



National Spatial Data Infrastructure

# Content Standard for Digital Geospatial Metadata Part 1: Biological Data Profile (Final Draft, version 2.0)

Biological Data Working Group  
Federal Geographic Data Committee  
and USGS Biological Resources Division

June 1999

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Federal Geographic Data Committee

Department of Agriculture • Department of Commerce • Department of Defense • Department of Energy  
Department of Housing and Urban Development • Department of the Interior • Department of State  
Department of Transportation • Environmental Protection Agency  
Federal Emergency Management Agency • Library of Congress  
National Aeronautics and Space Administration • National Archives and Records Administration  
Tennessee Valley Authority

## Federal Geographic Data Committee

Established by Office of Management and Budget Circular A-16, the Federal Geographic Data Committee (FGDC) promotes the coordinated development, use, sharing, and dissemination of geographic data.

The FGDC is composed of representatives from the Departments of Agriculture, Commerce, Defense, Energy, Housing and Urban Development, the Interior, State, and Transportation; the Environmental Protection Agency; the Federal Emergency Management Agency; the Library of Congress; the National Aeronautics and Space Administration; the National Archives and Records Administration; and the Tennessee Valley Authority. Additional Federal agencies participate on FGDC subcommittees and working groups. The Department of the Interior chairs the committee.

FGDC subcommittees work on issues related to data categories coordinated under the circular. Subcommittees establish and implement standards for data content, quality, and transfer; encourage the exchange of information and the transfer of data; and organize the collection of geographic data to reduce duplication of effort. Working groups are established for issues that transcend data categories.

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## 1.1 INTRODUCTORY MATERIAL

### 1.1.1 Objective

The objective of the profile is to provide a common set of terminology and definitions for the documentation of biological data through the creation of extended elements and a profile of the FGDC Content Standard for Digital Geospatial Metadata.

### 1.1.2 Scope

This profile is intended to support the collection and processing of biological data. It is intended to be useable by all levels of government and the private sector.

The profile was developed by defining information required by a prospective user to determine the availability of a set of biological data; to determine the fitness of a set of biological data for an intended use; to determine the means of accessing the set of biological data; and to successfully transfer the set of biological data. As such, the profile establishes the names of extended data elements and compound elements (groups of data elements) to be used for documenting biological data, the definitions of these extended compound elements and data elements, and information about the values to be provided for the data elements. The profile also describes any modifications to the optionality or repeatability of non-mandatory elements and any modifications to the domains of standard elements in the FGDC's Content Standard for Digital Geospatial Metadata.

The standard is not intended to reflect an implementation design. An implementation design requires adapting the structure and form of the profile to meet application requirements. The profile does not specify the means by which this information is organized in a computer system or in a data transfer, nor the means by which this information is transmitted, communicated, or presented to the user.

### 1.1.3 Applicability

Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure," was signed on April 11, 1994, by President William Clinton. Section 3, Development of a National Geospatial Data Clearinghouse, paragraph (b) states: "Standardized Documentation of Data. Beginning 9 months from the date of this order, each agency shall document all new geospatial data it collects or produces, either directly or indirectly, using the standard under development by the FGDC, for documenting, to the extent practicable, geospatial data previously collected or produced, either directly or indirectly, and making that data documentation electronically accessible to the Clearinghouse network." This is an official profile of the data documentation standard referenced in the executive order. It is designed to document biological data sets, both geospatial and non-geospatial in nature.

In addition to use by the Federal Government, the FGDC invites and encourages organizations and persons from State, local, and tribal governments, the private sector, and non-profit

organizations to use the profile to document their biological data. A major difficulty in the data community is the lack of information that helps prospective users to determine what data exist, the fitness of existing data for planned applications, and the conditions for accessing existing data, and the transfer of data to a user's system. This profile, developed with the aid of public participation, will help to ease these problems and to develop the National Spatial Data Infrastructure, National Information Infrastructure, and National Biological Information Infrastructure.

#### 1.1.4 Related Standards

The Content Standard for Digital Geospatial Metadata was developed to identify and define the metadata elements used to document digital geospatial data sets for many purposes. These include metadata to: 1) preserve the meaning and value of a data set; 2) contribute to a catalog or clearinghouse and; 3) aid in data transfer. The Biological Data Profile of the Content Standard for Digital Geospatial Metadata was developed to identify and define the metadata elements used to document biological data sets for the same purposes. Since biological data sets can be either geospatial or non-geospatial in their nature, the Biological Data Profile is designed to be used to document both geospatial and non-geospatial data sets. As a profile, all the requirements of the Content Standard for Digital Geospatial Metadata must be met for any geospatial biological data set. The Biological Data Profile extends the use of the Content Standard for Digital Geospatial Metadata into documenting non-geospatial data sets, when biological in nature. Because some data elements required for documenting geospatial data sets may be of marginal use or possibly even misleading in documenting non-geospatial data holdings, under these conditions, these data elements may contain a phrase such as "not applicable".

The Spatial Data Transfer Standard (SDTS) was developed to allow the transfer of digital spatial data sets between spatial data software. Since the SDTS is a standard for data transfer, its primary metadata content is used to determine the fitness of a geospatial data set for the user's purpose. There is a close relationship between the Content Standard for Digital Geospatial Metadata and its associated profiles with the SDTS metadata elements contained in the Data Quality module, and in other locations inside of the SDTS transfer set. Since the Content Standard for Digital Geospatial Metadata and its profiles contain metadata used to search for digital spatial data sets through a clearinghouse (metadata for locating, describing access, use, and distribution), these elements may not be contained in an SDTS transfer set. Since the Biological Data Profile is designed to accommodate the documentation of biological data sets which are not necessarily geospatial, these particular metadata will likely never be transferred via an SDTS transfer.

The June 8, 1994 FGDC Metadata Standard was used as the base document for the International Organization for Standards (ISO) 15046 Part 15, Geographic information - Part 15: Metadata. When this profile was prepared, ISO 15046-15 was a Committee Draft and subject to significant change before final approval.

#### 1.1.5 Standards Development Process

The National Biological Information Initiative (NBII) is dedicated to the collaborative development of an electronic "federation" of biological data and information sources to make data and information on biological resources more accessible for more people. The goal of the NBII is to provide swift user access to biological databases, information products, and analysis tools maintained by Federal, State, and local government agencies, non-government institutions, and private sector organizations in the United States and around the world. Thus the NBII promotes the availability of biological information and its associated documentation on the internet. The NBII and NSDI programs are complementary, and cooperate on common standards and protocols, partnerships with many Federal and non-Federal groups, and support for projects and activities that help increase access to biological and geospatial information. The FGDC Biological Data Working Group was established to help facilitate and promote these linkages.

To provide a standardized method for documenting biological data and information, an ad hoc working group met in November 1994 to develop a "strawman" metadata standard. The original strawman standard was created for documenting data and information considered non-spatial, and thus not being documented using the FGDC's Content Standards for Digital Geospatial Metadata. The American Institute of Biological Sciences (AIBS), the national umbrella organization of fifty biological societies, convened a workshop of national experts in the biological sciences to peer review and recommend modifications to the "strawman" metadata standard. This workshop was held May 16 and 17, 1995. Participants reviewed the content of the NBII's strawman Metadata Standard for Non-Geospatial Data to assure completeness and utility of the content from the biological science perspective. The AIBS review strongly endorsed refocusing from "non-geospatial" data sets to "Biological resource" data sets, regardless of their geospatial or non-geospatial characteristics. The resulting draft standard, the Content Standard for NBII Metadata, allowed the use of Content Standards for Digital Geospatial Metadata with data elements appropriate for documenting a biological data set, regardless of whether it is geospatial or non-geospatial in nature. The draft NBII Metadata Standard was presented three times to the FGDC standards working group. In February 1996, the Standards Working Group supported the interim implementation of the "Content Standard for NBII Metadata". In February 1997 the Standards Working Group approved the NBII Metadata Standard as being in Draft Stage.

In 1998, with the revision of the FGDC Content Standard for Digital Geospatial Metadata, and the clarification of the profile creation process, the FGDC Biological Data Working Group supported the revision of the NBII Metadata standard into a profile of the Content Standard for Digital Geospatial Metadata. It was released for public review in July 1998.

May 26, 1999, the FGDC Biological Data Working Group brought an issue before the FGDC Standards Working Group related to the Biological Data Profile. In essence, the BDWG would like to encourage standardized documentation of all types of biological data and information, in particular by using the Biological Data Profile. To support this effort, the Biological Data Profile must include the ability to document datasets and information products that are not explicitly geospatial. In order to do this, the BDWG would choose not to enforce the mandatory nature of Spatial\_Domain, instead establishing this element as "mandatory-if-applicable." Under this designation, the Spatial\_Domain would continue to be mandatory if the dataset or information product being documented is geospatial; only if the dataset or information product does not display the characteristic of geospatial extent would the requirement for Spatial\_Domain be

waived. This designation would be contradictory to the rules of profile development which say that the conditionality of an element cannot be made less stringent than that imposed by the Standard. The FGDC Standards Working Group agreed to this change in profile rules, with the understanding that only non-geospatial datasets would have less stringent conditionality requirements.

#### 1.1.6 Maintenance Authority

The current maintenance authority for the profile is the USGS Biological Resources Division. Questions concerning the profile should be addressed to: Biological Data Profile Questions, c/o USGS Center for Biological Informatics, Biological Resources Division, P.O. Box 25046, DFC, MS 302, Denver, CO 80225-0046. Copies of this publication are available from the Federal Geographic Data Committee Secretariat, in care of the U.S. Geological Survey, 590 National Center, Reston, Virginia 20192; telephone (703) 648-5514; facsimile (703) 648-5755; Internet (electronic mail) [fgdc@www.fgdc.gov](mailto:fgdc@www.fgdc.gov). The text also is available from anonymous File Transfer Protocol (anonymous ftp) server [www.fgdc.gov](http://www.fgdc.gov) and at the FGDC web site <http://www.fgdc.gov/Metadata/Metadata.html>.



## 1.2 ELEMENTS OF THE CONTENT STANDARD FOR DIGITAL GEOSPATIAL METADATA

All the standard elements of the Content Standard for Digital Geospatial Metadata are available for use in the Biological Data Profile. All the mandatory elements from the Content Standard for Digital Geospatial Metadata must be provided in a metadata document compliant with the CSDGM Profile for Biological Data. The only exception to this is the element `Spatial_Domain` becomes mandatory if applicable in the Biological Data Profile. Under this designation, the element `Spatial_Domain` would continue to be mandatory if the dataset or information product being documented is geospatial; only if the dataset or information product does not display the characteristic of geospatial extent would the requirement for `Spatial_Domain` be waived.



### 1.3 CHANGES TO THE CONTENT STANDARD FOR DIGITAL GEOSPATIAL METADATA

#### 1.3.1 Conditionality Changes

Due to the extension of the use of the Content Standard for Digital Geospatial Metadata into the use for documenting biological data sets in general, some changes to the conditionality of standard elements are required. These changes are detailed below, using the numbering scheme found in the Content Standard for Digital Geospatial Metadata. The content includes the element name, the change as defined in the profile, the modified production rules, and in addition, the set of information as defined for extended elements.

#### 1.5 Spatial\_Domain

Within this profile, the element "Spatial\_Domain" has been redefined as mandatory if applicable.

Identification\_Information =  
Citation +  
Description +  
Time\_Period\_of\_Content +  
Status +  
**0{Spatial\_Domain}1** +  
Keywords +  
0{Taxonomy}1 +  
Access\_Constraints +  
Use\_Constraints +  
(Point\_of\_Contact) +  
(1{Browse\_Graphic}n) +  
(Data\_Set\_Credit) +  
(Security\_Information) +  
(Native\_Data\_Set\_Environment) +  
(1{Cross\_Reference}n) +  
0{Analytical\_Tool}n

#### Conditionality\_Change:

Name: Spatial\_Domain

Short\_Name: spdom

Type: compound

Parent: Identification\_Information

Optionality: **mandatory if applicable**

Definition: the geographic areal domain of the data set.

Rationale:

Many biological datasets are not in any manner related to maps, or geospatial location. They neither contain geospatial references nor are they collected in a geospatial location that is relevant to their use or interpretation. Laboratory studies would be examples of non-geospatial datasets (e.g., a laboratory study of reproductive behavior in

response to temperature change, or controlled toxicity testing on fish, aquatic larvae, and invertebrates, or environmental enrichment data for non-human primates). Having non-geospatial datasets returned as products of a spatial search would be inaccurate, a misrepresentation of the datasets, and would degrade the utility of the National Spatial Data Infrastructure. For these reasons, the Spatial\_Domain element becomes "mandatory-if-applicable" within this profile. Under this designation, the element Spatial\_Domain would continue to be mandatory if the dataset or information product being documented is geospatial; only if the dataset or information product does not display the characteristic of geospatial extent would the requirement for Spatial\_Domain be waived.

Source:

National Biological Information Infrastructure (NBII), USGS  
Biological Resources Division, FGDC Biological Data Working Group

#### 8.6 Geospatial\_Data\_Presentation\_Form

Within this profile, the element "Geospatial\_Data\_Presentation\_Form" is defined as mandatory.

Citation\_Information =  
1{Originator}n +  
Publication\_Date +  
(Publication\_Time) +  
Title +  
0{Edition}1 +  
**Geospatial\_Data\_Presentation\_Form** +  
0{Series\_Information}1 +  
0{Publication\_Information}1 +  
0{Other\_Citation\_Details}1 +  
(1{Online\_Linkage}n) +  
0{Larger\_Work\_Citation}1

Conditionality\_Change:

Name: Geospatial\_Data\_Presentation\_Form

Short\_Name: geoform

Type: text

Domain: see domain changes page 1-12

Parent: Citation\_Information

Optionality: **mandatory**

Definition: The mode in which the geospatial data are represented.

Rationale:

With documentation of information products that are not explicitly geospatial, searchers for information via metadata need to be able to identify whether they are retrieving a data set or other product. By making Geospatial\_Data\_Presentation\_Form mandatory, metadata

creators must provide some description of the form of the data being documented.

Source:

National Biological Information Infrastructure (NBII), USGS  
Biological Resources Division, FGDC Biological Data Working Group

### 1.3.2 Domain Changes

Due to the extension of the use of the Content Standard for Digital Geospatial Metadata into the use for documenting biological data sets in general, some additions to domains of standard elements are required. These changes are detailed below, using the numbering scheme found in the Content Standard for Digital Geospatial Metadata, the element name, the domain as defined in the Content Standard for Digital Geospatial Metadata, and then the additions. Because some data elements required for documenting geospatial data sets may be of marginal use or possibly even misleading in documenting non-geospatial data holdings, under these conditions, these data elements may contain a phrase such as “not applicable”.

#### 1.3.1 Currentness\_Reference

Domain: “ground condition” “publication date” free text

Extended Domain: “observed”

### 1.10.3 Browse\_Graphic\_Format

Domain: domain values in the table below; free text

| DOMAIN VALUE | DEFINITION                               |
|--------------|--|
| "CGM"        | Computer Graphics Metafile               |
| "EPS"        | Encapsulated Postscript format           |
| "GIF"        | Graphic Interchange Format               |
| "JPEG"       | .Joint Photographic Experts Group format |
| "PBM"        | Portable Bit Map format                  |
| "PS"         | Postscript format                        |
| "TIFF"       | Tagged Image File Format                 |
| "XWD"        | X-Windows Dump                           |

Extended Domain:

If a definition of the type is not contained in the table below, use a standard mime type extension if possible, before creating a new name.

|         |   |
|---------|---|
| "AIF"   | Audio Interchange File Format             |
| "ASF"   | Advanced Streaming Format                 |
| "AU"    | Sun audio format                          |
| "AVI"   | Audio Video Interleave format             |
| "MID"   | Musical Digital Interface format          |
| "MOVIE" | SGI movie video format                    |
| "MP3"   | MP3 music format                          |
| "MPEG"  | Moving Picture Experts Group video format |
| "MPGA"  | MPEG audio format                         |
| "PNG"   | Portable Network Graphics format          |
| "PPT"   | Powerpoint presentation                   |
| "QT"    | Quicktime video format                    |
| "RA"    | RealAudio format                          |
| "WRL"   | Virtual Reality Modeling Language         |
| "WAV"   | Microsoft audio form                      |

### 2.2 Logical\_Consistency\_Report

Domain: free text

Extended Domain: "not applicable"

### 2.5.1.3 Type\_of\_Source\_Media

Domain: "paper" "stable-base material" "microfiche" "microfilm" "audiocassette"  
"chart" "filmstrip" "transparency" "videocassette" "videodisc" "videotape"  
"physical model" "computer program" "disc" "cartridge tape" "magnetic tape"  
"online" "CD-ROM" "electronic bulletin board" "electronic mail system" free  
text

Extended Domain: "digital database file" "field notes" "photographic print"  
"printed table" "visually observed or measured"

2.5.1.4.1 Source\_Currentness\_Reference

Domain: "ground condition" "publication date" free text

Extended Domain: "observed"

6.4.2.1.1 Format\_Name

Domain: domain values from the table below; free text

| <u>Domain Value</u> | <u>Definition</u>  |
|---------------------|--|
| "ARCE"              | ARC/INFO Export format   |
| "ARCG"              | ARC/INFO Generate format   |
| "ASCII"             | ASCII file, formatted for text attributes, declared format                   |
| "BIL"               | Imagery, band interleaved by line  |
| "BIP"               | Imagery, band interleaved by pixel   |
| "BSQ"               | Imagery, band interleaved sequential   |
| "CDF"               | Common Data Format   |
| "CFF"               | Cartographic Feature File (U.S. Forest Service)                              |
| "COORD"             | User-created coordinate file, declared format                                |
| "DEM"               | Digital Elevation Model format (U.S. Geological Survey)                      |
| "DFAD"              | Digital Feature Analysis Data (National Imagery and Mapping Agency)          |
| "DGN"               | Microstation format (Intergraph corporation)                                 |
| "DIGEST"            | Digital Geographic Information Exchange Standard                             |
| "DLG"               | Digital Line Graph (U.S. Geological Survey)                                  |
| "DTED"              | Digital Terrain Elevation Data (MIL-D-89020)                                 |
| "DWG"               | AutoCAD Drawing format   |
| "DX90"              | Data Exchange '90  |
| "DXF"               | AutoCAD Drawing Exchange Format  |
| "ERDAS"             | ERDAS image file (ERDAS Corporation)   |
| "GRASS"             | Geographic Resources Analysis Support System                                 |
| "HDF"               | Hierarchical Data Format   |
| "IGDS"              | Interactive Graphic Design System format (Intergraph Corporation)            |
| "IGES"              | Initial Graphics Exchange Standard   |
| "MOSS"              | Multiple Overlay Statistical System export file                              |
| "netCDF"            | network Common Data Format   |
| "NITF"              | National Imagery Transfer Format   |
| "RPF"               | Raster Product Format (National Imagery and Mapping Agency)                  |
| "RVC"               | Raster Vector Converted format (MicroImages)                                 |
| "RVF"               | Raster Vector Format (MicroImages)   |
| "SDTS"              | Spatial Data Transfer Standard (Federal Information Processing Standard 173) |
| "SIF"               | Standard Interchange Format (DOD Project 2851)                               |
| "SLF"               | Standard Linear format (National Imagery and Mapping Agency)                 |
| "TIFF"              | Tagged Image File Format   |

|                  |   |
|------------------|---|
| “TGRN”           | Topologically Integrated Geographic Encoding and Referencing (TIGER) Line format (Bureau of the Census) |
| “VPF”            | Vector Product Format (National Imagery and Mapping Agency)   |
| Extended Domain: |   |
| “DBF”            | dBASE data file   |
| “DIF”            | VisiCalc format   |
| “DOC”            | Microsoft Word file   |
| “EPS”            | Encapsulated Postscript   |
| “FW”             | Framework spreadsheet or database format  |
| “GIF”            | Graphics Interchange Format   |
| “GRA”            | ARC/INFO graphic file   |
| “MDB”            | Microsoft Access data file  |
| “PBM”            | Portable Bit Map format file  |
| “PLT”            | ARC/INFO Plot file  |
| “PS”             | Postscript  |
| “QP”             | Quattro Pro data file   |
| “RPD”            | Rapid File  |
| “SPLUS”          | S-Plus file   |
| “WK1”            | LOTUS 1-2-3 file  |
| “WKS”            | LOTUS 1-2-3 file  |
| “WP”             | WordPerfect   |
| “XLS”            | Microsoft Excel worksheet   |

#### 7.5 Metadata\_Standard\_Name

Domain: “FGDC Content Standards for Digital Geospatial Metadata” free text

Extended Domain: “Content Standard for National Biological Information Infrastructure Metadata” “FGDC Biological Data Profile of the Content Standard for Digital Geospatial Metadata”

#### 8.6 Geospatial\_Data\_Presentation\_Form

Domain: (the listed domain is partially from pp. 88-91 *in* Anglo-American Committee on Cataloging of Cartographic materials, 1982, Cartographic materials: A manual of interpretation for AACR2: Chicago, American Library Association): “atlas” “audio” “diagram” “document” “globe” “map” “model” “multimedia presentation” “profile” “raster digital data” “remote-sensing image” “section” “spreadsheet” “tabular digital data” “vector digital data” “video” “view” free text

Extended Domain: “book chapter” “CAD data” “conference proceedings” “database” “figure” “hologram” “journal article” “pamphlet” “table (non-digital)”



#### 1.4 EXTENDED ELEMENTS

The following are the production rules for how the extended elements fit within the hierarchical structure of the Content Standard for Digital Geospatial Metadata.

Metadata =

Identification\_Information +  
0{Data\_Quality\_Information}1 +  
0{Spatial\_Data\_Organization\_Information}1 +  
0{Spatial\_Reference\_Information}1 +  
0{Entity\_and\_Attribute\_Information}1 +  
0{Distribution\_Information}1 +  
Metadata\_Reference\_Information

Identification\_Information =

Citation +  
Description +  
Time\_Period\_of\_Content +  
Status +  
0{Spatial\_Domain}1 +  
Keywords +  
**0{Taxonomy}1** +  
Access\_Constraints +  
Use\_Constraints +  
(Point\_of\_Contact) +  
(1{Browse\_Graphic}n) +  
(Data\_Set\_Credit) +  
(Security\_Information) +  
(Native\_Data\_Set\_Environment) +  
(1{Cross\_Reference}n) +  
**0{Analytical\_Tool}n**

Spatial\_Domain =

**Description\_of\_Geographic\_Extent** +  
Bounding\_Coordinates +  
(1{Data\_Set\_G\_Polygon}n)

Bounding\_Coordinates =

West\_Bounding\_Coordinate +  
East\_Bounding\_Coordinate +  
North\_Bounding\_Coordinate +  
South\_Bounding\_Coordinate +  
**(Elevation\_Minimum)** +  
**(Elevation\_Maximum)**

**Taxonomy =**

**1{Keywords/Taxon}n +**  
**0{Taxonomic\_System}1 +**  
**(General\_Taxonomic\_Coverage) +**  
**Taxonomic\_Classification**

**Keywords/Taxon =**

**Taxonomic\_Keyword\_Thesaurus +**  
**1{Taxonomic\_Keywords}n**

**Taxonomic\_System =**

**1{Classification\_System/Authority}n +**  
**0{Identification\_Reference}n +**  
**(1{Identifier}n) +**  
**Taxonomic\_Procedures +**  
**0{Taxonomic\_Completeness}1 +**  
**0{Vouchers}n**

**Classification\_System/Authority =**

**Classification\_System\_Citation +**  
**0{Classification\_System\_Modifications}1**

**Classification\_System\_Citation =**

Citation\_Information

**Identification\_Reference =**

Citation\_Information

**Identifier =**

Contact\_Information

**Vouchers =**

**Specimen +**  
**Repository**

**Repository =**

Contact\_Information

**Taxonomic\_Classification =**

**Taxon\_Rank\_Name +**  
**Taxon\_Rank\_Value +**  
**(1{Applicable\_Common\_Name}n) +**  
**0{Taxonomic\_Classification}n**

**Analytical\_Tool =**

**Analytical\_Tool\_Description +**  
**Tool\_Access\_Information +**  
**(Tool\_Contact) +**  
**(Tool\_Citation)**

**Tool\_Access\_Information =**

**0{Tool\_Network\_Resource\_Name}n +**  
**Tool\_Access\_Instructions +**  
**(Tool\_Computer\_and\_Operating\_System)**

**Tool\_Contact =**

Contact\_Information

**Tool\_Citation =**

Citation\_Information

**Lineage =**

**0{Methodology}n +**  
**0{Source\_Information}n +**  
**1{Process\_Step}n**

**Methodology =**

**Methodology\_Type +**  
**(1{Methodology\_Identifier}n) +**  
**Methodology\_Description +**  
**0{Methodology\_Citation}n**

**Methodology\_Identifier =**

**Methodology\_Keyword\_Thesaurus +**  
**1{Methodology\_Keyword}n**

**Methodology\_Citation =**

Citation\_Information

**Digital\_Transfer\_Information =**

**Format\_Name +**  
**([Format\_Version\_Number |**  
**Format\_Version\_Date] +**  
**(Format\_Specification)) +**  
**0{ASCII\_File\_Structure}1 +**  
**(Format\_Information\_Content) +**  
**0{File-Decompression\_Technique}1 +**  
**(Transfer\_Size)**

**ASCII\_File\_Structure =**  
**0{Record\_Delimiter}1 +**  
**Number\_Header\_Lines +**  
**(Description\_of\_Header\_Content) +**  
**Orientation +**  
**Case\_Sensitive +**  
**0{Authentication}1 +**  
**0{Quote\_Character}1 +**  
**1{Data\_Field}n**

**Data\_Field =**  
**Data\_Field\_Name +**  
**0{Missing\_Value\_Code}1 +**  
**[ Data\_Field\_Width\_Delimiter |**  
**Data\_Field\_Width ]**

**Single\_Date/Time =**  
**[Calendar\_Date +**  
**(Time\_of\_Day)] |**  
**Geologic\_Age**

**Range\_of\_Dates/Times =**  
**[Beginning\_Date +**  
**(Beginning\_Time) +**  
**Ending\_Date +**  
**(Ending\_Time)] |**  
**Beginning\_Geologic\_Age +**  
**Ending\_Geologic\_Age**

**Beginning\_Geologic\_Age =**  
**Geologic\_Age**

**Ending\_Geologic\_Age =**  
**Geologic\_Age**

**Geologic\_Age =**  
**Geologic\_Time\_Scale +**  
**Geologic\_Age\_Estimate +**  
**0{Geologic\_Age\_Uncertainty}1 +**  
**0{Geologic\_Age\_Explanation}1 +**  
**(1{Geologic\_Citation}n)**

**Geologic\_Citation =**  
**Citation\_Information**

Extension\_Information:

Name: Description\_of\_Geographic\_Extent

Short\_Name: descgeog

z3950 tag: 4112

Type: text

Domain: free text

Parent: Spatial\_Domain

Optionality: Mandatory

Definition:

Short description of the geographic areal domain of the data set. Examples include, "Manistee River watershed", "extent of 7 ½ minute quads containing any property belonging to Yellowstone National Park", or "ponds and reservoirs larger than 2 acres in Jefferson County, Colorado". This is especially important when the extent of the data set is not well described by the "Bounding\_Rectangle\_Coordinates".

Rationale:

This description is especially important when the extent of the data set is not well described by the "Bounding\_Rectangle\_Coordinates", or in the case of data which is not specifically geospatial, to provide a geographic setting for the item being documented. Assuming the "Bounding\_Rectangle\_Coordinates" do not adequately describe the extent of the data set, the discrepancy can be identified and described in this data element. If the item being documented is not specifically geospatial, the "Bounding\_Rectangle\_Coordinates" can define a general polygon, such as a rectangle around a country, with this "Description\_of\_Geographic\_Extent" element containing a disclaimer concerning the "Bounding\_Rectangle\_Coordinates" and/or further detail concerning the geographic area of concern for the item being documented. For example, a study of the diseases of salmon may not have a specific geographic extent associated with it, but the salmon involved in the study were collected in Washington and Oregon states, thus the "Bounding\_Rectangle\_Coordinates" might form a general rectangle around the states of Washington and Oregon, but the "Description\_of\_Geographic\_Extent" might describe the fact that the extent within Washington and Oregon included only certain rivers within those states.

This data element differs from the standard data element "Place\_Keyword" in that it allows a free text description of the geographic extent, rather than just a list of words or phrases useful as an index of location names associated with the data set.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Elevation\_Minimum

Short\_Name: elevmin

Type: text

Domain: free text

Parent: Bounding\_Coordinates

Optionality: optional

Definition: The minimum elevation extent of coverage along with units of measure.

Rationale:

To be able to locate the vertical extent of a data set in association with its horizontal extent.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Elevation\_Maximum

Short\_Name: elevmax

Type: text

Domain: free text

Parent: Bounding\_Coordinates

Optionality: optional

Definition: The maximum elevation extent of coverage along with units of measure.

Rationale:

To be able to locate the vertical extent of a data set in association with its horizontal extent.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Taxonomy

Short\_Name: taxonomy

z3950 tag: 4001

Type: compound

Rule: Taxonomy =

1{Keywords/Taxon}n +  
0{Taxonomic\_System}1 +  
(General\_Taxonomic\_Coverage) +  
Taxonomic\_Classification

Parent: Identification\_Information

Optionality: Mandatory-if-applicable

Definition:

Information on the taxa (1 or more) included in the data set, including keywords, taxonomic system and coverage information, and taxonomic classification system.

Rationale: To provide for documentation of taxonomic information.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Keywords/Taxon

Short\_Name: keywtax

z3950 tag:

Type: compound

Rule: Keywords/Taxon =

Taxonomic\_Keyword\_Thesaurus +  
1{Taxonomic\_Keywords}n

Parent: Taxonomy

Optionality: mandatory

Definition:

Taxonomic ranks or common groups characterized by the data set.

Rationale:

To provide general keywords for searching, and to allow users to identify potential data sets addressing taxa of interest.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Taxonomic\_Keyword\_Thesaurus

Short\_Name: taxonkt

Type: text

Domain: "None" free text

Parent: Keywords/Taxon

Optionality: mandatory

Definition:

Reference to a formally registered thesaurus or similar authoritative source of taxonomic keywords.

Rationale: To provide for documentation of taxonomic information.

Extension\_Information:

Name: Taxonomic\_Keywords

Short\_Name: taxonkey

z3950 tag: 4002

Type: text

Domain:

"collection" "multiple species" "single species" "amphibians" "animals"  
"bacteria" "fungi" "invertebrates" "lichens" "mammals" "mosses" "plants"  
"protists" "reptiles" "vegetation" "vertebrates" "viruses" free text

Parent: Keywords/Taxon

Optionality: Mandatory

Definition:

Common-use words or phrases describing the taxonomy covered by the data set.

Rationale:

To provide general keywords for searching, and to allow users to identify potential data sets addressing taxa of interest.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group



Extension\_Information:

Name: Taxonomic\_System

Short\_Name: taxonsys

z3950 tag: 4028

Type: compound

Rule: Taxonomic\_System =

1{Classification\_System/Authority}n +

0{Identification\_Reference}n +

(1{Identifier}n) +

Taxonomic\_Procedures +

0{Taxonomic\_Completeness}1 +

0{Vouchers}n

Parent: Taxonomy

Optionality: Mandatory-if-applicable

Definition:

Documentation of taxonomic sources, procedures, and treatments.

Rationale:

The set of data elements contained within this compound element represent an attempt to provide better documentation of taxonomic sources, procedures, and treatments as strongly recommended in the American Institute of Biological Sciences Review to the National Biological Service on the Content Standard for Non-Geospatial Metadata Workshop, 1995.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Classification\_System/Authority

Short\_Name: classsys

z3950 tag: 4029

Type: compound

Rule: Classification\_System/Authority =

Classification\_System\_Citation +

0{Classification\_System\_Modifications}1

Parent: Taxonomic\_System

Optionality: Mandatory

Definition:

Information about the classification system or authority used.

Rationale:

Together, the classification system and any modifications made to it represent a significant piece of information concerning the data being documented.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Classification\_System\_Citation  
Short\_Name: classcit  
z3950 tag: 4030  
Type: compound  
Child: Citation\_Information  
Parent: Classification\_System/Authority  
Optionality: Mandatory

Definition:

A citation for the classification system or authority used, this might include monographs (e.g., a regional flora) or on-line data sets (e.g., the USDA PLANTS database), etc.

Rationale:

This data element defines the authority used for classifying. When appropriate, the Integrated Taxonomic Information System (ITIS) <URL:<http://www.itis.usda.gov/itis/>> should be used.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Classification\_System\_Modifications  
Short\_Name: classmod  
z3950 tag: 4037  
Type: text  
Domain: free text  
Parent: Classification\_System/Authority  
Optionality: Mandatory-if-applicable

Definition:

A description of any modifications or exceptions made to the classification system or authority used.

Rationale:

Many times a standard system is used, but exceptions are made for specific taxa or groups, this element allows for these exceptions or modifications to be described.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Identification\_Reference

Short\_Name: idref

z3950 tag: 4031

Type: compound

Child: Citation\_Information

Parent: Taxonomic\_System

Optionality: Mandatory-if-applicable

Definition:

Information on any non-authoritative materials (e.g. field guides) useful for reconstructing the actual identification process.

Rationale:

This information can be useful for someone who wishes to make use of a data set, and perhaps expand on it, following similar procedures.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Identifier

Short\_Name: ider

z3950 tag: 4032

Type: compound

Child: Contact\_information

Parent: Taxonomic\_System

Optionality: Optional

Definition:

Information about the individual(s) responsible for the identification(s) of the specimens or sightings, etc.

Rationale:

If there are any questions on the identification of specimens or field sightings, this should provide some insight into the data creator.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Taxonomic\_Procedures

Short\_Name: taxonpro

z3950 tag: 4035

Type: text

Domain: free text

Parent: Taxonomic\_System

Optionality: Mandatory

Definition:

Description of the methods used for the taxonomic identification. Could include specimen processing, comparison with museum materials, keys and key characters, chemical or genetic analyses, etc.

Rationale:

In order to be able to make appropriate use of a biological data set, often it is important to know not just who identified the individuals or specimens, but what process did they used to do so.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Taxonomic\_Completeness

Short\_Name: taxoncom

z3950 tag: 4036

Type: text

Domain: free text

Parent: Taxonomic\_System

Optionality: Mandatory-if-applicable

Definition:

Information concerning the proportions and treatment of unidentified materials (i.e. materials sent to experts, and not yet determined); estimates of the importance, and identities of misidentifications, uncertain determinations, synonyms or other incorrect usages; taxa not well treated or requiring further work; and expertise of field workers.

Rationale:

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Vouchers

Short\_Name: vouchers

z3950 tag: 4033

Type: compound

Rule: Vouchers =

Specimen +

Repository

Parent: Taxonomic\_System

Optionality: Mandatory-if-applicable

Definition:

Information on the types of specimen, the repository, and the individuals who identified the vouchers.

Rationale:

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Specimen

Short\_Name: specimen

z3950 tag: 4038

Type: text

Domain:

"herbarium specimens" "blood samples" "photographs" "individuals" free text

Parent: Vouchers

Optionality: Mandatory

Definition:

A word or phrase describing the type of specimen collected (e.g. herbarium specimens, blood samples, photographs, individuals, or batches).

Rationale:

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Repository

Short\_Name: reposit

z3950 tag: 4034

Type: compound

Child: Contact\_Information

Parent: Vouchers

Optionality: Mandatory

Definition:

Information about the curator or contact person and/or agency responsible for the specimens.

Rationale:

If, for any reason, the specimens should need to be referred to, information about where they are being housed and who is responsible for them should be kept along with the documentation of the data set. If they have not been archived, this should be noted.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: General\_Taxonomic\_Coverage

Short\_Name: taxongen

z3950 tag: 4105

Type: text

Domain: free text

Parent: Taxonomy

Optionality: optional

Definition:

A description of the range of taxa addressed in the data set or collection. For example, "all vascular plants were identified to family or species, mosses and lichens were identified as moss or lichen."

Rationale:

To provide the capability to document the taxa addressed in the data set or collection via a free text description. This is especially important with data sets or collections which contain examples of a many taxonomic levels.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Taxonomic\_Classification

Short\_Name: taxoncl

z3950 tag:

Type: compound

Rule: Taxonomic\_Classification =  
Taxon\_Rank\_Name +  
Taxon\_Rank\_Value +  
(0{Applicable\_Common\_Name}n) +  
0{Taxonomic\_Classification}n

Parent: Taxonomy

Parent: Taxonomic\_Classification

Definition:

Information about the range of taxa addressed in the data set or collection. It is recommended that one provide information starting from the taxonomic rank of kingdom, to a level which reflects the data set or collection being documented. The levels of Kingdom, Division/Phylum, Class, Order, Family, Genus, and Species should be included as ranks as appropriate. For example, if the data set deals with the species "red maple" or *Acer rubrum* var. *rubrum*, then the contents might look like the following:

Taxonomic\_Classification:

Taxon\_Rank\_Name: Kingdom

Taxon\_Rank\_Value: Plantae

Applicable\_Common\_Name: plants

Taxonomic\_Classification:

Taxon\_Rank\_Name: Division

Taxon\_Rank\_Value: Magnoliophyta

Taxonomic\_Classification:

Taxon\_Rank\_Name: Class

Taxon\_Rank\_Value: Magnoliopsida

Taxonomic\_Classification:

Taxon\_Rank\_Name: Subclass

Taxon\_Rank\_Value: Rosidae

Taxonomic\_Classification:

Taxon\_Rank\_Name: Order

Taxon\_Rank\_Value: Sapindales

Taxonomic\_Classification:

Taxon\_Rank\_Name: Family

Taxon\_Rank\_Value: Aceraceae

Applicable\_Common\_Name: maples

Taxonomic\_Classification:

Taxon\_Rank\_Name: Genus

Taxon\_Rank\_Value: Acer

Applicable\_Common\_Name: maples

Taxonomic\_Classification:

Taxon\_Rank\_Name: Species

Taxon\_Rank\_Value: *Acer rubrum* var. *rubrum*

Applicable\_Common\_Name: red maple

If the data set pertains to many species, then the Taxonomic\_Classification structure can be built by adding additional families under the Taxonomic\_Classification rank of order.

If the taxon of interest is undefined at any taxonomic rank, omit that rank from the structure. (One authority for this information is the Integrated Taxonomic Information System (ITIS) located at:

"<http://www.itis.usda.gov/plantproj/itis/>").

Rationale:

To provide the capability to describe precisely the taxa addressed in the data set or collection. This can be accomplished using a hierarchical structure to specify from Kingdom down to the appropriate taxonomic level.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Taxon\_Rank\_Name

Short\_Name: taxonrn

z3950 tag:

Type: text

Domain:

"Kingdom" "Division" "Phylum" "Subphylum" "Superclass" "Class"  
"Subclass" "Infraclass" "Superorder" "Order" "Suborder" "Infraorder"  
"Superfamily" "Family" "Subfamily" "Tribe" "Subtribe" "Genus" "Species"  
free text

Parent: Taxonomic\_Classification

Optionality: mandatory

Definition:

The name of the taxonomic rank for which the Taxon\_Rank\_Value is provided. See the example included in the definition of Taxonomic\_Classification.

Rationale:

To provide the capability to describe precisely the taxa addressed in the data set or collection.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group



Extension\_Information:

Name: Taxon\_Rank\_Value

Short\_Name: taxonrv

Type: text

Domain: free text

Parent: Taxonomic\_Classification

Optionality: mandatory

Definition:

The name representing the taxonomic rank of the taxon being described. See the example included in the definition of Taxonomic\_Classification.

Rationale:

To provide the capability to describe precisely the taxa addressed in the data set or collection.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Applicable\_Common\_Name

Short\_Name: common

z3950 tag: 4012

Type: text

Domain: free text

Parent: Taxonomic\_Classification

Optionality: optional

Definition:

Specification of applicable common names. These common names may be general descriptions of a group of organisms if appropriate (e.g. insects, vertebrate, grasses, waterfowl, vascular plants, etc.)

Rationale:

To provide the capability to describe precisely the taxa addressed in the data set or collection.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Analytical\_Tool

Short\_Name: tool

z3950 tag: 4013

Type: compound

Rule: Analytical\_Tool =  
Analytical\_Tool\_Description +  
Tool\_Access\_Information +  
(Tool\_Contact) +  
(Tool\_Citation)

Parent: Identification\_Information

Optionality: Mandatory-if-applicable

Definition:

Tools, models, or statistical procedures that the data set is intrinsically bound to and are available for use in analyzing the data set. Examples include reconstructions of phylogenies, population viability analyses, community ordinations, most atmospheric and hydrological transport analyses, and inferences on the effects of climate change on forest composition and productivity. Enough information should be included such that a potential data user can easily determine why they might wish to acquire the analytical tool, and the methodology to acquire it.

Rationale:

Some biological data sets are intrinsically bound to models or statistical procedures used to generate them. In these cases, a description of the analyses and contact, citation, and access information for the tools used are needed to properly interpret the data.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Analytical\_Tool\_Description

Short\_Name: tooldesc

z3950 tag: 4014

Type: text

Domain: free text

Parent: Analytical\_Tool

Optionality: Mandatory

Definition:

Description of the analytical tool, model, or statistical procedure.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Tool\_Access\_Information

Short\_Name: toolacc

z3950 tag: 4015

Type: compound

Rule: Tool\_Access\_Information =

0{Tool\_Network\_Resource\_Name}n +

Tool\_Access\_Instructions +

(Tool\_Computer\_and\_Operating\_System)

Parent: Analytical\_Tool

Optionality: Mandatory

Definition:

Information on the steps required to access the tool.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Tool\_Contact

Short\_Name: toolcont

z3950 tag: 4016

Type: compound

Child: Contact\_Information

Parent: Analytical\_Tool

Optionality: Optional

Definition:

The party from whom the tool, model, or statistical procedure may be obtained.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Tool\_Citation

Short\_Name: toolcite

z3950 tag: 4017

Type: compound

Child: Citation\_Information

Parent: Analytical\_Tool

Optionality: Optional

Definition:

Citation information about the tool, model, or statistical procedure.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Tool\_Network\_Resource\_Name

Short\_Name: toolnet

z3950 tag: 4018

Type: text

Domain: free text

Parent: Tool\_Access\_Information

Optionality: Mandatory-if-applicable

Definition:

The electronic address and name of the file or service from which the tool, model, or statistical procedure can be obtained.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Tool\_Access\_Instructions

Short\_Name: toolinst

z3950 tag: 4019

Type: text

Domain: free text

Parent: Tool\_Access\_Information

Optionality: Mandatory

Definition:

Instructions on the steps required to access the tool, model, or statistical procedure.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Tool\_Computer\_and\_Operating\_System

Short\_Name: toolcomp

z3950 tag: 4020

Type: text

Domain: free text

Parent: Tool\_Access\_Information

Optionality: Optional

Definition:

The brand of computer and its operating system that the tool, model, or statistical procedure requires.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Methodology

Short\_Name: method

z3950 tag: 4021

Type: compound

Rule: Methodology =

Methodology\_Type +

(1{Methodology\_Identifier}n) +

Methodology\_Description +

0{Methodology\_Citation}n

Parent: Lineage

Optionality: Mandatory-if-applicable

Definition:

Information about a single step of field and/or laboratory work.

Rationale:

This element represents a critical element of the documentation required to interpret important biological data sets.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Methodology\_Type

Short\_Name: methtype

z3950 tag: 4022

Type: text

Domain: "Field" "Lab" free text

Parent: Methodology

Optionality: Mandatory

Definition:

The type of methodology being documented, such as field or laboratory methodology.

Rationale:

This element should set a basic definition for the type of methodology being documented.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Methodology\_Identifier

Short\_Name: methodid

z3950 tag: 4023

Type: compound

Rule: Methodology\_Identifier =

Methodology\_Keyword\_Thesaurus +  
1{Methodology\_Keyword}n

Parent: Methodology

Optionality: Optional

Definition:

Keywords or phrases summarizing the field or laboratory methods used.

Rationale:

Although there are no simple sets of standardized methods for all data collection, for most classes of data, it should be possible to identify some standard terms describing the methodology being documented. In some cases, standardized references or thesauri may exist or may be under creation.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Methodology\_Keyword\_Thesaurus

Short\_Name: methkt

z3950 tag: 4024

Type: text

Domain: "None" free text

Parent: Methodology\_Identifier

Optionality: Mandatory

Definition:

Reference to a formally registered thesaurus or a similar authoritative source of methodology keywords.

Rationale:

Although there are no simple sets of standardized methods for all data collection, for most classes of data, it should be possible to identify some standard terms describing the methodology being documented. In some cases, standardized references or thesauri may exist or may be under creation.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Methodology\_Keyword  
Short\_Name: methkey  
z3950 tag: 4025  
Type: text  
Domain: free text  
Parent: Methodology\_Identifier  
Optionality: Mandatory  
Definition:

The name of a method used in the field or laboratory work.

Rationale:

Although there are no simple sets of standardized methods for all data collection, for most classes of data, it should be possible to identify some standard terms describing the methodology being documented. In some cases, standardized references or thesauri may exist or may be under creation.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Methodology\_Description  
Short\_Name: methdesc  
z3950 tag: 4026  
Type: text  
Domain: free text  
Parent: Methodology  
Optionality: Mandatory  
Definition:

Equivalent to "Materials and Methods" in a journal article. Describe the physical methods used to gather data, the experimental design, sample frequency, treatments or strata, statistical and spatial design of the sampling, and sample completeness, representativeness, and biases. For example, in a bird survey, relevant elements would include the methods used to detect species occurrences (casual sightings, transects, focal point surveys, vocalizations, mist nets), whether or not evidence of breeding activity was required, descriptions of the habitat strata in a stratified design, and known biases (e.g., non-territorial birds were undersampled, and some juveniles could not be identified to species.)

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Methodology\_Citation

Short\_Name: methcite

z3950 tag: 4027

Type: compound

Child: Citation\_Information

Parent: Methodology

Optionality: Mandatory-if-applicable

Definition: Information referencing the methods used.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: ASCII\_File\_Structure

Short\_Name: asciistr

Type: compound

Rule: ASCII\_File\_Structure =

0{Record\_Delimiter}1 +

Number\_Header\_Lines +

(Description\_of\_Header\_Content) +

Orientation +

Case\_Sensitive +

0{Authentication}1 +

0{Quote\_Character}1 +

1{Data\_Field}n

Parent: Digital\_Transfer\_Information

Optionality: mandatory if applicable

Definition: Information about the content and format of an ASCII data file.

Rationale:

To provide the capability to completely and accurately describe the content and format of an ASCII data file. This structure was created with the goal of automatic machine processing of this information for file transfer, data loading, and quality assurance.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group



Extension\_Information:

Name: Record\_Delimiter

Short\_Name: recdel

Type: text

Domain: free text

Parent: ASCII\_File\_Structure

Optionality: Mandatory if applicable

Definition:

The character(s) which indicate the end of a record.

Rationale:

To provide accurate machine processable information for transfer of ASCII files.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Number\_Header\_Lines

Short\_Name: numheadl

Type: Integer

Domain: Number\_Header\_Lines >= 0

Parent: ASCII\_File\_Structure

Optionality: mandatory

Definition:

The number of lines at the beginning of the file before the data content actually begins.

Rationale:

To provide accurate machine processable information for transfer of ASCII files.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Description\_of\_Header\_Content

Short\_Name: desthead

Type: text

Domain: free text

Parent: ASCII\_File\_Structure

Optionality: optional

Definition:

Description of the information content of the header lines.

Rationale:

To provide accurate machine processable information for transfer of ASCII files.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Orientation

Short\_Name: orienta

Type: text

Domain: "columnmajor" "rowmajor"

Parent: ASCII\_File\_Structure

Optionality: mandatory

Definition:

Definition of the direction of information content as represented in the ASCII file. Typical data sets are represented in column-major format, where each attribute in the data set is represented as a column and each observation is a row. In contrast, row-major data sets represent attributes as rows and observations as columns. For example, if one has 3 observations (1,2,3) of two attributes (A,B), in column-major format the first record of the datafile would contain the first observation for both attributes (values A1,B1), but in row-major format the first record would contain all of the observations for only attribute A (values A1,A2,A3).

Rationale:

To provide accurate machine processable information for transfer of ASCII files.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Case\_Sensitive

Short\_Name: casesens

Type: text

Domain: "y" "Y" "n" "N"

Parent: ASCII\_File\_Structure

Optionality: mandatory

Definition:

If the content of the data set is encoded in case-sensitive ASCII (the capital and small letters have meaning), then this element should contain "y" or "Y", otherwise this element should contain "n" or "N".

Rationale:

To provide accurate machine processable information for transfer of ASCII files.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Authentication

Short\_Name: authent

Type: text

Domain: free text

Parent: ASCII\_File\_Structure

Optionality: mandatory if applicable

Definition:

Information allowing verification of file contents to ensure accurate transmission of the file. This is generally a named checksum that uses a standard algorithm or a cryptographic signature. For example, a MD5 checksum could be provided and, if it matches a MD5 checksum calculated for the received file, one would conclude that the file is identical to the original.

Rationale:

To provide accurate machine processable information for transfer of ASCII files.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Quote\_Character  
Short\_Name: quotech  
Type: text  
Domain: “ ” “ ’ ” “ ` ” free text  
Parent: ASCII\_File\_Structure  
Optionality: mandatory if applicable  
Definition:

Character used to quote fields in the data representation so that the field delimiter can be used as part of the field value. This character is typically a single quote mark or double quote mark. For example, in a field representing a person's name, one might use double quotes around the field (e.g., "Johnson, M.") to indicate that the embedded comma in the text string is not a field delimiter.

Rationale:

To provide accurate machine processable information for transfer of ASCII files.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Data\_Field  
Short\_Name: datafiel  
Type: compound  
Rule: Data\_Field =  
Data\_Field\_Name +  
0{Missing\_Value\_Code}1 +  
[ Data\_Field\_Width\_Delimiter |  
Data\_Field\_Width ]

Parent: ASCII\_File\_Structure

Optionality: mandatory

Definition:

Information describing the individual data fields (this would be equivalent to columns in most databases).

Rationale:

To provide accurate machine processable information for transfer of ASCII files.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Data\_Field\_Name

Short\_Name: dfieldnm

Type: text

Domain: free text

Parent: Data\_Field

Optionality: mandatory

Definition:

Name of the data field. This name should be the same as an Attribute Label documented in Section 5.1.2 Attribute (within Detailed Description which is itself within Entity and Attribute Information). The definition, domain, units of measure, and measurement resolution are all important pieces of information for ASCII file use.

Rationale:

The definition, domain, units of measure, and measurement resolution are all defined as part of 5.1.2 Attribute, thus should not be defined again. This information should be entered, thus the name entered as the Attribute Label should be referred to here, so the appropriate information can be correlated with the fields of the ASCII data file.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Missing\_Value\_Code

Short\_Name: missingv

Type: text

Domain: free text

Parent: Data\_Field

Optionality: mandatory if applicable

Definition:

The code which represents missing data.

Rationale:

In order to differentiate between missing data and null data, a code to indicate that the data value is missing is often used. This code is required to make effective and accurate use of ASCII data files.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Data\_Field\_Width\_Delimiter

Short\_Name: dfwidthd

Type: text

Domain: free text

Parent: Data\_Field

Definition:

The character which indicates the end of the data field contents.

Rationale:

To make effective and accurate use of ASCII data files. Although entire data sets are generally characterized as fixed\_width format or variable\_width format, this characterization is more accurately reflected at the field level, as fixed\_width fields may be mixed in the same data file with variable\_width fields.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Data\_Field\_Width

Short\_Name: dfwidth

Type: integer

Domain: Data\_Field\_Width >=1

Parent: Data\_Field

Definition:

The number of characters of the data field.

Rationale:

To make effective and accurate use of ASCII data files. Although entire data sets are generally characterized as fixed\_width format or variable\_width format, this characterization is more accurately reflected at the field level, as fixed\_width fields may be mixed in the same data file with variable\_width fields.

Source:

National Biological Information Infrastructure (NBII), USGS Biological Resources Division, FGDC Biological Data Working Group

Extension\_Information:

Name: Beginning\_Geologic\_Age

Short\_Name: beggeol

Type: Compound

Rule: Beginning\_Geologic\_Age =  
Geologic\_Age

Parent: Range\_of\_Dates/Times

Definition:

A name, code, or date for the beginning of an event or period in geologic time.

Rationale:

To provide the capability to completely and accurately describe the geologic dates relevant to a data set.

Source:

U.S. Geological Survey, FGDC Biological Data Working Group, National Biological Information Infrastructure (NBII)

Extension\_Information:

Name: Ending\_Geologic\_Age

Short\_Name: endgeol

Type: Compound

Rule: Ending\_Geologic\_Age =  
Geologic\_Age

Parent: Range\_of\_Dates/Times

Definition: A name, code, or date for the end of an event or period in geologic time.

Rationale:

To provide the capability to completely and accurately describe the geologic dates relevant to a data set.

Source:

U.S. Geological Survey, FGDC Biological Data Working Group, National Biological Information Infrastructure (NBII)

Extension\_Information:

Name: Geologic\_Age  
Short\_Name: geolage  
Parent: Single\_Date/Time  
Parent: Beginning\_Geologic\_Age  
Parent: Ending\_Geologic\_Age  
Type: Compound  
Rule: Geologic\_Age =  
    Geologic\_Time\_Scale +  
    Geologic\_Age\_Estimate +  
    0{Geologic\_Age\_Uncertainty}1 +  
    0{Geologic\_Age\_Explanation}1 +  
    (1{Geologic\_Citation}n)

Definition:

A name, code, or date describing an event or period in geologic time, expressed either as an absolute date calculated using a named dating method, or as a relative date that is drawn from stratigraphy or biostratigraphy.

Rationale:

To provide the capability to describe the geologic dates relevant to a data set. Calendar dates as provided in the ISO 8601 dating system used in the standard CSDGM are not adequate to describe geologic time periods. Absolute geologic time is usually measured in “millions of years” before present, but may use different units and relative base times. Relative geologic time is measured by subdivisions of the earth’s geology in an order based upon relative age, most commonly, vertical or stratigraphic position. The actual dating systems used in geologic studies often tie relative times measured through stratigraphy or biostratigraphy to a particular absolute time using radioisotope dating techniques, among others. As these methods for absolute dating have improved, the estimates of the dates for strata have changed, consequently, it would be inaccurate to record absolute dates in situations where relative dates were measured. This structure is provided as an optional alternative to the standard calendar dates provided by ISO 8601.

Source:

U.S. Geological Survey, FGDC Biological Data Working Group, National Biological Information Infrastructure (NBII)



Extension\_Information:

Name: Geologic\_Time\_Scale

Short\_Name:geolscal

Type: text

Domain:

"Absolute" "Geomagnetic Polarity Time Scale" "International Geological Time Scale" "Oxygen-Isotope" free text

Parent: Geologic\_Age

Optionality: mandatory

Definition:

Name of a recognized geologic time scale. This includes "Absolute" as the name of the time scale for measuring geologic dates before the present and names of geologic dating systems that are arrangements of symbols or names in order of relative geologic time.

Rationale:

To provide the capability to completely and accurately describe the geologic dates relevant to a data set.

Source:

U.S. Geological Survey, FGDC Biological Data Working Group, National Biological Information Infrastructure (NBII)

Extension\_Information:

Name: Geologic\_Age\_Estimate

Short\_Name: geolest

Type: text

Domain: free text

Parent: Geologic\_Age

Optionality: mandatory

Definition:

Either an absolute geologic date or a relative geologic age name describing an event or period in geologic time based on the Geologic\_Time\_Scale. For example, "300 Ma" (300 million years before present) is a Geologic\_Age\_Estimate based on the "Absolute" Geologic\_Time\_Scale, "C28r" is a chron name from the Geomagnetic Polarity Time Scale, and "Maastrichtian" and "Jurassic" are names from the International Geological Time Scale. Since different relative geologic time scales are often not aligned, multiple geologic dates may need to be specified. For example, the Geomagnetic Polarity Time Scale chron "C29r", at the K/T boundary lies in both the Maastrichtian and the Danian stages from the International Geological Time Scale, thus if you were documenting this event using the International Geological Time Scale, both "Maastrichtian" and "Danian" should be included here.

Rationale:

To provide the capability to completely and accurately describe the geologic dates relevant to a data set.

Source:

U.S. Geological Survey, FGDC Biological Data Working Group, National Biological Information Infrastructure (NBII)

Extension\_Information:

Name: Geologic\_Age\_Uncertainty

Short\_Name:geolun

Type: text

Domain: free text

Parent: Geologic\_Age

Optionality: mandatory if applicable

Definition:

The error estimate for the geologic time. This should include the units of measure, a description of what the error estimate represents and how it was calculated.

Rationale:

To provide the capability to completely and accurately describe the geologic dates relevant to a data set.

Source:

U.S. Geological Survey, FGDC Biological Data Working Group, National Biological Information Infrastructure (NBII)

Extension\_Information:

Name: Geologic\_Age\_Explanation

Short\_Name:geolexp

Type: text

Domain: free text

Parent: Geologic\_Age

Optionality: mandatory if applicable

Definition:

The name and/or description of the method used to calculate the Geologic\_Age\_Estimate. Detailed information about the method may be provided through references contained in the Geologic\_Citation.

Rationale:

To provide the capability to completely and accurately describe the geologic dates relevant to a data set.

Source:

U.S. Geological Survey, FGDC Biological Data Working Group, National Biological Information Infrastructure (NBII)

Extension\_Information:

Name: Geologic\_Citation

Short\_Name: geolcit

Type: compound

Rule: Geologic\_Citation =

Citation\_Information

Parent: Geologic\_Age

Optionality: optional

Definition:

Citation for works providing detailed information about any element of the Geologic\_Age. For example, a publication describing the methodology used for carbon dating or describing the basic geologic time scale in more detail could be cited here.

Rationale:

To provide the capability to completely and accurately describe the geologic dates relevant to a data set.

Source:

U.S. Geological Survey, FGDC Biological Data Working Group, National Biological Information Infrastructure (NBII)

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1.7 APPENDIX 1.A (INFORMATIVE) GLOSSARY

**animalia** – (animals) Multicellular organisms possessing membrane-bound organelles and nucleus. Animals are heterotrophs and most are motile. Most animals reproduce via sperm and egg cells. Phylums within the animalia kingdom include porifera, cnidaria, platyhelminthes, nematoda, mollusca, annelida, arthropoda, echinodermata, and chordata.

**biological data** – Any communication or representation of biologically related facts or information collected for computation or analysis.

**class** – The primary subdivision of a taxonomic division or phylum, usually consisting of one or more orders.

**division-phylum** – The primary subdivision of a taxonomic kingdom consisting of one or more classes of organisms.

**family** – The major subdivision of a taxonomic order or suborder consisting of one or more genera.

**fungi** – (fungus) Organisms which are nonmotile, heterotrophic, with membrane-bounded organelles and nucleus. Most fungi reproduce by means of spores, and are unable to perform photosynthesis. The divisions with the fungi kingdom include mycophycota, zygomycota, basidiomycota, ascomycota, and deuteromycota.

**genus** – The major subdivision of a taxonomic family or subfamily usually consisting of one or more species.

**kingdom** – One of the taxonomic divisions of living organisms, includes animals (animalia), plants (plantae), protists (protista), fungus (fungi), and (monera).

**methodology** – A set or system of methods, principles, and rules for a biological inquiry procedure. This includes laboratory, field, data processing and statistical methodologies.

**monera** – (bacteria, blue-green algae) Organisms lacking a cell nuclei. The divisions within the monera kingdom include archaebacteria and eubacteria.

**observed** – To make a methodical or scientific record of something. Under “Currentness Reference” and “Source Currentness Reference” “observed” is used if you observed the time of the data collection. Under “Type of Source Media” “visually observed or measured” is used if the source of the data was generated from methodical or scientific observations or measurements.

**order** – The major subdivision of a taxonomic class or subclass consisting of one or more taxonomic families.

**plantae** – (plants) Multicellular organisms that perform photosynthesis to obtain their nutrition. Plants all possess chloroplasts and have distinct cell walls made of cellulose. The divisions with

the plantae kingdom include bryophytes, gymnosperms, angiosperms, and sphenophyta.

**protista** – (amoeba, euglena, paramecium, diatom, slime molds) The kingdom of protists consists of generally unicellular organisms possessing membrane-bound organelles and nucleus. The divisions within the protista kingdom include autotrophs and heterotrophs.

**species** – The major subdivision of a genus or subgenus, regarded as the basic category of biological classification, composed of related individuals that resemble one another and are able to breed among themselves, but are generally not able to breed with members of another species.

**taxa** – Taxonomic categories, such as species and genus.

**taxonomy** – The science or technique of describing, identifying, naming, and classifying living organisms.