INSPIRE
Infrastructure for Spatial Information in Europe

D2.8.III.17 Data Specification on Bio-geographical Regions – Draft Guidelines

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Foreword
How to read the document?

This document describes the *"INSPIRE data specification on Bio-geographical Regions - Guidelines"* version 2.0 as developed by the Thematic Working Group (TWG) *Bio-geographical Regions / Habitats and Biotopes / Species Distribution* using both natural and a conceptual schema language. This version is now available for the public consultation. Based on the results of the consultation (received comments and the testing reports), the final version 3.0 will be prepared by the TWGs.

The data specification is based on a common template used for all data specifications and has been harmonised using the experience from the development of the Annex I data specifications.

This document provides guidelines for the implementation of the provisions laid down in the draft Implementing Rule for spatial data sets and services of the INSPIRE Directive.

This document includes two executive summaries that provide a quick overview of the INSPIRE data specification process in general, and the content of the data specification on *Bio-geographical Regions* in particular. We highly recommend that managers, decision makers, and all those new to the INSPIRE process and/or information modelling should read these executive summaries first.

The UML diagrams (in Chapter 5) offer a rapid way to see the main elements of the specifications and their relationships. The definition of the spatial object types, attributes, and relationships are included in the Feature Catalogue (also in Chapter 5). People having thematic expertise but not familiar with UML can fully understand the content of the data model focusing on the Feature Catalogue. Users might also find the Feature Catalogue especially useful to check if it contains the data necessary for the applications that they run. The technical details are expected to be of prime interest to those organisations that are/will be responsible for implementing INSPIRE within the field of *Bio-geographical Regions.*

The technical provisions and the underlying concepts are often illustrated by examples. Smaller examples are within the text of the specification, while longer explanatory examples and descriptions of selected use cases are attached in the annexes.

In order to distinguish the INSPIRE spatial data themes from the spatial object types, the INSPIRE spatial data themes are written in *italics.*

Interoperability of Spatial Data Sets and Services – General Executive Summary

The challenges regarding the lack of availability, quality, organisation, accessibility, and sharing of spatial information are common to a large number of policies and activities and are experienced across the various levels of public authority in Europe. In order to solve these problems it is necessary to take measures of coordination between the users and providers of spatial information. The Directive 2007/2/EC of the European Parliament and of the Council adopted on 14 March 2007 aims at establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) for environmental policies, or policies and activities that have an impact on the environment.

INSPIRE will be based on the infrastructures for spatial information that are created and maintained by the Member States. To support the establishment of a European infrastructure, Implementing Rules addressing the following components of the infrastructure are being specified: metadata, interoperability of spatial data themes (as described in Annexes I, II, III of the Directive) and spatial data services, network services and technologies, data and service sharing, and monitoring and reporting procedures.

INSPIRE does not require collection of new data. However, after the period specified in the Directive[1] Member States have to make their data available according to the Implementing Rules.

Interoperability in INSPIRE means the possibility to combine spatial data and services from different sources across the European Community in a consistent way without involving specific efforts of humans or machines. It is important to note that “interoperability” is understood as providing access to spatial data sets through network services, typically via Internet. Interoperability may be achieved by either changing (harmonising) and storing existing data sets or transforming them via services for publication in the INSPIRE infrastructure. It is expected that users will spend less time and efforts on understanding and integrating data when they build their applications based on data delivered within INSPIRE.

In order to benefit from the endeavours of international standardisation bodies and organisations established under international law their standards and technical means have been utilised and referenced, whenever possible.

To facilitate the implementation of INSPIRE, it is important that all stakeholders have the opportunity to participate in specification and development. For this reason, the Commission has put in place a consensus building process involving data users, and providers together with representatives of industry, research and government. These stakeholders, organised through Spatial Data Interest Communities (SDIC) and Legally Mandated Organisations (LMO)[2], have provided reference materials, participated in the user requirement and technical[3] surveys, proposed experts for the Data Specification Drafting Team[4] and Thematic Working Groups[5].

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[1] For all 34 Annex I,II and III data themes: within two years of the adoption of the corresponding Implementing Rules for newly collected and extensively restructured data and within 5 years for other data in electronic format still in use

[2] Number of SDICs and LMOs on 8/6/2011 was 461 and 249 respectively

[3] Surveys on unique identifiers and usage of the elements of the spatial and temporal schema,

[4] The Data Specification Drafting Team has been composed of experts from Austria, Belgium, Czech Republic, France, Germany, Greece, Italy, Netherlands, Norway, Poland, Switzerland, UK, and the European Environmental Agency

[5] The Thematic Working Groups of Annex II and III themes have been composed of experts from Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Netherlands, Norway, Poland, Romania, Slovakia, Spain, Sweden, Switzerland, Turkey, UK, the European Commission, and the European Environmental Agency

This open and participatory approach was successfully used during the development of the data specification on Annex I data themes as well as during the preparation of the Implementing Rule on Interoperability of Spatial Data Sets and Services[6] for Annex I spatial data themes.,

The development framework elaborated by the Data Specification Drafting Team aims at keeping the data specifications of the different themes coherent. It summarises the methodology to be used for the data specifications and provides a coherent set of requirements and recommendations to achieve interoperability. The pillars of the framework are four technical documents:

- The Definition of Annex Themes and Scope[7] describes in greater detail the spatial data themes defined in the Directive, and thus provides a sound starting point for the thematic aspects of the data specification development.

- The Generic Conceptual Model[8] defines the elements necessary for interoperability and data harmonisation including cross-theme issues. It specifies requirements and recommendations with regard to data specification elements of common use, like the spatial and temporal schema, unique identifier management, object referencing, a generic network model, some common code lists, etc. Those requirements of the Generic Conceptual Model that are directly implementable will be included in the Implementing Rule on Interoperability of Spatial Data Sets and Services.

- The Methodology for the Development of Data Specifications[9] defines a repeatable methodology. It describes how to arrive from user requirements to a data specification through a number of steps including use-case development, initial specification development and analysis of analogies and gaps for further specification refinement.

- The "Guidelines for the Encoding of Spatial Data"[10] defines how geographic information can be encoded to enable transfer processes between the systems of the data providers in the Member States. Even though it does not specify a mandatory encoding rule it sets GML (ISO 19136) as the default encoding for INSPIRE.

Based on these framework documents and following the successful development of the Annex I Data specifications (Technical Guidelines) and the Implementing Rules, the new Thematic Working Groups have created the INSPIRE data specification for each Annex II and III theme. These documents – at the version 2.0 – are now publicly available for INSPIRE stakeholders for consultation. The consultation phase covers expert review as well as feasibility and fitness-for-purpose testing of the data specifications.

The structure of the data specifications is based on the "ISO 19131 Geographic information - Data product specifications" standard. They include the technical documentation of the application schema, the spatial object types with their properties, and other specifics of the spatial data themes using natural language as well as a formal conceptual schema language[11].

A consolidated model repository, feature concept dictionary, and glossary are being maintained to support the consistent specification development and potential further reuse of specification elements. The consolidated model consists of the harmonised models of the relevant standards from the ISO 19100 series, the INSPIRE Generic Conceptual Model, and the application schemas[12] developed for

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[6] Commission Regulation (EU) No 1089/2010 *implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services*, published in the Official Journal of the European Union on 8th of December 2010.

[7] *http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.3_Definition_of_Annex_Themes_and_scope_v3.0.pdf*

[8] *http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.5_v3.3.pdf*

[9] *http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.6_v3.0.pdf*

[10] *http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.7_v3.2.pdf*

[11] UML – Unified Modelling Language

[12] Conceptual models related to specific areas (e.g. INSPIRE themes)

each spatial data theme. The multilingual INSPIRE Feature Concept Dictionary contains the definition and description of the INSPIRE themes together with the definition of the spatial object types present in the specification. The INSPIRE Glossary defines all the terms (beyond the spatial object types) necessary for understanding the INSPIRE documentation including the terminology of other components (metadata, network services, data sharing, and monitoring).

By listing a number of requirements and making the necessary recommendations, the data specifications enable full system interoperability across the Member States, within the scope of the application areas targeted by the Directive. They will be published (version 3.0) as technical guidelines and will provide the basis for the content of the Amendment of the Implementing Rule on Interoperability of Spatial Data Sets and Services for data themes included in Annex II and III of the Directive. The Implementing Rule Amendment will be extracted from the data specifications keeping in mind short and medium term feasibility as well as cost-benefit considerations. The Implementing Rule will be legally binding for the Member States.

In addition to providing a basis for the interoperability of spatial data in INSPIRE, the data specification development framework and the thematic data specifications can be reused in other environments at local, regional, national and global level contributing to improvements in the coherence and interoperability of data in spatial data infrastructures.

Bio-geographical Regions – Executive Summary

The theme of Biogeographical regions is included under Annex III of the Directive. There is a strong linkage between this theme and the Annex I theme of Protected Sites and indeed between a number of other themes in Annex III particularly Habitats and Biotopes, Species Distribution.

The INSPIRE data specification on Biogeographical Regions has been prepared following the participative principle of a consensus building process. The stakeholders, based on their registration as a Spatial Data Interest Community (SDIC) or a Legally Mandated Organisation (LMO) had the opportunity to bring forward user requirements and reference materials, propose experts for the specification development, and to participate in the review of the data specifications. The Thematic Working Group responsible for the specification development was composed of experts coming from across Europe and from a range of organisations, ranging from regional level, to national level, European level as well as from academia and private industry. The specification process took place according to the methodology elaborated for INSPIRE respecting the requirements and the recommendation of the INSPIRE Generic Conceptual Model13, which is one of the elements that ensures a coherent approach and cross theme consistency with other themes in the Directive.

The Inspire Directive defined Biogeographical regions as “Areas of relatively homogeneous ecological conditions with common characteristics.”

The most important guiding document in regard to Biogepgraphical regions in Europe is the **Habitats Directive** (EEC/92/43), which contains a list of the ‘biogeographical regions’ (Article 1.iii). These biogeographical regions are the basis of a series of seminars evaluating the Natura2000 network and for reporting on the conservation status of the habitats and species protected by the Directive as required every 6 years. These processes are linked to the implementation of the Habitats Directive. The Habitats Directive was the first EU legislation to introduce the concept of biogeographical regions. There are currently 9 regions, covering the 27 Members States of the EU. The biogeographical regions are based on maps of potential natural vegetation (Bohn et al, 2000) but adjusted to fit political and administrative boundaries (Roekaerts, 2002, ETC/BD 2006). For the Bern Convention, via the Emerald Network, the map of these Biogeographical regions has been extended to cover the Pan-European geographical area. More recently 5 marine regions have also been used, based on the European marine conventions, but these have no legal basis. Although the regions have been modified to make them easier to use administratively, they still form ecologically coherent units of similar environmental conditions as can be seen by comparing the biogeographical regions map with other environmental classifications of Europe.

While these legally mandated biogeographical regions fulfil the administrative needs of the Habitats Directive and the Emerald network, there is further need amongst users for more detailed sets of ecological regions for more detailed analyses at a European scale or for use at a regional, national, sub national level; see for example (Metzger et al. 2005). The needs of these users for a more detailed set of ecological regions are covered under the use of additional code lists such as the ‘Environmental Stratification’ Classification values. These more detailed ecological regions may also include local sub-categories of the biogeographical regions outlined in the Habitats Directive.

Four of the basic use cases that helped define the scope of this theme and the attributes of the schema are detailed in Annex B.

1. The first use case describes the assessment of the Conservation Status of the habitat types and species listed on the Annex’s of the Habitat Directives. This is one of the key tools in assessing the efficiency of the Habitats Directive (and by default the efficiency of the EU and Member States) in its stated aim of protecting biodiversity in the European Union. These assessments are done at the biogeographical level.
2. The second use case describes the evaluation of the Natura 2000 network by biogeographical region. This is a critical step in the protection of biodiversity in Europe as it is during this process that the quality of protection is assessed.
3. The third case covers the situation relating to local (national level) ecological regions highlighting the case of the use of these regions in Germany.

4. Finally the fourth use case describes the use of the detailed set of ecological regions which were described in the previous paragraph, the use case highlights the use of Environmental stratification classification values in reporting under the European Biodiversity Observation Network (EBONE).

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The Thematic Working Group Bio-geographical Regions + Habitats and Biotopes + Species Distribution (BR-HB-SD) included:
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Other contributors to the INSPIRE data specifications are the Drafting Team Data Specifications, the JRC data specifications team and the INSPIRE stakeholders - Spatial Data Interested Communities (SDICs) or Legally Mandated Organisations (LMOs).

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1 Scope

This document specifies a harmonised data specification for the spatial data theme *Bio-geographical Regions* as defined in Annex III of the INSPIRE Directive.

This data specification provides the basis for the drafting of Implementing Rules according to Article 7 (1) of the INSPIRE Directive [Directive 2007/2/EC]. The entire data specification will be published as implementation guidelines accompanying these Implementing Rules.

2 Overview

2.1 Name

INSPIRE data specification for the theme Bio-geographical Regions.

2.2 Informal description

Definition:

Areas of relatively homogeneous ecological conditions with common characteristics. [Directive 2007/2/EC]

Description:

Data content:
The scope of the theme ‘Bio-geographical regions’ falls under the more general scope of ‘biodiversity’ which covers three of the themes listed under Annex III of the INSPIRE Directive: Bio-geographical regions, Habitat and Biotopes and Species Distribution, all of which have a link to the Annex I theme on Protected Sites. More specifically this theme deals with areas of “*relatively homogeneous ecological conditions with common characteristics”*.

In regards to this theme the most important guiding document is the **Habitats Directive** (EEC/92/43), which contains a list of ‘bio-geographical regions’ (Article 1.iii). These bio-geographical regions are the basis of a series of seminars which evaluate the Natura2000 network and which are used for reporting every 6 years on the “conservation status” of the habitat types and species protected by the Directive (see Figure 1 and Figure 2). These processes are linked to the implementation of the Habitats Directive. These bio-geographic regions may be also understood as a specific instance of "reporting units", which link of the scope of another Annex III theme "Area management/restriction/regulation zones and reporting units".

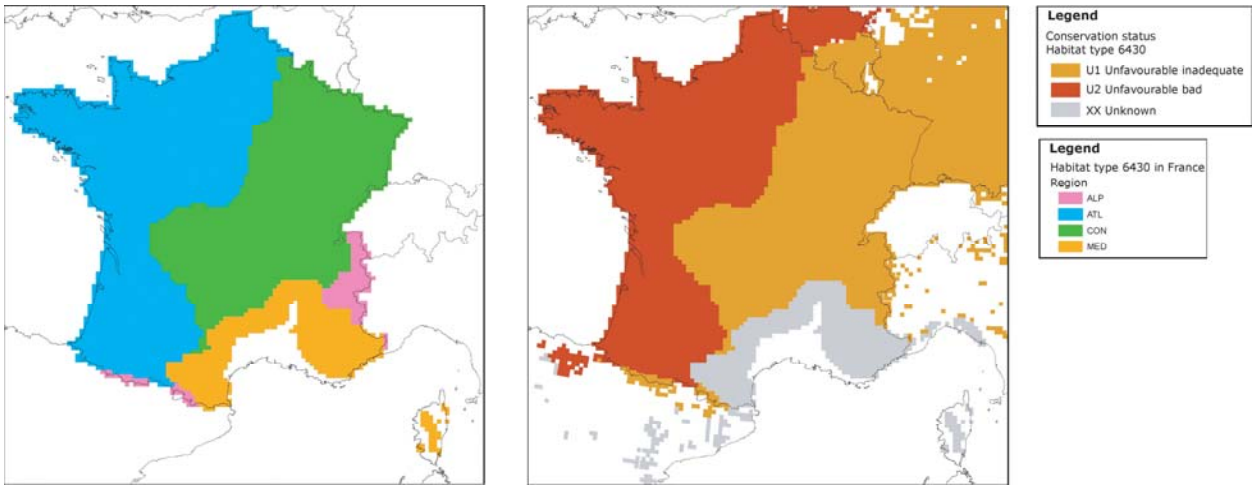

Figure 1 – Left side shows the distribution of a habitat type in France colour coded by the biogegraphical region it occurs in; Rigth side shows the "conservation status" of the same habitat by bio-geographical region.

The Habitats Directive was the first EU legislation to introduce the concept of bio-geographical regions. There are currently 9 regions, covering the 27 Members States of the EU. The bio-geographical regions are based on maps of potential natural vegetation (Bohn et al, 2000) but adjusted to fit political and administrative boundaries (Roekaerts, 2002, ETC/BD 2006). For the Bern Convention, via the Emerald Network, the map of these Bio-geographical regions has been extended to cover the Pan-European geographical area (Figure 2). More recently 5 marine regions have also been used, based on the European marine conventions, but these have no legal basis. Although the regions have been modified to make them easier to use administratively, they still form ecologically coherent units of similar environmental conditions as can be seen by comparing the bio-geographical regions map with other environmental classifications of Europe.

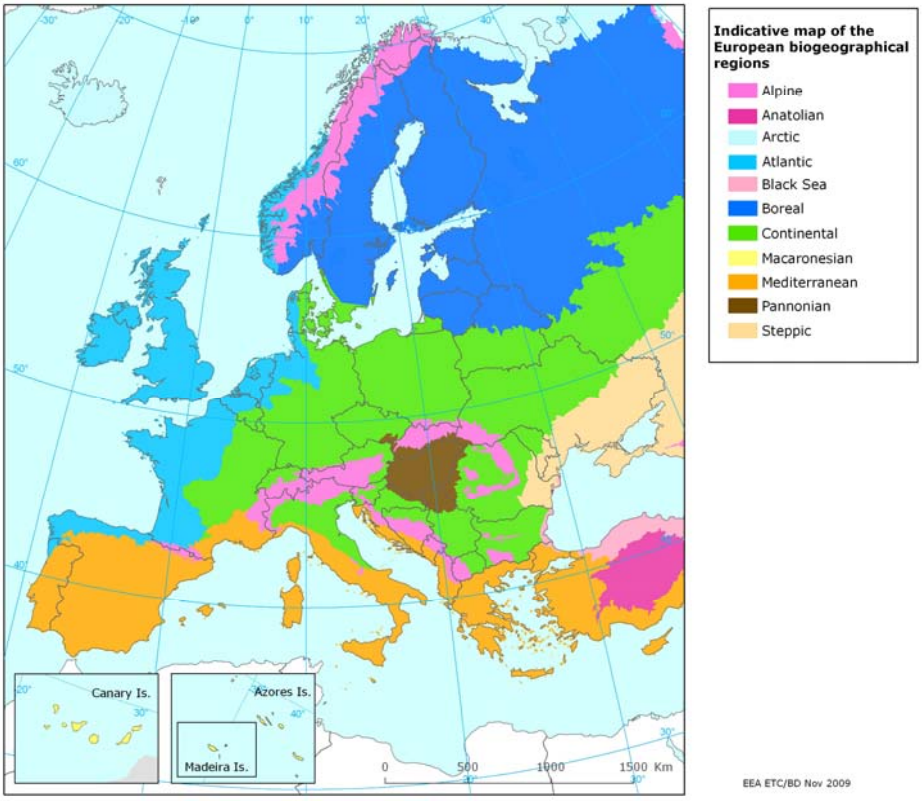

Figure 2 – The pan European bio-geographical regions map.

While these legally mandated bio-geographical regions fulfil the administrative needs of the Habitats Directive and the Emerald network, there is further need amongst users for more detailed sets of ecological regions for detailed analysis at a European scale or for use at regional, national, sub national level; see for example (Metzger et al. 2005). The needs of these users for a more detailed set of ecological regions are covered under the use of additional code lists such as the 'Environmental Stratification' Classification values. These more detailed ecological regions may also include local sub-categories of the bio-geographical regions outlined in the Habitats Directive.

Use cases:
Four of the basic use cases that help define the scope of this theme and the attributes of the schema are detailed in Annex B.

1. The first use case describes the assessment of the Conservation Status of the habitat types and species listed on the Annex's of the Habitat Directives. This is one of the key tools in assessing the efficiency of the Habitats Directive (and by default the efficiency of the EU and Member States) in its stated aim of protecting biodiversity in the European Union. These assessments are done at the bio-geographical level.
2. The second use case describes the evaluation of the Natura 2000 network by bio-geographical region. This is a critical step in the protection of biodiversity in Europe as it during this process that the quality of protection is assessed.
3. The third case covers the situation relating to local (national level) ecological regions highlighting the case of the use of these regions in Germany.
4. Finally the fourth use case describes the use of the detailed set of ecological regions which were described in the previous paragraph; the use case highlights the use of Environmental stratification classification values in reporting under the European Biodiversity Observation Network (EBONE).

References

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Council directive 92/43/EEC of 21 may 1992 on the conservation of natural habitats and of wild fauna and flora. *Official Journal of the European Communities, 206* (22), 7.

ETC/BD (2006) "*The indicative Map of European Biogeographical Regions: methodology and development"*.http://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-2005/methodology-description-pdf-format/methodology-description-pdf-format/at_download/file

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Noirfalise, A. (1987) Map of the Natural Vegetation of the member countries of the European Community and of the Council of Europe. Office for Official Publications of the European Communities, Luxembourg

Roekaerts, M. (2002) The Biogeographical Regions Map of Europe - Basic principles of its creation and overview of its development. http://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-2001/methodology-basic-principles-of-the-biogeographical-regions-map-creation-and-overview-of-its-development/methodology-basic-principles-of-the-biogeographical-regions-map-creation-and-overview-of-its-development/at_download/file

2.3 Normative References

[Directive 2007/2/EC]	Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

[ISO 19107] EN ISO 19107:2005, Geographic Information – Spatial Schema

[ISO 19108] EN ISO 19108:2005, Geographic Information – Temporal Schema

[ISO 19108-c] ISO 19108:2002/Cor 1:2006, Geographic Information – Temporal Schema, Technical Corrigendum 1

[ISO 19111] EN ISO 19111:2007 Geographic information - Spatial referencing by coordinates (ISO 19111:2007)

[ISO 19113] EN ISO 19113:2005, Geographic Information – Quality principles

[ISO 19115] EN ISO 19115:2005, Geographic information – Metadata (ISO 19115:2003)

[ISO 19118] EN ISO 19118:2006, Geographic information – Encoding (ISO 19118:2005)

[ISO 19123] EN ISO 19123:2007, Geographic Information – Schema for coverage geometry and functions

[ISO 19135] EN ISO 19135:2007 Geographic information – Procedures for item registration (ISO 19135:2005)

[ISO 19138] ISO/TS 19138:2006, Geographic Information – Data quality measures

[ISO 19139] ISO/TS 19139:2007, Geographic information – Metadata – XML schema implementation

[OGC 06-103r3] Implementation Specification for Geographic Information - Simple feature access – Part 1: Common Architecture v1.2.0

NOTE This is an updated version of "EN ISO 19125-1:2006, Geographic information – Simple feature access – Part 1: Common architecture". A revision of the EN ISO standard has been proposed.

[Regulation 1205/2008/EC] Regulation 1205/2008/EC implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata

2.4 Terms and definitions

General terms and definitions helpful for understanding the INSPIRE data specification documents are defined in the INSPIRE Glossary[13].

Specifically, for the theme Bio-geographical Regions, the following terms are defined:

(1) Article 17
Article 17 of the Habitats Directive requires that every 6 years Member States prepare reports to be sent to the European Commission on the implementation of the Directive. Article 11 of the Habitats Directive requires Member States to monitor the habitats and species listed in the annexes and Article 17 requires a report to be sent to the European Commission every 6 years following an agreed format

[13] The INSPIRE Glossary is available from http://inspire-registry.jrc.ec.europa.eu/registers/GLOSSARY

– hence the term 'Article 17 Reporting'. The report includes assessments on the conservation status of the habitat types and species of Community interest at the bio-geographical level.

(2) Bio-geographical regions
Article 1.iii of the Habitats Directive identifies 9 bio-geographical regions in the EU. These bio-geographical regions are, according to Article 4.2 of the Habitats Directive, the geographical framework for the establishment of a draft list of sites of Community Importance drawn from the Member States' lists with a view of setting up the Natura2000 ecological network (Special Areas of Conservation – SACs). In parallel, Bern Convention Resolution No. 16 (1989) foresees that Contracting Parties take steps to designate Areas of Special Conservation Interest (ASCIs). As a consequence there was a need to extend the Map of Bio-geographical Regions to the Pan-European geographical area.

(3) Environmental stratification
These are more refined ecological regions than the broader Bio-geographical regions.

(4) Marine regions
The marine regions are used in the context of Natura2000 due to practical/technical reasons only; they do not have any legal status as opposed to the "terrestrial" Bio-geographical Regions which do.

(5) Natura 2000
Natura 2000 is a European Union-wide network of nature protection areas established under the 1992 Habitats Directive. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. It is comprised of Special Areas of Conservation (SAC) designated by Member States under the Habitats Directive, and also incorporates Special Protection Areas (SPAs) designated under the 1979 Birds Directive. The establishment of this network of protected areas also fulfils a Community obligation under the UN Convention on Biological Diversity.

2.5 Symbols and abbreviations

2.6 Notation of requirements and recommendations

To make it easier to identify the mandatory requirements and the recommendations for spatial data sets in the text, they are highlighted and numbered.

IR Requirement X	Requirements that are reflected in the Implementing Rule on interoperability of spatial data sets and services are shown using this style.

DS Requirement X	Requirements that are not reflected in the Implementing Rule on interoperability of spatial data sets and services are shown using this style.

Recommendation 1 Recommendations are shown using this style.

2.7 Conformance

DS Requirement 1	Any dataset claiming conformance with this INSPIRE data specification shall pass the requirements described in the abstract test suite presented in Annex A.

3 Specification scopes

This data specification does not distinguish different specification scopes, but just considers one general scope.

NOTE For more information on specification scopes, see [ISO 19131:2007], clause 8 and Annex D.

4 Identification information

NOTE Since the content of this chapter was redundant with the overview description (section 2) and executive summary, it has been decided that this chapter will be removed in v3.0.

5 Data content and structure

IR Requirement 1 Spatial data sets related to the theme **Bio-geographical Regions** shall be provided using the spatial object types and data types specified in the application schema(s) in this section.

IR Requirement 2 Each spatial object shall comply with all constraints specified for its spatial object type or data types used in values of its properties, respectively.

Recommendation 1 The reason for a void value should be provided where possible using a listed value from the VoidValueReason code list to indicate the reason for the missing value.

NOTE The application schema specifies requirements on the properties of each spatial object including its multiplicity, domain of valid values, constraints, etc. All properties have to be reported, if the relevant information is part of the data set. Most properties may be reported as “void”, if the data set does not include relevant information. See the Generic Conceptual Model [INSPIRE DS-D2.5] for more details.

5.1 Basic notions

This section explains some of the basic notions used in the INSPIRE application schemas. These explanations are based on the GCM [DS-D2.5].

5.1.1 Stereotypes

In the application schemas in this sections several stereotypes are used that have been defined as part of a UML profile for use in INSPIRE [INSPIRE DS-D2.5]. These are explained in Table 1 below.

Table 1 – Stereotypes (adapted from [INSPIRE DS-D2.5])

Stereotype	Model element	Description
applicationSchema	Package	An INSPIRE application schema according to ISO 19109 and the Generic Conceptual Model.
featureType	Class	A spatial object type.
type	Class	A conceptual, abstract type that is not a spatial object type.
dataType	Class	A structured data type without identity.
union	Class	A structured data type without identity where exactly one of the properties of the type is present in any instance.
enumeration	Class	A fixed list of valid identifiers of named literal values. Attributes of an enumerated type may only take values from this list.
codeList	Class	A flexible enumeration that uses string values for expressing a list of potential values.
placeholder	Class	A placeholder class (see definition in section 5.1.2).
voidable	Attribute, association role	A voidable attribute or association role (see definition in section 5.1.3).
lifeCycleInfo	Attribute, association role	If in an application schema a property is considered to be part of the life-cycle information of a spatial object type, the property shall receive this stereotype.
version	Association role	If in an application schema an association role ends at a spatial object type, this stereotype denotes that the value of the property is meant to be a specific version of the spatial object, not the spatial object in general.

5.1.2 Placeholder and candidate types

Some of the INSPIRE Annex I data specifications (which were developed previously to the current Annex II+III data specifications) refer to types that thematically belong and were expected to be fully specified in Annex II or III spatial data themes. Two kinds of such types were distinguished:

- *Placeholder types* were created as placeholders for types (typically spatial object types) that were to be specified as part of a future spatial data theme, but which was already used as a value type of an attribute or association role in this data specification.

  Placeholder types received the stereotype «placeholder» and were placed in the application schema package of the future spatial data theme where they thematically belong. For each placeholder, a definition was specified based on the requirements of the Annex I theme. The Annex II+III TWGs were required to take into account these definitions in the specification work of the Annex II or III theme.

  If necessary, the attributes or association roles in the Annex I data specification(s) that have a placeholder as a value type shall be updated if necessary.

- *Candidate types* were types (typically spatial object types) for which already a preliminary specification was given in the Annex I data specification. Candidate types did not receive a specific stereotype and were placed in the application schema package of the future spatial data theme where they thematically belong. For each candidate type, a definition and attributes and association roles were specified based on the requirements of the Annex I theme. The Annex II+III TWGs were required to take into account these specifications in the specification work of the Annex II or III theme.

  If the type could not be incorporated in the Annex II or III data specification according to its preliminary specification, it should be moved into the application schema of the Annex I theme where it had first been specified. In this case, the attributes or association roles in the Annex I data specification(s) that have the type as a value type shall be updated if necessary.

Open issue 1: For all Annex II+III themes for which placeholders and candidate types were specified in an Annex I data specification, it should be clearly indicated in the data specification, how the placeholder and candidate types were taken into account. If the proposed solution would require any changes to an Annex I data specification (and the corresponding section in the IR for interoperability of spatial data sets and services), this should also be clearly indicated.

A thorough investigation of the implications of the proposed changes of candidate types (in particular related to requirements of Annex I maintenance) will have to be performed for v3.0 of the data specifications.

5.1.3 Voidable characteristics

If a characteristic of a spatial object is not present in the spatial data set, but may be present or applicable in the real world, the property shall receive this stereotype.

If and only if a property receives this stereotype, the value of *void* may be used as a value of the property. A *void* value shall imply that no corresponding value is contained in the spatial data set maintained by the data provider or no corresponding value can be derived from existing values at reasonable costs, even though the characteristic may be present or applicable in the real world.

It is possible to qualify a value of void in the data with a reason using the VoidValueReason type. The VoidValueReason type is a code list, which includes the following pre-defined values:

- *Unpopulated*: The characteristic is not part of the dataset maintained by the data provider. However, the characteristic may exist in the real world. For example when the “elevation of the water body above the sea level” has not been included in a dataset containing lake spatial objects, then the reason for a void value of this property would be ‘Unpopulated’. The characteristic receives this value for all objects in the spatial data set.
- *Unknown*: The correct value for the specific spatial object is not known to, and not computable by the data provider. However, a correct value may exist. For example when the “elevation of the water body above the sea level” *of a certain lake* has not been measured, then the reason for a void value of this property would be ‘Unknown’. This value is applied on an object-by-object basis in a spatial data set.

NOTEIt is expected that additional reasons will be identified in the future, in particular to support reasons / special values in coverage ranges.

The «voidable» stereotype does not give any information on whether or not a characteristic exists in the real world. This is expressed using the multiplicity:

- If a characteristic may or may not exist in the real world, its minimum cardinality shall be defined as 0. For example, an if an Address may or may not have a house number, the multiplicity of the corresponding property shall be 0..1.
- If at least one value for a certain characteristic exists in the real world, the minimum cardinality shall be defined as 1. For example, if an Administrative Unit always has at least one name, the multiplicity of the corresponding property shall be 1..*.

In both cases, the «voidable» stereotype can be applied. A value (the real value or void) only needs to be made available for properties that have a minimum cardinality of 1.

5.1.4 Code lists and Enumerations

5.1.4.1. Style

All code lists and enumerations use the following modelling style:

- No initial value, but only the attribute name part, is used.
- The attribute name conforms to the rules for attributes names, i.e. is a lowerCamelCase name. Exceptions are words that consist of all uppercase letters (acronyms).

5.1.4.2. Governance of code lists

Two types of code lists are defined in INSPIRE. These two types are distinguished using the tagged value “extendableByMS” in the UML data model:

- *Code lists that **may not** be extended by Member States.* For these code lists, the tagged value is set to “false”. They shall be managed centrally in the INSPIRE code list register, and only values from that register may be used in instance data.
- *Code lists that **may** be extended by Member States.* For these code lists, the tagged value is set to “true”.

5.2 Application schema Bio-geographicalRegions

5.2.1 Description

5.2.1.1. Narrative description

The application schema “Bio-geographicalRegions” provides the means for a common pan-European representation of bio-geographical regions. Bio-geographicalRegion is the key spatial object of this application schema for representing regions or areas of relatively homogenous ecological conditions with common characteristics. This spatial object type will allow for a proper description of the bio-geographical classification that has been applied to identify and classify the bio-geographical region each feature represents. Within this respect it needs to be emphasized that the application schema not only supports the classification of bio-geographical regions as mandated by the European Habitats Directive, but also meets the requirements raised by INSPIRE stakeholders with regard to alternative and more precise sets of different types of ecological regions.

Currently the Bio-geographical Regions application schema includes four distinct European classification schemes, however through the mechanism of codelists the model can be extended to define and include other classifications as well.

Because of the limited number of Bio-geographical region datasets on the one hand and the objective of INSPIRE to strive for maximum harmonisation of datasets on the other hand, the structure of this application schema has been kept simple on purpose: one spatial object comprising information on geometry, an identifier and classification properties. It should also be realized that a strong link exists between the biogeographical regions application schema and the Annex I Protected Sites theme.

Open issue 2: The relationships to other themes are not specified for version 2.0 of the specification. It is still an open issue how (and if) this will be done.

5.2.1.2. UML Overview

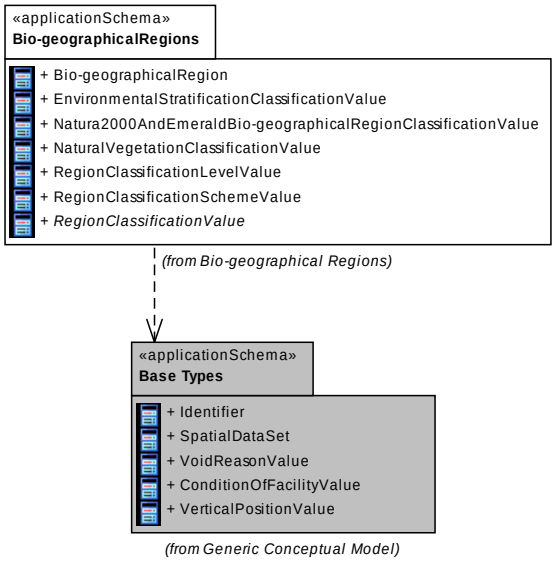

Figure 3 – UML class diagram: Overview of the *Bio-geographical Regions* application schema package dependencies

An overview of the Bio-geographicalRegions package and referenced packages is depicted in Figure 3 above. Basically, the Bio-geographicalRegion spatial object type refers to the package Base Types of the General Conceptual Model to include an Identifier.

The complete application schema for Bio-geographical Regions is shown in Figure 4 and described in detail below.

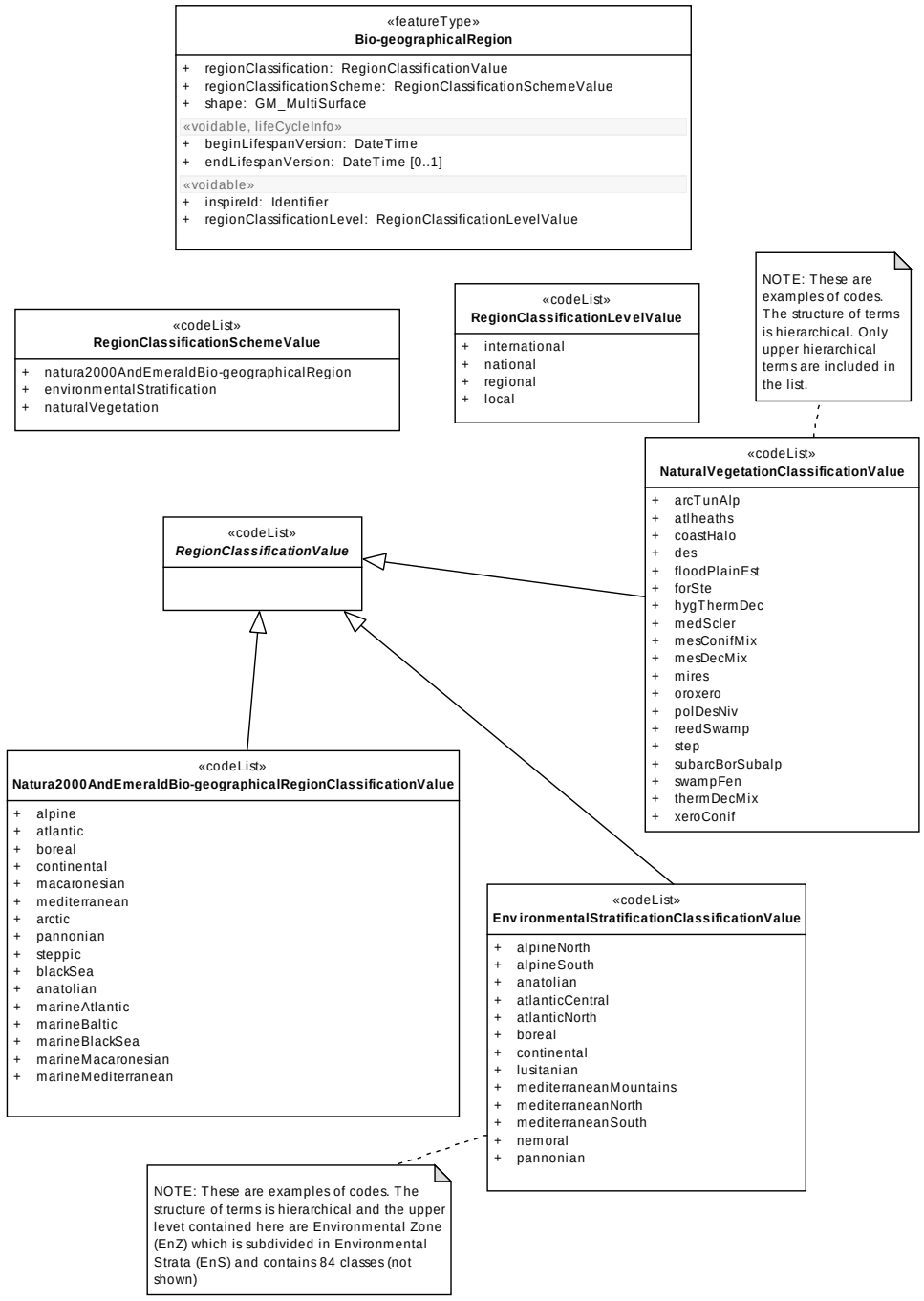

Figure 4 – UML class diagram: Overview of the *Bio-geographical Regions* application schema

Bio-geographicalRegion is the only single spatial object type included in the application schema and represents any type of bio-geographical region. Since bio-geographical regions can consist of polygons or multi-part polygons, their geometric representation is expressed by GM_Multisurface type. Each single bio-geographical region (i.e. instance of the *Bio-geographicalRegion* spatial object type) is described by a bio-geographical classification. The classification system is specified by three attributes: information on the classification scheme and the classification value that is applicable to the instance is provided by two mandatory attributes respectively called *regionClassificationScheme* and *regionClassification*. Values for these attributes can be selected from a codelist. A third voidable attribute *regionClassificationLevel* has been defined to document the level of the classification system. Potential values for this level are: international, national, regional or local. Many different classification systems exist at different levels; the current application schema only includes information on the

classification scheme and corresponding values of 3 European Classification systems, but the schema may be extended to include other classification systems via the codelist mechanism:

- Natura2000 and Emerald Bio-Geographical Regions
  The Natura2000 and Emerald Bio-geographical Regions as outlined in respectively the Habitats Directive and the Bern Convention are reporting units that support the process of nature conservation, and more specifically the conservation of species and habitat types under similar natural conditions across a suite of countries, irrespective of political and administrative boundaries. These biogeographical regions are terrestrial in order to create a similar unit that can be used for assessment etc 5 marine regions, based on the European marine conventions, have been added. Unlike the terrestrial bio-geographical regions, these marine regions do not have a legal basis.
- Environmental Stratification of Europe
  The Environmental Zones of Europe are derived from the Environmental Stratification of Europe (see Metzger et al 2005 and Jongman et al 2005). The stratification is based on climate data, data on the ocean influence and geographical position.
- Natural Vegetation of Europe
  The codes for Natural Vegetation in Europe are derived from the map of Natural Vegetation of Europe (Bohn et al 2000).

A detailed feature catalogue is included later in this section.

5.2.1.3. Consistency between spatial data sets

It is worth noting that Bio-geographical regions are derived features, being based on more detailed work and being modified to make them easier to use at different scales. For instance the Natura2000 and Emerald Bio-geographical Regions as outlined in the Habitats Directive and the Bern Convention are derived from an interpretation of the digital version of the 'Map of Natural Vegetation of the member countries of the European Community and of the Council of Europe' (Noirfalise A., 1987) and the regions have been modified to make them easier to use administratively no subclasses.

Currently, there are no other consistency rules than those defined within the application schema and no consistency rules between Bio-geographical regions and other spatial datasets has been identified.

5.2.1.4. Identifier management

The Bio-geographical regions data specification specifies an optional *inspireId*. This identifier shall, if provided, be maintained by the national or regional authority. The identifier shall consist of two parts: the namespace and a local id (see also the Generic Conceptual Model [DS-D2.5]).

5.2.1.5. Modelling of object references

Open issue 3: The relationships to external themes are not specified for version 2.0 of the specification. It is still an open issue how (and if) this will be done (is required).

5.2.1.6. Geometry representation

IR Requirement 3	The value domain of spatial properties used in this specification shall be restricted to the Simple Feature spatial schema as defined by EN ISO 19125-1.

NOTE The specification restricts the spatial schema to 0-, 1-, 2-, and 2.5-dimensional geometries where all curve interpolations are linear.

NOTE The topological relations of two spatial objects based on their specific geometry and topology properties can in principle be investigated by invoking the operations of the types defined in ISO 19107 (or the methods specified in EN ISO 19125-1).

5.2.1.7. Temporality representation

The application schema(s) use(s) the derived attributes "beginLifespanObject" and "endLifespanObject" to record the lifespan of a spatial object.

The attributes "beginLifespanVersion" specifies the date and time at which this version of the spatial object was inserted or changed in the spatial data set. The attribute "endLifespanVersion" specifies the date and time at which this version of the spatial object was superseded or retired in the spatial data set.

NOTE 1 The attributes specify the beginning of the lifespan of the version in the spatial data set itself, which is different from the temporal characteristics of the real-world phenomenon described by the spatial object. This lifespan information, if available, supports mainly two requirements: First, knowledge about the spatial data set content at a specific time; second, knowledge about changes to a data set in a specific time frame. The lifespan information should be as detailed as in the data set (i.e., if the lifespan information in the data set includes seconds, the seconds should be represented in data published in INSPIRE) and include time zone information.

NOTE 2 Changes to the attribute "endLifespanVersion" does not trigger a change in the attribute "beginLifespanVersion".

Recommendation 2 If life-cycle information is not maintained as part of the spatial data set, all spatial objects belonging to this data set should provide a void value with a reason of "unpopulated".

5.2.2 Feature catalogue

Table 3 - Feature catalogue metadata

Feature catalogue name	INSPIRE feature catalogue Bio-geographicalRegions
Scope	Bio-geographicalRegions
Version number	2.0
Version date	2011-06-14
Definition source	INSPIRE data specification Bio-geographicalRegions

Table 4 - Types defined in the feature catalogue

Type	Package	Stereotypes	Section
Bio-geographicalRegion	Bio-geographicalRegions	«featureType»	5.2.2.1.1
EnvironmentalStratificationClassificationValue	Bio-geographicalRegions	«codeList»	5.2.2.2.1
Natura2000AndEmeraldBio-geographicalRegionClassificationValue	Bio-geographicalRegions	«codeList»	5.2.2.2.2
NaturalVegetationClassificationValue	Bio-geographicalRegions	«codeList»	5.2.2.2.3
RegionClassificationLevelValue	Bio-geographicalRegions	«codeList»	5.2.2.2.4
RegionClassificationSchemeValue	Bio-geographicalRegions	«codeList»	5.2.2.2.5
RegionClassificationValue	Bio-geographicalRegions	«codeList»	5.2.2.2.6

5.2.2.1. Spatial object types

5.2.2.1.1. Bio-geographicalRegion

Bio-geographicalRegion	
Definition:	An area of relatively homogeneous ecological conditions with common characteristics.
Description:	EXAMPLE Europe is divided into eleven broad bio-geographical terrestrial zones and 5 zones for marine bio-geographical regions. NOTE The marine regions are used in the context of Natura2000 due to practical / technical reasons only; they do not have any legal status in contrast to the "terrestrial" Biogeographic Regions.
Status:	Proposed
Stereotypes:	«featureType»
URI:	null

Attribute: beginLifespanVersion	
Value type:	DateTime
Definition:	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.
Multiplicity:	1
Stereotypes:	«voidable,lifeCycleInfo»

Attribute: endLifespanVersion	
Value type:	DateTime
Definition:	Date and time at which this version of the spatial object was superseded or retired in the spatial data set.
Multiplicity:	0..1
Stereotypes:	«voidable,lifeCycleInfo»

Attribute: inspireId	
Value type:	Identifier
Definition:	External object identifier of the spatial object.
Description:	An external object identifier is a unique object identifier published by the responsible body, which may be used by external applications to reference the spatial object. The identifier is an identifier of the spatial object, not an identifier of the real-world phenomenon.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: regionClassification	
Value type:	RegionClassificationValue
Definition:	Regionclass code, according to a classification scheme.
Multiplicity:	1

Attribute: regionClassificationLevel	
Value type:	RegionClassificationLevelValue
Definition:	The classification level of the region class.
Multiplicity:	1
Stereotypes:	«voidable»

Attribute: regionClassificationScheme	
Value type:	RegionClassificationSchemeValue
Definition:	Classification scheme used for classifying regions.
Multiplicity:	1

Bio-geographicalRegion	
Attribute: shape	
Value type:	GM_MultiSurface
Definition:	The geometry defining the ecological region.
Multiplicity:	1

5.2.2.2. Code lists

5.2.2.2.1. EnvironmentalStratificationClassificationValue

EnvironmentalStratificationClassificationValue	
Subtype of:	RegionClassificationValue
Definition:	Climatic stratification of the Environment of Europe.
Description:	Based on environmental variables (climate, geomorphology, oceanicity and northing) using a Principal component analysis and ISODATA clustering routine. The Environmental Stratification of Europe (EnS) consists of 84 Strata, which have been aggregated to 13 Environmental Zones with a spatial resolution of 1 km². NOTE This stratification is after Metzger et al. 2005.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	http://inspire-registry.jrc.ec.europa.eu/registers/CLR/EnvironmentalStratificationClassificationValue
Value: alpineNorth	
Definition:	The mountains and uplands of western Scandinavia together with the narrow coastal plain.
Description:	The Zone has been heavily glaciated typified not only by deep U-shaped valleys but also by the indented fjord coastline. Much of the land surface is covered by glacial deposits of various types. The climate of the western scarp is oceanic because of the influence of the Gulf Stream and becomes progressively continental further east. The severe temperature regime and terrain constraints restrict modern agriculture to the coastal fringe, but extensive grazing is also present elsewhere, although often in decline. The land cover is dominated by arctic tundra in the north, arctic-alpine grasslands and in the higher mountains and extensive dwarf and low heaths elsewhere. The decline in grazing is leading to widespread colonisation by forest adding to the extensive existing coniferous forests of spruce and pine as well as birch.
Value: alpineSouth	
Definition:	The high, medium and low mountains of Central Europe.
Description:	Mostly belonging to the main Alpine orogenic belt as well as minor ranges. Deep U-shaped glaciated valleys dissect the peaks, which are sufficiently high in the Alps to have glaciers but even elsewhere may have long snow cover. Crops are therefore restricted to the valleys where there are also extensive urban areas and fertile pastures. The mountain slopes are covered by coniferous forests of spruce and larch, as well as various types of deciduous forest on the more fertile soils. The former are used for forestry and the latter are mainly for protection. Above the tree line there are extensively managed grasslands and various types of alpine heaths depending on altitude and soil type. EXAMPLE The Carpathians, Pyrenees, Alps, the Massif Central, Picos de Europa and Tatra.
Value: anatolian	
Definition:	Environmental zone comprising the following regions: 1 West Anatolia (Turkey); 2 Central Anatolia (Turkey).

EnvironmentalStratificationClassificationValue

Value: atlanticCentral

Definition: The south west and south of the British Isles, Northern France and the Low countries.

Description: The land consists mainly of lowlands with level or undulating terrain according to geology, but also has some uplands in the west and south. The climate is typically strongly oceanic in the west, with cool wet winters and mild moist summers, but becomes more continental in the east. Arable agriculture dominates through much of the Zone, but there are also fertile and extensive grasslands in the west and in the uplands that have associated grazing systems. Some low heaths are also present in the west, but were originally more widespread. Deciduous forests are present locally on shallow soils as well as some coniferous plantations, mainly pine. Many major conurbations are present throughout the Zone.

Value: atlanticNorth

Definition: The uplands and low mountains in central and northern Britain, Northern Ireland, and the west coast of Norway as well as the coastal plains. The lowlands of Denmark and north west Germany are also in the Zone.

Description: There is a contrast between the glaciated landscapes of the north and west of the Zone and the deposition features present in the south and east. The climate is strongly oceanic in the west with typical mild wet winters and moist cool summers, but becomes more continental in the east. Crops can be grown throughout zone except in the north and west where they are restricted to the lowlands. As a result the southern strata of the Zone are dominated by arable land whereas the northern have various types of grassland enterprise such as dairy and sheep. The former strata also have much urban land cover. Low heaths and bogs are widespread in the mountains, but have now largely disappeared in the lowlands. In the British uplands there are extensive plantations of spruce, but otherwise the forest cover is mostly deciduous.

Value: boreal

Definition: The eastern slopes of the Scandinavian mountains, as well as the undulating plains and lowlands of the northern and eastern Baltic.

Description: The Zone has been heavily glaciated which resulted in the deposition of many residual features such as moraines and eskers. The climate is continental, with a large annual temperature range. The severe temperature restricts crop production to the extreme south, but fertile grasslands are present further north. The land is dominated by coniferous forests of spruce and pine often mixed with birch and aspen, utilised by a major forest industry. There is also an extensive cover of bog types, as well as dwarf and low heaths at higher altitudes which are often grazed by reindeer. There are many wetlands and lakes, especially in Finland.

Value: continental

Definition: The plains and lowlands of Central and Eastern Europe and the Balkans as well as some of the lower hills on the margin of ALS.

Description: The geology and soils are variable and cause much of the variation in land cover. The climate is continental, with large annual temperature ranges and precipitation concentrated the summer months. The continental character is more pronounced in the east than in the extreme west of the Zone. Crops and fertile grassland and associated agricultural enterprises are dominant in much of the Zone. Extensive forests are present locally on shallow and poor soils, with beech and planted spruce and pine widespread and most areas being managed for timber production. Major urban areas are present throughout the Zone, which also has major river systems.

Value: lusitanian

EnvironmentalStratificationClassificationValue

Definition: The coastal plain and low hills of west and south west France, as well as northern Spain and Portugal.

Description: The climate is warm and wet, with precipitation concentrated in the winter months. The long growing seasons and high water availability means that the widespread fertile grasslands can be cut several times in the year. Crops are locally important on better soils, and vineyards are also important throughout the Zone. There is a major pine forest in the Landes in France, with further extensive pine and Eucalypt plantations on former heathlands. Native woodlands are restricted in cover and the heathlands are now fragmented. The coastal plain is heavily urbanised.

Value: mediterraneanMountains

Definition: The low- and medium high mountains in the northern Mediterranean.

Description: Around the margins of the main mountain ranges such as the Pyrenees and Alps as well as includes the low- and medium height mountains in the northern Mediterranean around the margins of the main ranges such as the Pyrenees and Alps as well as high mountains in the south. The climate is Mediterranean, with warm summers and precipitation concentrated in the winter months, with more precipitation than elsewhere in the Mediterranean. Poor soils and difficult terrain restrict crop production over much of the Zone, but together with vineyards, these are still locally important. Extensive grasslands are still widespread and used for cattle and sheep grazing, but overall these are in decline, with subsequent scrub invasion, especially of broom and *Cistus* species. There are some alpine grassland on the highest mountains and locally extensive deciduous and coniferous forests, sometimes planted.

Value: mediterraneanNorth

Definition: The lowlands of the northern and central Mediterranean, but also hills and low mountains further south.

Description: The topography is diverse and includes coastal plains, plateaus with isolated mountains, foothills and mountain valleys. The climate is Mediterranean, with warm and dry summers and precipitation concentrated in the winter months. Crop production is constrained by water availability, and permanent irrigation is locally important to increase productivity. Vineyards are important throughout the Zone and olives are also grown in the south. Orchards are also locally important as are grasslands in agricultural use, although these are often in decline. Various scrub formations are therefore widespread and increasing in cover, as well as evergreen and pine forests. There are many major conurbations in the Zone and the coastal belt especially is highly urbanised.

Value: mediterraneanSouth

Definition: Plains and uplands in the southern Mediterranean and some lowlands in northern Spain and the Rhone delta in France.

Description: The topography is diverse and includes coastal plains, plateaus with isolated mountains, foothills and mountain valleys. The climate is Mediterranean, with hot and dry summer and maximum of precipitations in winter. Water availability restricts crop production, but arable land is still widespread and yields often increased by permanent irrigation and plastic greenhouses. Vineyards and olive groves are an important land cover throughout the Zone. Grazing of extensive grasslands is in decline with widespread scrub invasion adding to the existing extensive cover. Dehesas and Montados are also important, especially in Spain and Portugal. Otherwise forest cover is restricted because of long over-exploitation, but pine forests are important locally. The coastal belt is highly urbanised.

Value: nemoral

EnvironmentalStratificationClassificationValue	
Definition:	The lowlands and undulating plains of the southern and eastern Baltic to a variable extent inland and extending in the west to the North Sea coast.
Description:	The Zone has been heavily glaciated which has resulted in the deposition of many surface features such as moraines and eskers. The climate is continental and cool, but suitable for crop production on the better soils, although abandonment is taking place in marginal regions. Whilst managed grasslands are widespread, the land is mainly covered by coniferous forest of pine and spruce often mixed with birch and aspen, utilised by a major forest industry. Bogs and large floodplain marshes are present throughout the Zone, but especially in the east.
Value: pannonian	
Definition:	The plains, valleys and mountain fringes in the middle and the lower Danube basin, the Black Sea lowlands and a small outlier in the central Rhine valley.
Description:	The warm continental climate has a steppic character and the concentration of precipitation in early summer can lead to water shortages. Much of the land is relatively flat, but there are some low hills and differences in geology causing regional variations. Arable agriculture dominates throughout the Zone and is converted from the original steppic grasslands, which now only remain usually in small patches. Forest cover, although locally important, is restricted in extent. There are some large lakes and major river systems.

5.2.2.2.2. Natura2000AndEmeraldBio-geographicalRegionClassificationValue

Natura2000AndEmeraldBio-geographicalRegionClassificationValue	
Subtype of:	RegionClassificationValue
Definition:	A set of codes to be used for the bio-geographic region classification.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	http://inspire-registry.jrc.ec.europa.eu/registers/CLR/Natura2000AndEmeraldBio-geographicalRegionClassificationValue
Value: alpine	
Definition:	The Alpine biogeographical region consists of several important mountain chains. They comprise the Alps which stretch over France, Italy, Germany, Austria, Slovenia and the non EU countries of Switzerland and Monaco, the Apennines that run down the spine of Italy, the Pyrenees on the border between Spain and France, the Scandes which straddle Sweden, Finland and Norway and the Carpathians that extend well beyond the EU frontiers of Slovakia and Poland into Romania and Ukraine.
Value: anatolian	
Definition:	The region corresponds to the interior and eastern part of the Anatolian peninsula, having no contact with the Black Sea or the Mediterranean. The region extends over three different geographical areas: the central Anatolian Plateau, the east Anatolian mountain range and the northern Mesopotamia.
Value: arctic	
Definition:	Arctic biogeographical region as defined by the European Commission and the Council of Europe for evaluation and reporting on nature conservation. It includes Iceland, northern Norway, the northern Kola Peninsula, the north-west Russian Federation and islands further north, such as Svalbard, Franz Joseph Land and Novaya Zemlya.
Value: atlantic	

Natura2000AndEmeraldBio-geographicalRegionClassificationValue	
Definition:	The Atlantic region stretches from the top of the United Kingdom and Ireland down to the northern shores of Spain and Portugal, encompassing all of the Netherlands and parts of Germany, Denmark, Belgium and France and Norway along the way.
Value: blackSea	
Definition:	The Black Sea Region runs anticlockwise around the Black Sea from Romania and Bulgaria, through northern Turkey and onto Georgia. Within the European Union, the region is no more than a thin coastal strip some 20–60 km wide that runs down almost the entire length of Romania and Bulgaria.
Value: boreal	
Definition:	Comprises parts of the territory of Finland, Sweden and Lithuania and the territory of Estonia and Latvia.The Boreal region in Europe is part of a large zone dominated by coniferous forests, which circles the northern hemisphere in Europe, Asia and North America.
Value: continental	
Definition:	The Continental region covers over a quarter of the European Union and extends in a broad band from west to east, starting in central France and continuing to the eastern edge of Poland. Outside the EU it stretches to the Ural mountains, on the border with Asia. In the south, the region is almost split in two by the high mountain ranges of the Alpine zone and the steppic plains of the Pannonian region. Parts of the Adriatic and Baltic coastlines are also included. Altogether 11 EU countries have all or part of their territory in the Continental region.
Value: macaronesian	
Definition:	The Macaronesian biogeographical region is comprised of volcanic islands in the Atlantic Ocean and includes the archipelagos of the Azores, Madeira and the Canary Islands.
Value: marineAtlantic	
Definition:	The entire extent of marine waters covered by the sovereignty or jurisdiction of Ireland, the United Kingdom, the Netherlands, belgium, and the portions of thewaters of Denmark, Germany, Portugal, Spain Sweden that occur within the geographical entity that is the North Atlantic Ocean (excluding the waters around the Macaronesian biogeographical region: that is the waters surrounding the Azores, Maderia (PT) and Canary Islands (ES)).
Value: marineBaltic	
Definition:	The entire extent of marine waters covered by the sovereignty or jurisdiction of Estonia, Finland ,Latvia, Lithuania and Poland and the portions of these waters of Denmark, Germany and Sweden that occur within the geographical entity that is the Baltic Sea.
Value: marineBlackSea	
Definition:	The entire extent of marine waters covered by the sovereignty or jurisdiction of Bulgaria and Romania.
Value: marineMacaronesian	
Definition:	The waters surrounding the Macaronesian biogeographical region: that is the waters surrounding the Azores, Maderia (PT) and Canary Islands (ES).
Value: marineMediterranean	
Definition:	The entire extent of marine waters covered by the sovereignty or jurisdiction of Member States and the portions of these waters of France and Spainthat occur within the geographical entity that is the Mediterranean Sea.

Natura2000AndEmeraldBio-geographicalRegionClassificationValue	
Value: mediterranean	
Definition:	The Mediterranean basin stretches c.3, 800 km east to west from the tip of Portugal to the shores of Lebanon and c.1, 000 km north to south from Italy to Morocco and Libya. Within the European Union, the Mediterranean Region encompasses seven Member States either partially (France, Portugal, Italy, Spain) or completely (Greece, Malta, Cyprus).
Value: pannonian	
Definition:	The Pannonian Region is dominated by a large flat alluvial basin that is transected from north to south by two major rivers – the Danube and Tisza. Once an ancient inland sea, the basin is almost completely enclosed on all sides by low-lying hills and mountains. To the north and east lie the Carpathians, to the west the Alps and, to the south, the Dinarics. All of Hungary is included in the Pannonian Region as are peripheral areas of Slovakia, the Czech Republic and Romania within the EU, as well as Serbia, Croatia and the Ukraine outside the EU.
Value: steppic	
Definition:	Within the EU, the Steppic Region is found only in one Member State: Romania. Beyond the EU it develops into a vast band of vegetation that stretches out over southern Moldova, Ukraine, Russia and western Kazakhstan. It eventually continues all the way across Asia to the foothills to the Altai Mountains on the borders of Mongolia.

5.2.2.2.3. NaturalVegetationClassificationValue

NaturalVegetationClassificationValue	
Subtype of:	RegionClassificationValue
Definition:	Values for the natural vegetation classification.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	http://inspire-registry.jrc.ec.europa.eu/registers/CLR/NaturalVegetationClassificationValue
Value: arcTunAlp	
Definition:	Arctic tundras and alpine vegetation.
Value: atlheaths	
Definition:	Atlantic dwarf shrub heaths.
Value: coastHalo	
Definition:	Coastal vegetation and inland halophytic vegetation.
Value: des	
Definition:	Deserts.
Value: floodPlainEst	
Definition:	Vegetation of flood-plains, estuaries and fresh-water polders and other moist or wet sites.
Value: forSte	
Definition:	Forest steppes (meadow steppes alternating with deciduous broad-leaved forests) and dry grasslands alternating with xerophytic scrub.
Value: hygThermDec	

NaturalVegetationClassificationValue	
Definition:	Hygro-thermophilous mixed deciduous broad-leaved forests.
Value: medScler	
Definition:	Mediterranean sclerophyllous forests and scrub.
Value: mesConifMix	
Definition:	Mesophytic and hygromesophytic coniferous and mixed broad-leaved-coniferous forests.
Value: mesDecMix	
Definition:	Mesophytic deciduous broad-leaved and mixed coniferous-broad-leaved forests.
Value: mires	
Definition:	Mires.
Value: oroxero	
Definition:	Oroxerophytic vegetation (thorn-cushion communities, tomillares, mountain steppes, partly scrub).
Value: polDesNiv	
Definition:	Polar deserts and subnival-nival vegetation of high mountains.
Value: reedSwamp	
Definition:	Tall reed vegetation and tall sedge swamps, aquatic vegetation.
Value: step	
Definition:	Steppes.
Value: subarcBorSubalp	
Definition:	Subarctic, boreal and nemoral-montane open woodlands as well as subalpine and oro-Mediterranean vegetation.
Value: swampFen	
Definition:	Swamp and fen forests.
Value: thermDecMix	
Definition:	Thermophilous mixed deciduous broad-leaved forests.
Value: xeroConif	
Definition:	Xerophytic coniferous forests, woodlands and scrub.

5.2.2.2.4. RegionClassificationLevelValue

RegionClassificationLevelValue	
Definition:	A set of codes to define the classification level of the region class.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May not be extended by Member States.
URI:	
Value: international	
Definition:	This is a region classification on the international level.
Value: local	
Definition:	This is a region classification on the local level.
Value: national	

RegionClassificationLevelValue	
Definition:	This is a region classification on the national level.
Value: regional	
Definition:	This is a region classification on the regional level.

5.2.2.2.5. RegionClassificationSchemeValue

RegionClassificationSchemeValue	
Definition:	A set of code lists to be used to define the different biogeographical regions.
Status:	Proposed
Stereotypes:	«codeList»
Governance:	May be extended by Member States.
URI:	
Value: environmentalStratification	
Definition:	A set of code lists to be used to define the Environmental Stratification.
Value: natura2000AndEmeraldBio-geographicalRegion	
Definition:	A set of code lists to be used to define the Natura 2000 and Emerald network Biogeographical regions.
Value: naturalVegetation	
Definition:	A set of code lists to be used to define the natural vegetation.

5.2.2.2.6. RegionClassificationValue

RegionClassificationValue (abstract)	
Definition:	A set of code lists used to define the different biogeographical regions
Status:	Proposed
Stereotypes:	«codeList»
URI:	null

5.2.2.3. Imported types (informative)

This section lists definitions for feature types, data types and enumerations and code lists that are defined in other application schemas. The section is purely informative and should help the reader understand the feature catalogue presented in the previous sections. For the normative documentation of these types, see the given references.

5.2.2.3.1. DateTime

DateTime	
Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19103:2005 Schema Language::Basic Types::Primitive::Date and Time [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.2.2.3.2. GM_MultiSurface

GM_MultiSurface	
Package:	INSPIRE Consolidated UML Model::Foundation Schemas::ISO TC211::ISO 19107:2003 Spatial Schema:: Geometry::Geometric aggregates [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

5.2.2.3.3. Identifier

Identifier	
Package:	INSPIRE Consolidated UML Model::Generic Conceptual Model::Base Types [Include reference to the document that includes the package, e.g. INSPIRE data specification, ISO standard or the GCM]

Identifier	
Definition:	External unique object identifier published by the responsible body, which may be used by external applications to reference the spatial object.
Description:	NOTE1 External object identifiers are distinct from thematic object identifiers. NOTE 2 The voidable version identifier attribute is not part of the unique identifier of a spatial object and may be used to distinguish two versions of the same spatial object. NOTE 3 The unique identifier will not change during the life-time of a spatial object.

6 Reference systems

6.1 Coordinate reference systems

6.1.1 Datum

IR Requirement 4 For the coordinate reference systems used for making available the INSPIRE spatial data sets, the datum shall be the datum of the European Terrestrial Reference System 1989 (ETRS89) in areas within its geographical scope, and the datum of the International Terrestrial Reference System (ITRS) or other geodetic coordinate reference systems compliant with ITRS in areas that are outside the geographical scope of ETRS89. Compliant with the ITRS means that the system definition is based on the definition of the ITRS and there is a well established and described relationship between both systems, according to EN ISO 19111.

6.1.2 Coordinate reference systems

IR Requirement 5 INSPIRE spatial data sets shall be made available using one of the three-dimensional, two-dimensional or compound coordinate reference systems specified in the list below.

Other coordinate reference systems than those listed below may only be used for regions outside of continental Europe. The geodetic codes and parameters for these coordinate reference systems shall be documented, and an identifier shall be created, according to EN ISO 19111 and ISO 19127.

1. Three-dimensional Coordinate Reference Systems
   - Three-dimensional Cartesian coordinates
   - Three-dimensional geodetic coordinates (latitude, longitude and ellipsoidal height), using the parameters of the GRS80 ellipsoid

2. Two-dimensional Coordinate Reference Systems
   - Two-dimensional geodetic coordinates, using the parameters of the GRS80 ellipsoid
   - Plane coordinates using the Lambert Azimuthal Equal Area projection and the parameters of the GRS80 ellipsoid
   - Plane coordinates using the Lambert Conformal Conic projection and the parameters of the GRS80 ellipsoid
   - Plane coordinates using the Transverse Mercator projection and the parameters of the GRS80 ellipsoid

3. Compound Coordinate Reference Systems
   - For the horizontal component of the compound coordinate reference system, one of the two-dimensional coordinate reference systems specified above shall be used
   - For the vertical component on land, the European Vertical Reference System (EVRS) shall be used to express gravity-related heights within its geographical scope
   - Other vertical reference systems related to the Earth gravity field shall be used to express gravity-related heights in areas that are outside the geographical scope of EVRS. The geodetic codes and parameters for these vertical reference systems shall be documented and an identifier shall be created, according to EN ISO 19111 and ISO 19127
   - For the vertical component measuring the depth of the sea floor, where there is an appreciable tidal range, the Lowest Astronomical Tide shall be used as reference surface. In marine areas without an appreciable tidal range, in open oceans and effectively in waters that are deeper than 200 m, the depth of the sea floor shall be referenced to the Mean Sea Level
   - For the vertical component measuring depths above the sea floor in the free ocean, barometric pressure shall be used
   - For the vertical component in the free atmosphere, barometric pressure, converted to height using ISO 2533:1975 International Standard Atmosphere shall be used

6.1.3 Display

IR Requirement 6 For the display of the INSPIRE spatial data sets with the View Service specified in D003152/02 Draft Commission Regulation implementing Directive 2007/2/EC of the European Parliament and of the Council as regards Network Services, at least the two dimensional geodetic coordinate system shall be made available.

6.1.4 Identifiers for coordinate reference systems

IR Requirement 7 For referring to the non-compound coordinate reference systems listed in this Section, the identifiers listed below shall be used.

For referring to a compound coordinate reference system, an identifier composed of the identifier of the horizontal component, followed by a slash (/), followed by the identifier of the vertical component, shall be used.

- ETRS89-XYZ for Cartesian coordinates in ETRS89
- ETRS89-GRS80h for three-dimensional geodetic coordinates in ETRS89 on the GRS80 ellipsoid
- ETRS89-GRS80 for two-dimensional geodetic coordinates in ETRS89 on the GRS80
- EVRS for height in EVRS
- LAT for depth of the sea floor, where there is an appreciable tidal range
- MSL for depth of the sea floor, in marine areas without an appreciable tidal range, in open oceans and effectively in waters that are deeper than 200m
- ISA for pressure coordinate in the free atmosphere
- PFO for Pressure coordinate in the free ocean
- ETRS89-LAEA for ETRS89 coordinates projected into plane coordinates by the Lambert Azimuthal Equal Area projection

- ETRS89-LCC for ETRS89 coordinates projected into plane coordinates by the Lambert Conformal Conic projection
- ETRS89-TMzn for ETRS89 coordinates projected into plane coordinates by the Transverse Mercator projection

6.2 Temporal reference system

IR Requirement 8 The Gregorian Calendar shall be used for as a reference system for date values, and the Universal Time Coordinated (UTC) or the local time including the time zone as an offset from UTC shall be used as a reference system for time values.

6.3 Theme-specific requirements and recommendations on reference systems

There are no theme-specific requirements or recommendations on reference systems.

7 Data quality

This chapter includes a description of data quality elements and sub-elements as well as the associated data quality measures (section 7.1). The selected data quality measures should be used to evaluate quality of data sets for a specific data quality element / sub-element. The evaluation can be performed at the level of spatial object, spatial object type, dataset or dataset series.

The results of the evaluation are then reported at the spatial object type or dataset level in metadata utilising the same data quality elements and measures (see chapter 8).

NOTE The selection of appropriate data quality measures represents the first step towards the harmonisation of documenting data quality.

In addition, for some of the data quality elements described in section 7.1, minimum data quality requirements or recommendations may be defined. These are described in the section 1.2.

Recommendation 1 If data quality information is required at spatial object level then it should be modelled in the data model as an attribute of a relevant spatial object type.

7.1 Data quality elements and measures

No data quality elements for quantitative evaluation are defined for this theme.

Open issue 4: Data quality requirements based on real use cases

In case stakeholders participating on consultation & testing will identify via comments requirements for data quality and related measures based on real use cases these can be introduced for ver. 03 of this Data specification.

7.2 Minimum data quality requirements and recommendations

No minimum data quality requirements are defined.

8 Dataset-level metadata

Metadata can be reported for each individual spatial object (spatial object-level metadata) or once for a complete dataset or dataset series (dataset-level metadata). Spatial object-level metadata is fully described in the application schema (section **5**). If data quality elements are used at spatial object level, the documentation shall refer to the appropriate definition in section 7. This section only specifies dataset-level metadata elements.

For some dataset-level metadata elements, in particular on data quality and maintenance, a more specific scope can be specified. This allows the definition of metadata at sub-dataset level, e.g. separately for each spatial object type. When using ISO 19115/19139 to encode the metadata, the following rules should be followed:

- The scope element (of type DQ_Scope) of the DQ_DataQuality subtype should be used to encode the scope.
- Only the following values should be used for the level element of DQ_Scope: Series, Dataset, featureType.
- If the level is featureType the levelDescription/MDScopeDescription/features element (of type Set< GF_FeatureType>) shall be used to list the feature type names.

NOTEThe value featureType is used to denote spatial object type.

Mandatory or conditional metadata elements are specified in Section 8.1. Optional metadata elements are specified in Section 8. The tables describing the metadata elements contain the following information:

- The first column provides a reference to a more detailed description.
- The second column specifies the name of the metadata element.
- The third column specifies the multiplicity.
- The fourth column specifies the condition, under which the given element becomes mandatory (only for Table 2 and Table 3).

8.1 Common metadata elements

IR Requirement 9	The metadata describing a spatial data set or a spatial data set series related to the theme **Bio-geographical Regions** shall comprise the metadata elements required by Regulation 1205/2008/EC (implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata) for spatial datasets and spatial dataset series (Table 2) as well as the metadata elements specified in Table 3.

Table 2 – Metadata for spatial datasets and spatial dataset series specified in Regulation 1205/2008/EC (implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata)

Metadata Regulation Section	**Metadata element**	**Multiplicity**	**Condition**
1.1	Resource title	1	
1.2	Resource abstract	1	
1.3	Resource type	1	
1.4	Resource locator	0..*	Mandatory if a URL is available to obtain more information on the resource, and/or access related services.
1.5	Unique resource identifier	1..*	
1.7	Resource language	0..*	Mandatory if the resource includes textual information.
2.1	Topic category	1..*	
3	Keyword	1..*	
4.1	Geographic bounding box	1..*	
5	Temporal reference	1..*	
6.1	Lineage	1	
6.2	Spatial resolution	0..*	Mandatory for data sets and data set series if an equivalent scale or a resolution distance can be specified.
7	Conformity	1..*	
8.1	Conditions for access and use	1..*	
8.2	Limitations on public access	1..*	
9	Responsible organisation	1..*	
10.1	Metadata point of contact	1..*	
10.2	Metadata date	1	
10.3	Metadata language	1	

Table 3 – Mandatory and conditional common metadata elements

INSPIRE Data Specification Bio-geographical Regions **Section**	**Metadata element**	**Multiplicity**	**Condition**
8.1.1	Coordinate Reference System	1	

8.1.2	Temporal Reference System	0..*	Mandatory, if the spatial data set or one of its feature types contains temporal information that does not refer to the Gregorian Calendar or the Coordinated Universal Time.
8.1.3	Encoding	1..*	
8.1.4	Character Encoding	0..*	Mandatory, if an encoding is used that is not based on UTF-8.
8.1.5	Data Quality – Logical Consistency – Topological Consistency	0..*	Mandatory, if the data set includes types from the Generic Network Model and does not assure centreline topology (connectivity of centrelines) for the network.

8.1.1 Coordinate Reference System

Metadata element name	**Coordinate Reference System**
Definition	Description of the coordinate reference system used in the dataset.
ISO 19115 number and name	13. referenceSystemInfo
ISO/TS 19139 path	referenceSystemInfo
INSPIRE obligation / condition	mandatory
INSPIRE multiplicity	1
Data type(and ISO 19115 no.)	189. MD_CRS
Domain	Either the referenceSystemIdentifier (RS_Identifier) or the projection (RS_Identifier), ellipsoid (RS_Identifier) and datum (RS_Identifier) properties shall be provided. NOTE More specific instructions, in particular on pre-defined values for filling the referenceSystemIdentifier attribute should be agreed among Member States during the implementation phase to support interoperability.
Implementing instructions	
Example	referenceSystemIdentifier: code: ETRS_89 codeSpace: INSPIRE RS registry
Example XML encoding	<gmd:referenceSystemInfo> <gmd:MD_ReferenceSystem> <gmd:referenceSystemIdentifier> <gmd:RS_Identifier> <gmd:code> <gco:CharacterString>ETRS89 </gco:CharacterString> </gmd:code> <gmd:codeSpace> <gco:CharacterString>INSPIRE RS registry</gco:CharacterString> </gmd:codeSpace> </gmd:RS_Identifier> </gmd:referenceSystemIdentifier> </gmd:MD_ReferenceSystem> </gmd:referenceSystemInfo>
Comments	

8.1.2 Temporal Reference System

Metadata element name	**Temporal Reference System**
Definition	Description of the temporal reference systems used in the dataset.
ISO 19115 number and name	13. referenceSystemInfo
ISO/TS 19139 path	referenceSystemInfo
INSPIRE obligation / condition	Mandatory, if the spatial data set or one of its feature types contains temporal information that does not refer to the Gregorian Calendar or the Coordinated Universal Time.
INSPIRE multiplicity	0..*
Data type(and ISO 19115 no.)	186. MD_ReferenceSystem
Domain	No specific type is defined in ISO 19115 for temporal reference systems. Thus, the generic MD_ReferenceSystem element and its reference SystemIdentifier (RS_Identifier) property shall be provided. NOTEMore specific instructions, in particular on pre-defined values for filling the referenceSystemIdentifier attribute should be agreed among Member States during the implementation phase to support interoperability.
Implementing instructions	
Example	referenceSystemIdentifier: code: GregorianCalendar codeSpace: INSPIRE RS registry
Example XML encoding	<gmd:referenceSystemInfo> <gmd:MD_ReferenceSystem> <gmd:referenceSystemIdentifier> <gmd:RS_Identifier> <gmd:code> <gco:CharacterString>GregorianCalendar</gco:CharacterString> </gmd:code> <gmd:codeSpace> <gco:CharacterString>INSPIRE RS registry</gco:CharacterString> </gmd:codeSpace> </gmd:RS_Identifier> </gmd:referenceSystemIdentifier> </gmd:MD_ReferenceSystem> </gmd:referenceSystemInfo>
Comments	

8.1.3 Encoding

Metadata element name	**Encoding**
Definition	Description of the computer language construct that specifies the representation of data objects in a record, file, message, storage device or transmission channel
ISO 19115 number and name	271. distributionFormat
ISO/TS 19139 path	distributionInfo/MD_Distribution/distributionFormat
INSPIRE obligation / condition	mandatory
INSPIRE multiplicity	1
Data type (and ISO 19115 no.)	284. MD_Format
Domain	See B.2.10.4. The property values (name, version, specification) specified in section 9 shall be used to document the default and alternative encodings.

Implementing instructions	
Example	name: **Bio-geographical Regions** GML application schema version: version **2.0**, GML, version 3.2.1 specification: D2.8.**III**.**17** Data Specification on **Bio-geographical Regions** – Draft Guidelines
Example XML encoding	<gmd:MD_Format> <gmd:name> <gco:CharacterString> **Bio-geographical Regions** GML application schema </gco:CharacterString> </gmd:name> <gmd:version> <gco:CharacterString>**2.0**, GML, version 3.2.1</gco:CharacterString> </gmd:version> <gmd:specification> <gco:CharacterString>D2.8.**III**.**17** Data Specification on **Bio-geographical Regions** – Draft Guidelines</gco:CharacterString> </gmd:specification> </gmd:MD_Format>
Comments	

8.1.4 Character Encoding

Metadata element name	**Character Encoding**
Definition	The character encoding used in the data set.
ISO 19115 number and name	
ISO/TS 19139 path	
INSPIRE obligation / condition	Mandatory, if an encoding is used that is not based on UTF-8.
INSPIRE multiplicity	0..*
Data type (and ISO 19115 no.)	
Domain	
Implementing instructions	
Example	-
Example XML encoding	<gmd:characterSet> <gmd:MD_CharacterSetCode codeListValue="8859part2" codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmxCodelists.xml#CharacterSetCode">8859-2</gmd:MD_CharacterSetCode> </gmd:characterSet>
Comments	

8.1.5 Data Quality – Logical Consistency – Topological Consistency

Metadata element name	**Data Quality – Logical Consistency – Topological Consistency**
Definition	Correctness of the explicitly encoded topological characteristics of the dataset as described by the scope
ISO 19115 number and name	18. dataQualityInfo
ISO/TS 19139 path	dataQualityInfo
INSPIRE obligation / condition	Mandatory, if the data set includes types from the Generic Network Model and does not assure centreline topology (connectivity of centrelines) for the network.
INSPIRE multiplicity	0..*

Data type (and ISO 19115 no.)	115. DQ_TopologicalConsistency
Domain	Lines 100-107 from ISO 19115
Implementing instructions	This metadata should be filled, at least, with these elements: - valueUnit: UnitOfMeasure - value: Record
Example	
Example XML encoding	
Comments	See clauses on topological consistency in section 7 for detailed information. This metadata element is mandatory if connectivity is not assured for network centrelines in the dataset. In this case the *Connectivity tolerance* parameter – as described in section 7 – must be provided in order to ensure automatic and unambiguous creation of centreline topology in post-process.

8.2 Metadata elements for reporting data quality

Information concerning the metadata elements for reporting data quality for this version (ver.02) is only defined in Chapter 8.4.

Open issue 5: Metadata for data quality reporting

In case stakeholders participating on consultation & testing will identify via comments requirements for data quality and related measures based on real use cases (to be defined in chapter 7), relevant metadata elements for reporting data quality can be introduced for ver. 03 of this Data specification.

Recommendation 2 For reporting the results of the data quality evaluation quantitatively, the data quality elements and measures defined in chapter 7 should be used.

The scope for reporting may be different from the scope for evaluating data quality (see section 7). If data quality is reported at the data set or spatial object type level, the results are usually derived or aggregated.

Metadata element name	**See chapter 7**
Definition	See chapter 7
ISO 19115 number and name	80. report
ISO/TS 19139 path	dataQualityInfo/*/report
INSPIRE obligation / condition	optional
INSPIRE multiplicity	0..*
Data type (and ISO 19115 no.)	Corresponding DQ_xxx element from ISO 19115, e.g. 109. DQ_CompletenessCommission
Domain	Lines 100-107 from ISO 19115 100. nameOfMeasure : CharacterString [0..*] 101. measureIdentification : MD_Identifier [0..1] 102. measureDescription : CharacterString [0..1] 103. evaluationMethodType : DQ_EvaluationMethodTypeCode [0..1] 104. evaluationMethodDescription : CharacterString [0..1] 105. evaluationProcedure : CI_Citation [0..1] 106. dateTime : DateTime [0..*] 107. result : DQ_Result [1..2]

Implementing instructions	**Recommendation 3** For each DQ result included in the metadata, at least the following properties should be provided: 100. nameOfMeasure NOTE This should be the name as defined in Chapter 7. 103. evaluationMethodType 104. evaluationMethodDescription NOTE If the reported data quality results are derived or aggregated (i.e. the scope levels for evaluation and reporting are different), the derivation or aggregation should also be specified using this property. 106. dateTime NOTE This should be data or range of dates on which the data quality measure was applied. 107. result NOTE This should be of type DQ_QuantitativeResult
Example	
Example XML encoding	
Comments	See Chapter 7 for detailed information on the individual data quality elements and measures to be used.

Open issue 6: In the ongoing revision of ISO 19115 and development of new ISO 19157 standard (Geographic Information – Data quality), a new element is introduced (DQ_DescriptiveResult). This element enables to describe and report qualitative results of the data quality evaluation and could be used instead of DQ_QuantitativeResult. Once the new (version of the) standards are approved, these guidelines will be revisited and be updated if necessary.

Open issue 7: For reporting compliance with minimum data quality requirements and recommendations specified in section 7, the INSPIRE conformity metadata element should be used.

However, since this issue is part of the larger discussion on the Abstract Test Suite and the definition of conformance classes for the data specification, detailed instructions on how to provide metadata on compliance with minimum data quality requirements and recommendations will only be provided for v3.0.

8.3 Theme-specific metadata elements

No mandatory theme-specific metadata elements are defined for this theme.

Recommendation 4 The metadata describing a spatial data set or a spatial data set series related to the theme **Bio-geographical Regions** should comprise the theme-specific metadata elements specified in Table 4.

Table 4 – Optional theme-specific metadata elements for the theme Bio-geographical Regions

INSPIRE Data Specification Bio-geographical Regions **Section**	**Metadata element**	**Multiplicity**
8.3.1	Maintenance information	0..1

8.3.1 Maintenance information

Metadata element name	**Maintenance information**
Definition	Information about the scope and frequency of updating
ISO 19115 number and name	30. resourceMaintenance
ISO/TS 19139 path	identificationInfo/MD_Identification/resourceMaintenance
INSPIRE obligation / condition	Optional
INSPIRE multiplicity	0..1
Data type (and ISO 19115 no.)	142. MD_MaintenanceInformation
Domain	This is a complex type (lines 143-148 from ISO 19115). At least the following elements should be used (the multiplicity according to ISO 19115 is shown in parentheses): – maintenanceAndUpdateFrequency [1]: frequency with which changes and additions are made to the resource after the initial resource is completed / domain value: MD_MaintenanceFrequencyCode: – updateScope [0..*]: scope of data to which maintenance is applied / domain value: MD_ScopeCode – maintenanceNote [0..*]: information regarding specific requirements for maintaining the resource / domain value: free text
Implementing instructions	
Example	resourceMaintenance: maintenanceAndUpdateFrequency: upon request updateScope: dataset maintenanceNote: .

Example XML encoding	<gmd:resourceMaintenance> <gmd:MD_MaintenanceInformation> <gmd:maintenanceAndUpdateFrequency> <gmd:MD_MaintenanceFrequencyCode code-List="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/gmxCodelists.xml#MD_MaintenanceFrequencyCode" codeList-Value="weekly">upon request</gmd:MD_MaintenanceFrequencyCode> </gmd:maintenanceAndUpdateFrequency> <gmd:updateScope> <gmd:MD_ScopeCode codeList-Value="dataset" code-List="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/gmxCodelists.xml#MD_ScopeCode">dataset</gmd:MD_ScopeCode> </gmd:updateScope> <gmd:maintenanceNote> <gco:CharacterString> </gco:CharacterString> </gmd:maintenanceNote> </gmd:MD_MaintenanceInformation> </gmd:resourceMaintenance>
Comments	

8.4 Guidelines on using metadata elements defined in Regulation 1205/2008/EC

8.4.1 Conformity

The *Conformity* metadata element defined in Regulation 1205/2008/EC allows to report the conformance with the Implementing Rule for interoperability of spatial data sets and services or another specification. The degree of conformity of the dataset can be *Conformant* (if the dataset is fully conformant with the cited specification), *Not Conformant* (if the dataset does not conform to the cited specification) or *Not evaluated* (if the conformance has not been evaluated).

Recommendation 5 The Conformity metadata element should be used to report conceptual consistency with this INSPIRE data specification. The value of Conformant should be used for the Degree element only if the dataset passes all the requirements described in the abstract test suite presented in Annex A. The Specification element should be given as follows:
- title: “INSPIRE Data Specification on <Theme Name> – Draft Guidelines”
- date:
  - dateType: publication
  - date: 2011-06-15

This metadata element will also allow data producers to report that a specific dataset fulfils the obligations from particular legal regulation.

NOTE 1 In order to improve the interoperability, domain templates and instructions for filling these free text elements (descriptions) are specified in an Annex C of this data specification.

Open issue 8: Conformance testing is still an open issue under discussion.

Instructions on conformance testing and a common abstract test suite (including detailed instructions on how to test specific requirements) will be added at a later stage.

This may also lead to an update of the recommendations on how to fill the conformity metadata element.

8.4.2 Lineage

Recommendation 6 Following the ISO 19113 Quality principles, if a data provider has a procedure for quality validation of their spatial data sets then the data quality elements listed in the Chapters 7 and 8 should be used. If not, the *Lineage* metadata element (defined in Regulation 1205/2008/EC) should be used to describe the overall quality of a spatial data set.

According to Regulation 1205/2008/EC, lineage "is a statement on process history and/or overall quality of the spatial data set. Where appropriate it may include a statement whether the data set has been validated or quality assured, whether it is the official version (if multiple versions exist), and whether it has legal validity. The value domain of this metadata element is free text".

The Metadata Technical Guidelines based on EN ISO 19115 and EN ISO 19119 specify that the statement sub-element of LI_Lineage (EN ISO 19115) should be used to implement the lineage metadata element.

Recommendation 7 To describe the transformation steps and related source data, it is recommended to use the following sub-elements of LI_Lineage:
- For the description of the transformation process of the local to the common INSPIRE data structures, the LI_ProcessStep sub-element should be used.
- For the description of the source data the LI_Source sub-element should be used.

NOTE 1 This recommendation is based on the conclusions of the INSPIRE Data Quality Working Group to avoid overloading of the overall lineage statement element with information on the transformation steps and related source data.

NOTE 2 In order to improve the interoperability, domain templates and instructions for filling these free text elements (descriptions) are specified in an Annex C of this data specification.

Open issue 9: The suggested use of the LI_Lineage sub-elements needs to be discussed as part of the maintenance of the INSPIRE metadata Technical Guidelines.

8.4.3 Temporal reference

According to Regulation 1205/2008/EC, at least one of the following temporal reference metadata elements shall be provided: temporal extent, date of publication, date of last revision, date of creation. If feasible, the date of the last revision of a spatial data set should be reported using the *Date of last revision* metadata element.

9 Delivery

9.1 Delivery medium

DS Requirement 2	Data conformant to this INSPIRE data specification shall be made available through an INSPIRE network service.

DS Requirement 3	All information that is required by a calling application to be able to retrieve the data through the used network service shall be made available in accordance with the requirements defined in the Implementing Rules on Network Services.

EXAMPLE 1 Through the Get Spatial Objects function, a download service can either download a pre-defined data set or pre-defined part of a data set (non-direct access download service), or give direct access to the spatial objects contained in the data set, and download selections of spatial objects based upon a query (direct access download service). To execute such a request, some of the following information might be required:

- the list of spatial object types and/or predefined data sets that are offered by the download service (to be provided through the Get Download Service Metadata operation),
- and the query capabilities section advertising the types of predicates that may be used to form a query expression (to be provided through the Get Download Service Metadata operation, where applicable),
- a description of spatial object types offered by a download service instance (to be proviced through the Describe Spatial Object Types operation).

EXAMPLE 2 Through the Transform function, a transformation service carries out data content transformations from native data forms to the INSPIRE-compliant form and vice versa. If this operation is directly called by an application to transform source data (e.g. obtained through a download service) that is not yet conformant with this data specification, the following parameters are required:
Input data (mandatory). The data set to be transformed.

- Source model (mandatory, if cannot be determined from the input data). The model in which the input data is provided.
- Target model (mandatory). The model in which the results are expected.
- Model mapping (mandatory, unless a default exists). Detailed description of how the transformation is to be carried out.

9.2 Encodings

9.2.1 Default Encoding(s)

DS Requirement 4	Data conformant to the application schema(s) defined in section 5.2 shall be encoded using the encoding(s) specified in this section.

9.2.1.1. Default encoding for application schema Bio-geographicalRegions

Name: Bio-geographicalRegions GML Application Schema
Version: version 2.0, GML, version 3.2.1
Specification: D2.8.**III**.**17** Data Specification on **Bio-geographical Regions** – Draft Guidelines
Character set: UTF-8

The GML Application Schema is distributed in a zip-file separately from the data specification document.

10 Data Capture

There is no specific guidance required with respect to data capture.

11 Portrayal

This clause defines the rules for layers and styles to be used for portrayal of the spatial object types defined for this theme.

In section 11.1, the *types* of layers are defined that are to be used for the portrayal of the spatial object types defined in this specification. A view service may offer several layers of the same type, one for each dataset that it offers on a specific topic.

Section 11.2 specifies the styles that shall be supported by INSPIRE view services for each of these layer types.

In section 11.3, further styles can be specified that represent examples of styles typically used in a thematic domain. It is recommended that also these styles should be supported by INSPIRE view services, where applicable.

Where XML fragments are used in these sections, the following namespace prefixes apply:

- sld="http://www.opengis.net/sld" (WMS/SLD 1.1)
- se="http://www.opengis.net/se" (SE 1.1)
- ogc="http://www.opengis.net/ogc" (FE 1.1)

IR Requirement 10	If an INSPIRE view services supports the portrayal of data related to the theme **Bio-geographical Regions**, it shall provide layers of the types specified in this section.

DS Requirement 5	If an INSPIRE view network service supports the portrayal of spatial data sets corresponding to the spatial data theme **Bio-geographical Regions**, it shall support the styles specified in section 11.2. If no user-defined style is specified in a portrayal request for a specific layer to an INSPIRE view service, the default style specified in section 11.2 for that layer shall be used.

Recommendation 8 In addition to the styles defined in section 11.2, it is recommended that, where applicable, INSPIRE view services also support the styles defined in section 11.3.

11.1 Layers to be provided by INSPIRE view services

Open issue 10: PLEASE NOTE: This section will be finalized for version 3.0

Layer Name	Layer Title	Spatial object type(s)	Keywords
BR.Bio-geographicalRegion	Bio-geographical Region	Bio-geographicalRegion	Bio-geographical regions, ecological regions

11.1.1 Layers organisation

None.

11.2 Styles to be supported by INSPIRE view services

11.2.1 Styles for the layer BR.Bio-geographicalRegion

Style Name	BR.Bio-geographicalRegions.Default
Default Style	yes
Style Title	Biogeographical regions Default style
Style Abstract	This style is the generic style for visualising the boundaries of the biogeographical regions.. Polygon geometries are rendered using a 50% grey (#808080) fill and a solid black outline with a stroke width of 1 pixel. Where a RegionClass has a colour scheme defined it should be used as the default colour scheme. This deafuly scheme is generic and is superceded when an established colour scheme exists.
Symbology	The SLD specifying the symbology is distributed in a file separately from the data specification document.

```
   <sld:NamedLayer>
     <se:Name>BR.BiogeographicalRegions.Default</se:Name>
     <sld:UserStyle>
       <se:Name>INSPIRE_Default</se:Name>
       <sld:IsDefault>1</sld:IsDefault>
       <se:FeatureTypeStyle version="1.1.0">
         <se:Description>
           <se:Title>Biogeographical regions Default style</se:Title>
           <se:Abstract>The geometry is rendered using a 50% grey (#808080)
fill and a solid black outline with a stroke width of 1 pixel.</se:Abstract>
         </se:Description>
         <se:FeatureTypeName>BiogeographicalRegion</se:FeatureTypeName>
         <se:Rule>
           <se:PolygonSymbolizer>
             <se:Geometry>
```

	<ogc:PropertyName>shape</ogc:PropertyName> </se:Geometry> <se:Fill/> <se:Stroke/> </se:PolygonSymbolizer> </se:Rule> </se:FeatureTypeStyle> </sld:UserStyle> </sld:NamedLayer>
Minimum & maximum scales	<min scale> - <max scale>

11.3 Other recommended styles

Those biogeographical regions that correspond to the values in the 'Natura2000 and Emerald Biogeographical regions' codelist have a predefined colour scheme. This colour scheme is described in Figure 5, where the colour and the hexadecimal value for the colour are listed next to the name of the biogeographical region.

Name	Colour	Colour (hexadecimal code)
Alpine		#FF73DF
Anatolian		#ED52B0
Arctic		#CAFCFD
Atlantic		#00C5FF
Black Sea		#FFAAC6
Boreal		#0070FF
Continental		#4CE600
Macaronesian		#FFFF73
Mediterranean		#FFAA00
Pannonian		#734C00
Steppic		#FFCB94

Figure 5 – Colour scheme for Natura 2000 and Emerald Biogeographical regions

11.3.1 Styles for the layer BR.Bio-geographicalRegion

Style Name	**BR.Bio-geographicalRegion.Natura2000AndEmerald**
Style Title	Natura 2000 and Emerald Bio-geographical regions style
Style Abstract	This style is to be used when visualising the Regions covered under the Natura2000 and Emerald biogeographical regions code lists. This style in inherited from the paper maps used by the Council of Europe and Habitats Committee for visualisg and adopting the Biogeographical regions outlined in the Habitats Directive and expanded by the Bern Convention under the Emerald network.
Symbology	<sld:NamedLayer> <se:Name>BR.Natura2000andEmeraldBio-geographicalRegions</se:Name> <sld:UserStyle> <se:Name>INSPIRE_Default</se:Name> <sld:IsDefault>1</sld:IsDefault> <se:FeatureTypeStyle version="1.1.0"> <se:Description> <se:Title> Natura 2000 and Emerald Bio-geographical regions

	style</se:Title>
	`<se:Abstract>`Where 'alpine' is selected in the code list the geometry is rendered using a pink (#FF73DF) fill and a pink (#FF73DF) outline with a stroke width of 1 pixel
	Where 'atlantic' is selected in the code list the geometry is rendered using a blue (#00C5FF) fill and a blue (#00C5FF) outline with a stroke width of 1 pixel
	Where 'boreal' is selected in the code list the geometry is rendered using a dark blue (#0070FF) fill and a dark blue (#0070FF) outline with a stroke width of 1 pixel
	Where 'continental' is selected in the code list the geometry is rendered using a green (#4CE600) fill and a green (#4CE600) outline with a stroke width of 1 pixel
	Where 'macaronesian' is selected in the code list the geometry is rendered using a yellow (#FFFF73) fill and a yellow (#FFFF73) outline with a stroke width of 1 pixel
	Where 'mediterranean' is selected in the code list the geometry is rendered using a orange (#FFAA00) fill and a orange (#FFAA00) outline with a stroke width of 1 pixel
	Where 'arctic' is selected in the code list the geometry is rendered using a pale blue (#CAFCFD) fill and a pale blue (#CAFCFD) outline with a stroke width of 1 pixel
	Where 'pannonian' is selected in the code list the geometry is rendered using a brown (#734C00) fill and a brown (#734C00) outline with a stroke width of 1 pixel
	Where 'steppic' is selected in the code list the geometry is rendered using a beige (#FFCB94) fill and a beige (#FFCB94) outline with a stroke width of 1 pixel
	Where 'blackSea' is selected in the code list the geometry is rendered using a pink (#FFAAC6) fill and a pink (#FFAAC6) outline with a stroke width of 1 pixel
	Where 'anatolian' is selected in the code list the geometry is rendered using a purple (#ED52B0) fill and a pipurple (#ED52B0) outline with a stroke width of 1 pixel`</se:Abstract>`
	`</se:Description>`
	`<se:FeatureTypeName>`BR.BiogeographicalRegions`</se:FeatureTypeName>`
	`<se:Rule>`
	`<se:PolygonSymbolizer>`
	`<se:Geometry>`
	`<ogc:PropertyName>`shape`</ogc:PropertyName>`
	`</se:Geometry>`
	`<se:Fill/>`
	`<se:Stroke/>`
	`</se:PolygonSymbolizer>`
	`</se:Rule>`
	`</se:FeatureTypeStyle>`
	`</sld:UserStyle>`
	
	`</sld:NamedLayer>`

Minimum & maximum scales	<min scale> - <max scale>

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[ISO 19103] ISO/TS 19103:2005, Geographic information – Conceptual schema language

[ISO 19107] EN ISO 19107:2005, Geographic information – Spatial schema (ISO 19107:2003)

[ISO 19108] EN ISO 19108:2005 Geographic information - Temporal schema (ISO 19108:2002)

[ISO 19111] EN ISO 19111:2007 Geographic information - Spatial referencing by coordinates (ISO 19111:2007)

[ISO 19115] EN ISO 19115:2005, Geographic information – Metadata (ISO 19115:2003)

[ISO 19118] EN ISO 19118:2006, Geographic information – Encoding (ISO 19118:2005)

[ISO 19135] EN ISO 19135:2007 Geographic information – Procedures for item registration (ISO 19135:2005)

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Metzger M.J., Bunce, R.G.H., Jongman R.H.G,. Mücher, C.A, and Watkins J.W. (2005) A climatic stratification of the environment of Europe Global Ecology and Biogeography 14 (6), 549–563

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Annex A
(normative)

Abstract Test Suite

Any dataset conforming to this INSPIRE data specification shall meet all requirements specified in this document.

Open issue 11: Conformance testing is still an open issue under discussion.

Instructions on conformance testing and a common abstract test suite (including detailed instructions on how to test specific requirements) will be added at a later stage.

Annex B
(informative)
Use Cases

None of the user requirements detailed practical uses (or needs) of the data, therefore a series of user requirements have been created which fill the gap in this regard. User requirements are a critical part of this process as they should be used to drive the schema. These user requirements cover

The assessment of conservation status of habitats and species at the biogeographical level
(use case 1)
Evaluation of the Natura 2000 network by biogeographical region
(use case 2)
Provide german physiographic units (Naturräumliche Haupteinheiten) to INSPIRE
(use case 3)
Use of the Environmental Stratification of Europe (Metzger et al. 2005) in EBONE reporting
(use case 4)

The first use case describes the assessment of the Conservation Status of the habitat types and species listed on the Annex's of the Habitat Directives. This is one of the key tools in assessing the efficiency of the Habitats Directive (and by default the efficiency of the EU and Member States) in its stated aim of protecting biodiversity in the European Union. These assessments are done the biogeographical level.

The second use case is similar to the first in that it is an important tool in assessing the effectiveness of the Commission and the Member States in protecting biodiversity in Europe, in this case through analyses of the sufficiency of the Natura 2000 network.

The third use case describes how the german physiographic units have to be respected for impact regulation to insure coherence (Federal Nature Conservation Act, Bundesnaturschutzgesetz).

The fourth use case describes how to use the Environmental Stratification of Europe (Metzger et al. 2005) in EBONE reporting

Use Case Description - use case 1	
Name	Assessing the Conservation Status of Habitats and Species reported under Article 17 of Habitats Directive
Priority	High
Description	Article 17 of the Habitats Directive obliges Member States to report every six years on the progress of the implementation of the Directive. It is applicable for habitat types and species listed in the Annexes of the Directive. The key outcome of this process is the assessment of the Conservation Status of a habitat type or species at the Biogeographical level.
Pre-condition	Agreed upon Biogeographical regions, (agreed upon codings for these regions) National datasets on habitat type and species distribution. Specifications for the data input.
Flow of Events – Basic Path	
Step 1	MS produces 2 obligatory spatial datasets (distribution of habitat types and species) and one descriptive (tabular) dataset. MS follow the encodings given in the Article 17 Guidelines. (Link: to Habitats and Biotopes and Species Themes)
Step 2	MS uploads the datasets as XML and GML into Reportnet's CDR
Step 3	The ETC/BD downloads the national datasets from the CDR
Step 4	The ETC/BD performs a series of quality assessment on the data
Step 5	In case the report or data requires improvement, the ETC/BD notifies MS via

	Reportnet and provides a report on data suggesting improvements. Steps 2,3,4 are repeated then.
Step 6	The assessments for the conservation status of a habitat type are done at the biogeographical level. The 27 Member States data is merged together and split into 14 files (9 biogeographical regions and 5 marine regions) This splitting is done in 2 steps, first off the regions a feature occurs in are selected from the tabular data, secondly the grid cells of the feature that occur in a region are extracted from the MS submission by overlaying the distribution with the biogeographical regions (spatial boundary) and spatial select all those grids that occur within the region (see Figure 2 and Figure 3). All the datasets per region are merged into one dataset upon which the assessments are carried out. The end product will be merged boundaries for 9 biogeographical regions and 5 marine regions.
Step 7	The assessment of the conservation status of the features are calculated per biogeographical region, ideally, based on attributes from the tabular data. Where the tabular data is poor, or inconsistent or absent the spatial data is used as one of the parameters to calculate the Conservation Status
Step 8	Conservation Status calculate (Figure 3)
Step 9	The ETC/BD merges the 9 biogeographical regions and 5 marine regions into a European dataset, which is disseminated to the public, used in the Natura 2000 viewer etc.
Step 10	ETC/BD produces National reports and a Technical report for DG ENVIRONMENT
Step 11	DG ENVIRONMENT produces a Composite Report
Flow of Events – Alternative Paths	
Step m	
Step m+1	
Data source: Biogeographical regions	
Description	Biogeographical regions according to Habitat Directive
Data provider	EEA
Geographical scope	EU27
Thematic scope	Biogeographical regions of Europe
Scale, resolution	1:1.000.000
Documentation	*http://dataservice.eea.europa.eu/dataservice/metadetails.asp?id=1054*
Data source: Habitat types distribution	
Description	Distribution of Habitat types listed in Annex I of the Habitats Directive,
Data provider	National
Geographical scope	National
Thematic scope	Habitats
Post-condition	Published national and EU27 reports
Scale, resolution	10kmx10km (ETRS 89 LAEA 5210 'European grid')
Documentation	http://ec.europa.eu/environment/nature/knowledge/rep_habitats/index_en.htm
Data source: Habitat types distribution	
Description	Distribution of species listed in Annexes: II, IV and V of the Habitats Directive
Data provider	National
Geographic scope	National
Thematic scope	Species distribution
Post-condition	Published national and EU27 reports
Scale, resolution	10kmx10km (ETRS 89 LAEA 5210 'European grid')
Documentation	http://ec.europa.eu/environment/nature/knowledge/rep_habitats/index_en.htm

This use case highlights the need for a standard, approved, code list of biogeographical regions (and Marine regions) as well as standard boundaries of these regions. As the data is being supplied by 27 countries and deviation in

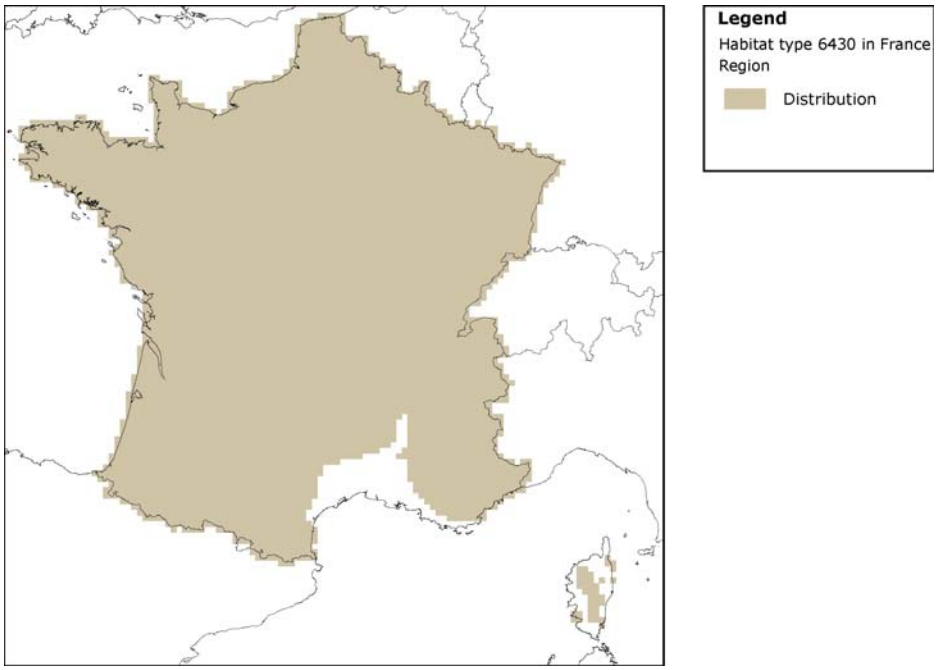

Figure 1 – Distribution e.g. of the wide spread habitat type 6430 in France.

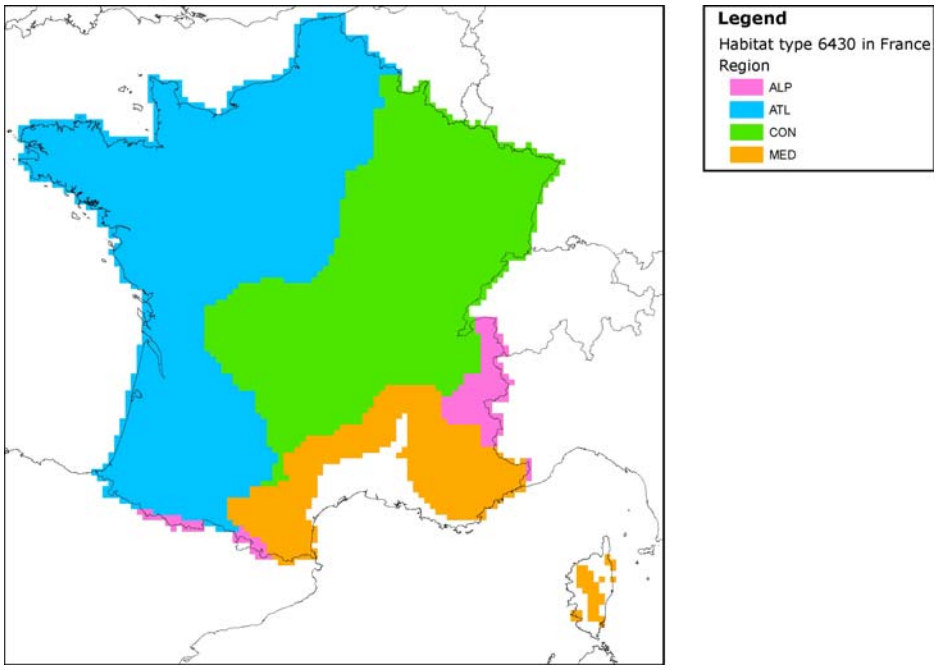

Figure 2 – Distribution split by Biogeographical region.

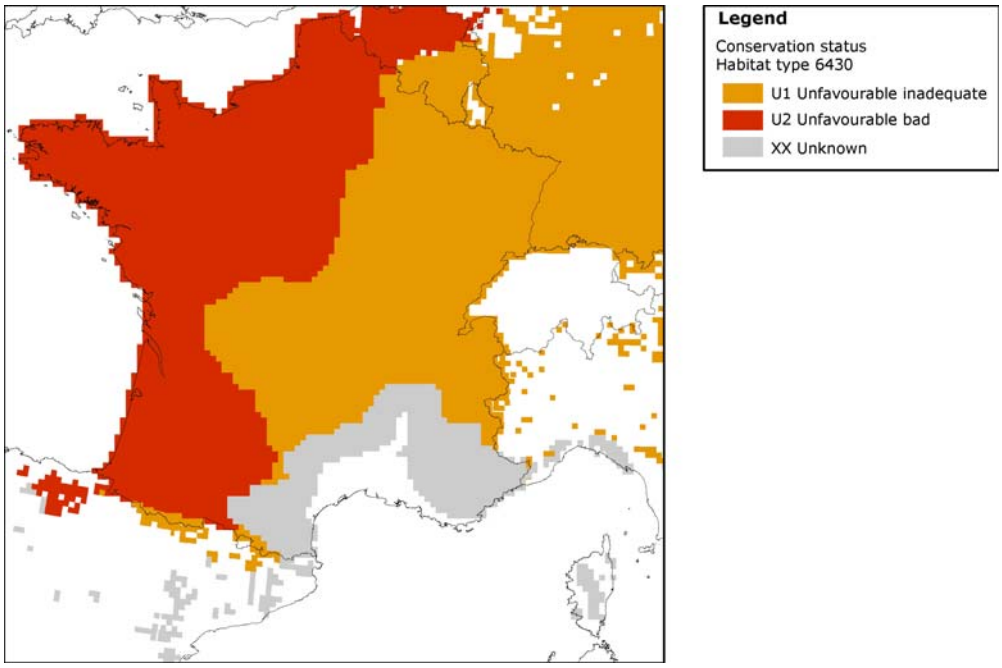

Figure 3 – Conservation Status calculated by Bio-geographical region.

Use Case Description – use case 2	
Name	Evaluation of the Natura 2000 network by biogeographical region. In order to assess the quality of the Natura 2000 network in terms of protecting the habitat types and species a site is designated for the sites are assessed at the biogeographical level in the for a of biogeographical seminars. A degree of sufficiency for the network in terms of each designated feature (habitat type or species) is assessed and based on this assessment (Sufficient, Insufficient minor, Insufficient moderate, Insufficient Major or Scientific reserve in case more data is needed) further work may be needed. It is during this process that the quality of protection offered by the sites is assessed and as such is a critical step in the protection of biodiversity in Europe.
Priority	High
Description	
Pre-condition	National datasets on Protected sites (Natura 2000), biogeographical regions.
Flow of Events – Basic Path	
Step 1	Member States upload their Natura 2000 boundaries to CDR
Step 2	QA/QC process on the MS deliveries (Link : to another possible use case 'QA/ Natura data; one check is to check the biogeographical regions)
Step 3	QA/QC reports prepared
Step 4	Merged European tabular and spatial datasets are prepared
Step 5	Biogeographical or bi-lateral meetings are arrange/are undertaken
Step 6	The tabular data is split by the attribute 'Biogeographical regions' with all sites in region X being selected. This is cross referenced with the biogeographical regions map, additionally all sites with the regions are selected and this is cross checked with the tabular data (this is a 2 stage cross referencing process).
Step 7	A list of all sites by the habitat types and species they are designated for is created. The spatial data is split accordingly.
Step 8	Assessment as the quality and coverage of the sites is undertaken with sufficiency's per Habitat type and species being proposed
Step 9	Report prepared in advance of meetings to MS. Note reports prepared and discussed on the Biogeographical region only.
Step 10	Report and sufficiency's discussed at the meeting
Step 11	Revised sufficiency's incorporated into final report and actions required by MS are noted to improve their assessment – the aim is for all habitat types and species to

	be deemed 'Sufficient'
Step 12	These revised assessments feed into the 'Scientific lists ' created for the Commission e.g. the Reference list, Final Conclusions list etc.
Flow of Events – Alternative Paths	
Step m	
Step m+1	
Post-condition	Published national and EU27 reports
Data source: Protected sites	
Description	Natura 2000 boundaries
Data provider	National
Geographical scope	National
Thematic scope	Habitats
Scale, resolution	
Documentation	
Data source: Biogeographical regions	
Description	Biogeographical regions according to Habitat Directive
Data provider	EEA
Geographical scope	EU27
Thematic scope	Biogeographical regions of Europe
Scale, resolution	1:1.000.000
Documentation	*http://dataservice.eea.europa.eu/dataservice/metadetails.asp?id=1054*

Use Case 3: Provide german physiographic units (Naturräumliche Haupteinheiten) to INSPIRE
Germany´s landscape can be characterised ecologically and classified into physiographic units. These are regional divisions defined by the overall character of their natural environment. The classification is based on natural landscape factors such as geology, geomorphology, soil, water and climate (the later including overall climate character, altitudinal belts and continentality).
This is useful for surveys, assessments and planning activities in nature conservation and landscape management, particularly at regional and national level.

Use Case Description - use case 3	
Name	Provide german physiographic units (Naturräumliche Haupteinheiten) to INSPIRE
Priority	high
Description	The german physiographic units have to be respected e.g. for impact regulation to insure/ re-establish coherence (§15 Federal Nature Conservation Act, Bundesnaturschutzgesetz).
Pre-condition	§ 15(2) … An impact shall be considered to have been substituted as soon as the impaired functions of the natural balance, in the relevant natural area, have been restored to an equivalent value and landscape appearance has been re-designed in a manner consistent with the landscape….
Flow of Events – User project planning/ implementation and appropriate Assessment (Natura 2000)	
Step 1.	Check project /plan for possible impacts on species and habitats of Annexes of Birds and Habitats Directive (Screening)
Step 2.	If negative impact is possible or will occur -> Art. 6(3) procedure, check alternatives, check mitigation measures etc.

Use Case Description - use case 3	
Step 3.	If plan/project is realized despite negative impacts according to exemption rules of Art. 6(4) Habitats Directive -> plan and execute spatially suitable measures within same physiographic unit to ensure/ re-establish coherence
Step 4.	Inclusion of new site, where the coherence measures have been taken into Natura 2000 – network
Step 5.	Change of Natura 2000-Gis Cover and Community list
Post-condition	Conservation Status of impacted species & Habitats re-established, eventually monitored for necessary correction of taken measures
Data source: Member State Data Set	
Description	Data set created by BfN for Habitats Directive Assessments in Standard Data Form (97/266/EG) for site proposals (pSCI/SCI) based on Meynen/Schmithüsen et al. (1953-1962). Additional use in legal context of impact assessment and appropriate assessment according to Art. 6(3), (4) Habitats Directive. Dataset is used by Nature Conservation Authorities and Planning Authorities.
Data provider	Federal Agency for Nature Conservation (BfN)
Geographic scope	Germany
Thematic scope	Physiographic unit
Scale, resolution	1:1 Mio
Delivery	.shp-file direct to INSPIRE
Documentation	Flow not documented

Use Case 4: Use of the Environmental Stratification of Europe (Metzger et al. 2005) in EBONE reporting

Use Case Description - use case 4	
Name	A statistical stratification of the European Environment providing integration of biodiversity information into strata as a hierarchical framework for understanding biodiversity trends in Europe.
Priority	Middle
Description	The European Biodiversity Observation Network defines a procedure to monitor the habitat and species diversity of the wider country side. The mapping and analysis procedure defines an update of the data every 5 to 10 years on a country by country basis. The key outcome of this process is the assessment of the existence and distribution of the selected habitat types at the level of the Environmental Strata (Metzger et al. 2005, Jongman et al 2006).
Pre-condition	Agreement on the Environmental stratification level (Environmental Strata 84 and Environmental Zones 13). Data sets on the diversity of General Habitat Categories based for mapping surveys (EBONE procedure). Specifications for the survey and data input.
Flow of Events – Basic path	
Step 1.	Survey organisation (nationally organised) provides data: one spatial data file and one descriptive data file (tabular format) on the distribution of general habitat categories based on the EBONE observation network of squares. Survey organisation follows the guidelines based on the EBONE field manual.

Use Case Description - use case 4	
Step 2.	Survey organisation uploads the datasets as MDB to the central EBONE data management
Step 3.	EBONE data management performs a series of quality assessments on the datasets
Step 4.	In case the data requires improvements due to data inconsistencies the survey organisation is contacted and step 1, 2 and 3 are repeated
Step 5	Analysis of the share and diversity of general habitat categories at the level of the Environmental Zones or Environmental Strata are done
Step 6	EBONE provides a European data set on the share and diversity of the general habitat categories using the EBONE web viewer
Step 7	EBONE produces a report on the status and trends of habitats based on the general habitat categories
Post-condition	
Data source: Environmental Stratification of Europe	
Description	Environmental Stratification of Europe (Metzger et al. 2005)
Data provider	EBONE
Geographic scope	A 'Greater European Window' with the following boundaries: 11° W, 32° E, 34° N, 72° N covering also EU 27
Thematic scope	Climatic Stratification of the Environment
Scale, resolution	1 km²
Delivery	EBONE
Documentation	http://onlinelibrary.wiley.com/doi/10.1111/j.1466-822X.2005.00190.x/pdf
Data source: Habitat distribution	
Description	Distribution of general habitat categories according to the EBONE field handbook
Data provider	EBONE
Geographic scope	National
Thematic scope	Habitats
Scale, resolution	1x1 km sample squares
Delivery	National survey organisations
Documentation	http://www.ebone.wur.nl/UK/Publications/and *http://www.alterra.wur.nl/UK/publications/Alterra+Reports/* and (Report 2154: http://content.alterra.wur.nl/Webdocs/PDFFiles/Alterrarapporten/AlterraRapport2154.pdf)

Annex C
(informative)
Examples

This Annex provides examples of use metadata elements defined in Regulation 1205/2008/EC.

C.1 *Examples on using metadata elements defined in Regulation 1205/2008/EC*

C.1.1 Conformity

This metadata element will also allow data producers to report that a specific dataset fulfils INSPIRE requirements as well as obligations from particular legal regulation.

Conformity example:

```
<gmd:report>
    <gmd:DQ_DomainConsistency>
    <gmd:result>
        <gmd:DQ_ConformanceResult>
            <gmd:specification>
                <gmd:CI_Citation>
                    <gmd:title>
                        <gco:CharacterString>COMMISSION REGULATION (EU) No 1089/2010
of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the
Council as regards interoperability of spatial data sets and services</gco:CharacterString>
                    </gmd:title>
                    <gmd:date>
                        <gmd:CI_Date>
                            <gmd:date>
                                <gco:Date>2010-12-08</gco:Date>
                            </gmd:date>
                            <gmd:dateType>
                                <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Cod
elist/ML_gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
                            </gmd:dateType>
                        </gmd:CI_Date>
                    </gmd:date>
                </gmd:CI_Citation>
            </gmd:specification>
            <gmd:explanation>
                <gco:CharacterString>See the referenced specification</gco:CharacterString>
            </gmd:explanation>
            <gmd:pass>
                <gco:Boolean>false</gco:Boolean>
            </gmd:pass>
        </gmd:DQ_ConformanceResult>
    </gmd:result>
    </gmd:DQ_DomainConsistency>
</gmd:report>
<gmd:report>
    <gmd:DQ_DomainConsistency>
    <gmd:result>
        <gmd:DQ_ConformanceResult>
            <gmd:specification>
```

```
                        <gmd:CI_Citation>
                            <gmd:title>
                                <gco:CharacterString>Council Directive 92/43/EEC of 21 May 1992 on
the conservation of natural habitats and of wild fauna and flora</gco:CharacterString>
                            </gmd:title>
                            <gmd:date>
                                <gmd:CI_Date>
                                    <gmd:date>
                                        <gco:Date>1992-05-02</gco:Date>
                                    </gmd:date>
                                    <gmd:dateType>
                                        <gmd:CI_DateTypeCode codeListValue="creation"
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Cod
elist/ML_gmxCodelists.xml#CI_DateTypeCode">publication</gmd:CI_DateTypeCode>
                                    </gmd:dateType>
                                </gmd:CI_Date>
                            </gmd:date>
                        </gmd:CI_Citation>
                    </gmd:specification>
                    <gmd:explanation>
                        <gco:CharacterString>See the referenced specification</gco:CharacterString>
                    </gmd:explanation>
                    <gmd:pass>
                        <gco:Boolean>false</gco:Boolean>
                    </gmd:pass>
                </gmd:DQ_ConformanceResult>
            </gmd:result>
            </gmd:DQ_DomainConsistency>
        </gmd:report>
```

C.1.2 Lineage

This metadata element will also allow data producers to report as well as data users to see what kind of transformation methodologies were used to transform local data to common INSPIRE structures, including description of the source data.

Example for Lineage element is available in Annex C

```
        <gmd:lineage>
          <gmd:LI_Lineage>
            <gmd:statement>
              <gco:CharacterString>Source observation data has been aggregated to distribution
data using spatial operators buffer and intersect.</gco:CharacterString>
            </gmd:statement>
            <gmd:processStep>
              <gmd:LI_ProcessStep>
                <gmd:description>
                  <gco:CharacterString>For the data transformation from local to the INSPIRE
model, the following methodology has been used: 1. Harmonization between the source and target
(INSPIRE) data model. 2. Semantic mapping of individual featuers and their attributes. 3. Additional
rules for data conversion, as data type conversions, data grouping, data concatenate, constants
definition. 4. Implementation of the transformation means completely automated crosswalk by means
of the application of some type of tool (Geoserver - Application schema extension and XML
MapForce)</gco:CharacterString>
                </gmd:description>
              </gmd:LI_ProcessStep>
            </gmd:processStep>
            <gmd:source>
              <gmd:LI_Source>
                <gmd:description>
```

<gco:CharacterString>Each sample within the source dataset was collected at the point of maximum depth of the lake, incorporating identical aliquot of water taken between 0-2 m, 3 m, 4 m and between 5-6 m deep. The sampling frequency was every month. Tear Bottle, year of production 1999, Model number:SJ900AXCD has been used for sampling.</gco:CharacterString>
</gmd:description>
</gmd:LI_Source>
</gmd:source>
</gmd:LI_Lineage>
</gmd:lineage>