG:3349**
    b. Unique Resource Locator
       Example: **http://www.opengis.net/gml/srs/epsg/xml#3349**
    c. Unique Resource Identifier (URI)
       Example: **urn:ogc:def:crs:EPSG::3349**

2.2. Use of Geographic coordinates

Recommendations Proposal

1. Writing format: When exchanging data with geographic coordinates (e.g. datasets geo-referenced with raw coordinates), it is recommended to use decimal degrees (DD) as main or additional, instead of Degrees Minutes Seconds (DMS). In the case of reports handling the list of coordinates that define reference areas, the DMS writing format is still widely used (especially to avoid errors of precisions) and should be considered as reference. Nevertheless, in the latter case, the DD writing format is recommended for addition in order to facilitate the digitalization of geographic coordinates by data managers.

2. Axis ordering (longitude/latitude or latitude/longitude): Although this recommendation is often minimized, it is strongly recommended, as general practice, to align on the recommendations given by the OGC standards for geospatial data, which is to use the axis ordering depending on the representation used for the coordinate reference system (See 2.1. recommendation 2). The following table gives the assumed axis order depending on the spatial reference system representation. This recommendation applies to data geo-referenced with raw geographic coordinates (locations), but also for other geometric representations used (geographic areas, transects, etc).

Representation	Assumed axis order
`EPSG:xxxx`	longitude/latitude (x/y)
`http://www.opengis.net/gml/srs/epsg.xml#xxxx`	longitude/latitude (x/y)
`urn:x-ogc:def:crs:EPSG:xxxx`	latitude/longitude (y/x)

Source : GeoServer

2.3. Use of Geographic classification systems

Background

A tentative definition of a *classification system* could be: a way of grouping and organizing data with the aim to compare them to other data. A *classification system* is generally accompanied of a *coding system* that gives the rules to assign a unique code for each element of the classification system. In geography, and in particular in application to the fishery domain, we may distinguish three types of geographic classification systems:

1. Locations / Sites e.g. list of ports, landing sites

2. Linear transects e.g. trawl transects in scientific surveys

3. Area classification systems: e.g. FAO major areas and breakdown

The latter category will generally target aggregated fishery data. Two main types of area classification systems can be distinguished: (i) irregular area classification system (e.g. FAO major areas), (ii) grid reporting systems (Cf. paragraph 1). Area classification systems may include a notion of hierarchy (e.g. Regional breakdown of FAO Major Marine Fishing Areas).

Current Status

Currently, the CWP handles two pages dealing implicitly with *geographic classification systems*, *i.e.* sections G – FISHING AREAS - GENERAL (http://www.fao.org/fishery/cwp/handbook/G/en) and H – FISHING AREAS FOR STATISTICAL PURPOSES (http://www.fao.org/fishery/cwp/handbook/H/en). In section G, the introduction targets specifically the FAO Major areas for fishery purpose, while followed by two sub-sections that are not directly related to the FAO Major areas: (i) a sub-section describing the different water bodies (marine, internal, inland waters), (ii) a sub-section describing the Areal Grid system. The section H provides details on FAO major areas and its breakdown.

Recommendations Proposal

1. Restructure the current section G to cover general and broader information on geographic classification systems (that go beyond the case of geographic areas and the description of FAO major fishing areas). The above background information on *geographic classification systems* may be used as starting point. Key definitions should be added in a glossary. The description of water bodies (marine, internal, inland waters) could be handled in the latter as well.

2. Include in above general section sub-sections (possibly handled in other pages) covering the three types of geographic classification systems mentioned above (point, linear and area classification systems), and for the area classification systems, a distinction between irregular area classification systems and grid reporting systems.

2.1 The sub-section on irregular area classification systems should include information on FAO major fishing areas and breakdown, as presently handled in CWP handbook section H.

2.2. The sub-section on grid reporting systems may include information from the current section G and additional information from paragraph 1 that would be adopted by CWP.

3. In addition, it is recommended to CWP GIS working group to discuss the following topics (to be prioritized by CWP members):

3.1. Need to discuss further whether content described in recommendations 2.1 (FAO major fishing areas) and 2.2 (Grid systems), or part of it, should be moved to a proper GIS section of the handbook, if appropriate.

3.2. Need to exploit existing definitions, possibly standard definitions, of *geographic classification systems.* On this respect, it is recommended to further analyze possible standards for geographic information. Key sources of information could be: (i) for the geographic information: the ISO/TC211 committee on geographic information / geomatics (https://committee.iso.org/tc211) and their existing standards, (i) for the fishery information: the Research Data Alliance Fishery Data Interoperability working group (https://www.rd-alliance.org/groups/fisheries-data-interoperability-wg). Information acquired may be used to further refine the terms used in the restructured section G.

3.3. In addition, the need of a harmonized classification of *Area classification systems* could be further discussed. The aim of such "parent" classification system may allow distinguishing between the *types* of areas systems used in fishery data, and facilitating collation and

harmonization of information coming from scattered sources (e.g. information on stocks and fisheries). Examples of *types*: *fishery statistical area, fishing area, reporting area, management unit, competence area, jurisdiction area, etc.*

Although such discussion may be challenging (harmonization of area definitions, legal aspects), the CWP could have a key role in driving this task harmonization continuous process.

2.4. Use of Geographic coding systems

Background

As mentioned in section 2.3, a *coding system* can be defined as a set of rules used to assign a unique code to an element of a *classification system*. In the case of *geographic classification systems* for fishery data, two different types of *coding systems* can be distinguished:

1. Area, Point or Lines - based (Irregular) coding systems, e.g. FAO area codes
2. Grid-based (regular) coding systems, e.g. Areal grid codes

The difference between these coding systems is in their capacity or not to handle a *encoding/decoding* mechanism. In the case of irregular polygons, it will be not possible to handle such mechanism, while in the case of a *grid coding system*, it will be possible to encode a grid unit (e.g. square) into a code, and decode it again to a geometrical form.

Hence, *classification systems* based on irregular areas, points or transects will be handled with codes with a logic specific to each classification system. The product of such coding systems will be either a *geo-codelist* or a *geo-registry*. A *geo-registry* is distinguished from a geo-*codelist* due to the fact it is generally large (e.g. *registry of landing sites*), and its frequency of update is high.

Recommendations Proposal

1. Add a general handbook sub-section giving background on *geographic coding systems*.
2. For the description of specific coding systems, it could be recommended to make it available close to the description of *geographic classification system* it targets (e.g. FAO major areas coding system, Areal grid coding system).
3. In case the handbook content would be considered too invasive, the specification of the coding system may be handled as annex within the CWP GIS section, and linked properly. It is recommended to proceed in this way for the Grid areal coding system.

2.5. (Meta)data formats in support to geo-referencing

Current Status

From the GIS data survey, it appears that some members (GFCM, FAO, ICES) already make available GIS reference data sets online as digital data formats. FAO and ICES provide data in OGC formats and the proprietary ESRI shapefile format. GFCM only provides data in ESRI shape file format. Other members (IOTC, ICCAT) indicated that online GIS data access will be made available. In the case of IOTC, although it is under consideration, it is not yet planned to adopt OGC data formats and web-services, but to adopt the internal IOTC web-services architecture. Regarding metadata formats, FAO and ICES describe GIS reference datasets by means of ISO / OGC metadata standard formats (ISO 19115:2003, 19139).

Recommendations Proposal

1. Data formats:

    1.1. Use of OGC data formats: It is recommended to provide access to geo-reference data through at least one of the OGC standard: Geographic Markup Language (GML), or GeoJSON.

    1.2. Use of ESRI Shapefile: It is recognized that the ESRI Shapefile is widely used for geo-referenced data, but it is not recommended as preferred geospatial data format, in particular because of its limitations (see http://pro.arcgis.com/en/pro-app/tool-reference/appendices/geoprocessing-considerations-for-shapefile-output.htm).

    1.3. Use of CSV: Although the Comma Separated Value (CSV) format is not a geospatial data standard format, it is widely used and may be easy for CWP members to implement and for use by data consumers. It is therefore recommended to provide access of geo-referenced data through CSV. In such case, it is strongly recommended to append the geometrical form of the geo-reference in addition to the geo-code that identify the geometry. The geometry should be handled as text using the OGC Well-Known-Text definition (see https://en.wikipedia.org/wiki/Well-known_text#Geometric_objects)

2. Metadata formats: It is recommended to describe GIS referenced datasets and geo-referenced fishery data by means of the ISO/OGC 19115 / 19139 metadata standards. A relevant use case for the CWP community would be the FAO proposal to create a CWP GIS reference data catalogue, as highlighted in paragraph 3.

2.6. Web-services in support of geo-referencing

Current Status

From the GIS data survey, it appears that some members (ICES, FAO) are already implementing web-services in support to fishery geo-referencing. For data access, the Web Map Service and Web Feature Service are extensively used, while for data discovery, metadata catalogue services for the Web (OGC CSW) are available by means of GeoNetwork.

Recommendations Proposal

1. Data Access: in order to facilitate GIS reference data & geo-referenced data access, it is recommended to use as much as possible existing internationally-recognized standards namely the OGC Web Map Service (WMS), for accessing data as web maps, and Web Feature Service (WFS) for accessing the "physical" data.

2. Data Discovery: in order to facilitate the data discovery, in the case of datasets without specific access limitations or data project policies, it is recommended to use the OGC Catalogue Service for the Web standard, which relies on metadata descriptions (Cf. paragraph 2.5 – recommendation 2) for facilitating the datasets discovery. A relevant use case for the CWP community would be the FAO proposal to create a CWP GIS reference data catalogue, as highlighted in paragraph 3.

3. Activity 3: Establish a list of GIS reference datasets and layers relevant for fishery & aquaculture

Such activity has not yet been covered by the CWP GIS working group. A second survey could be prepared to collect feedback from CWP members.

FAO proposal: Such inventory of GIS reference datasets could be materialized as a simple catalogue based on the CSW standard (Cf. Activity 2 – 2.6 Web-services in support of geo-referencing – recommendation 2).

Based on the CSW standard and its capacity to harvest existing catalogues, a simple CSW catalogue could be put at disposal of CWP members and public. In particular, such approach would be a way to promote the implementation of web-services in support of geo-referencing. As starting point, existing metadata catalogues handling GIS reference datasets of interest for fishery (e.g. ICES – http://gis.ices.dk/geonetwork , FAO – http://www.fao.org/geonetwork) could be harvested.

Annex 1 – GIS data survey template

Dataset name	....
Dataset description	....
Geo-referencing characteristics	
➔ Type of geo-referencing / classification system (please choose one)	○ ***Geographic Coordinates*** ○ ***Grid-based (regular) classification system*** **Examples: CWP Areal Grid system, ICES rectangles, C-squares, etc.** If used, what are the characteristics of this grid reporting system: ○ Shape: Square / Rectangle / Other ○ Grid cell resolution(s): .... ○ ***Area-based (irregular) classification system*** **Examples: FAO major fishing areas, area statistical units, etc.** Explanations why you use it: ....
➔ Spatial Reference System used ***For a definition, see:*** *https://en.wikipedia.org/wiki/Spatial_reference_system*	Name: ... Spatial Reference System Identifier - SRID (***if known***): .... Explanations why you use it: ...
➔ Grid Coding System (please choose one) ***To fill in case you are using a grid-based reporting system***	○ ***Areal Grid system (CWP)*** ○ ***ICES Rectangles*** ○ ***Others?*** Explanations why you use it: ....
➔ Areas classification system Description (please choose) ***To fill in case you are using an area classification system (geographic code list, GIS reference dataset)***	○ ***Fishing Areas for Statistical Purpose (CWP)*** ○ ***FAO Major Fishing Areas*** ○ ***FAO statistical areas*** ***(subareas, divisions, subdivisions, subunits)*** ○ ***RFMO reporting/statistical units*** ○ ***Other*** Additional description: ....
➔ Geographic code list and GIS reference dataset (if any specific grid or area classification system used) ***To fill in case you are using an area classification system (geographic code list, GIS reference dataset)***	Web link where descriptions of the geographic codelist / GIS reference area dataset can be found: .... • Is the geo reference dataset available on the web? YES / NO Link: .... • In which formats the dataset is distributed? .... • Are you using standard format and services for **data**? YES / NO Link: .... • Are you describing these reference datasets with **metadata**? YES / NO Metadata standard(s) used: ..... Link: .... • Is the geo reference dataset part of a maintenance procedure? Frequency of maintenance:.... People in charge of the maintenance: .... Maintenance Procedure followed: ....