CDDA version 12
with a focus on GIS QA

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Version history

Version	Date	Author	Status and description	Distribution
0.1	31/07/2014	Manuel Löhnertz	Pre-draft for ETC	Sabine Roscher
1.0	31/07/2014	Manuel Löhnertz	First draft for EEA	Mette Lund
2.0	08/10/2014	Manuel Löhnertz	Final draft for EEA	Mette Lund
3.0	24/11/2014		Version for distribution with the dataset	Editing by Mette Lund with a focus on GIS QA version
3.1	9/01/2015	Manuel Löhnertz	Correction of map 1-2, table 2-2	Mette Lund

Contents

1 CDDA v12 delivery

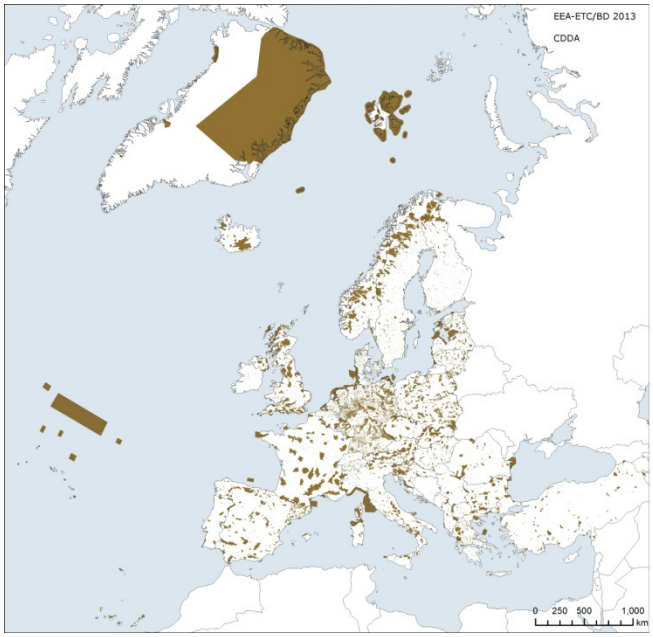
The Common Database on Designated Areas (CDDA) is more commonly known as Nationally designated areas. It is the official source of protected area information from European countries to the World Database of Protected Areas (WDPA). The CDDA inventory holds information about protected areas and the national legislative instruments, which directly or indirectly create protected areas. The dataset contains data on individual nationally designated sites and designations in EEA member and collaborating countries.

1.1 Coverage

The latest version of the CDDA, version 12 from 2014, covers the entire geographical area of the countries that make up the EEA (including the 6 West Balkan countries that are 'cooperating countries' of the EEA) and includes the full geographical area under the responsibility of European countries as well as other States and Territories related to key initiatives in the European region.

The resulting data covers the 40 EEA member and cooperating countries as well as Greenland (Denmark) and the French Overseas Departments and Territories and Overseas Collectives (Map 2-1).

Map 2-1 Extent of the CDDA dataset (DOM/TOMs are not shown)



34 countries delivered tabular and spatial data in 2014, which had to be included into version 12 of CDDA.
These datasets were subjected to a series of quality control and quality assurance (QA/AC) checks. Once the data passed these tests they were combined with data from those countries that did not submit data in 2014, which was extracted from the previous CDDA dataset, version 11.

The combined and integrated dataset (i.e. CDDA, version 12, 2014) covers 40 countries, and consists of a total of **98 375** records in the tabular database and **95 176** spatial records.

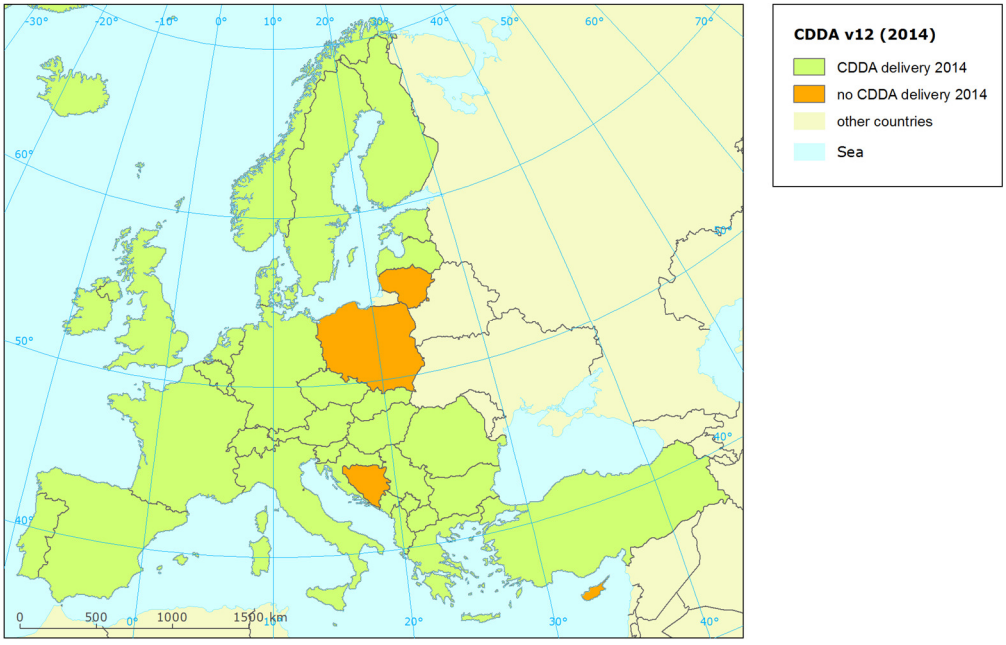
Table 2-1 Number of tabular and spatial records in the different CDDA versions

CDDA version	Number of records	Number of records
	tabular	spatial
Version 12	**98 375**	**95 176**
Version 11	97 481	92 757
Version 10	94 810	86 226
Version 9*	120 456	112 274
Version 8*	109 634	101 818

* previous versions included data from the EECCA countries so the perceived decline in numbers is an artefact of this. In addition, between versions 9 and 10 Germany removed a number of sites from the CDDA as they did not fit the definition of protected areas used in the CDDA.

The following map presents the countries, which provided data for the CDDA version 12.

Map 1-2 Countries that delivered data in 2014



A more detailed overview is given in the following table.

Table 1-2 Data deliveries respectively data updates for CDDA version 12 & 11 (tabular & spatial)

Name	ISO - 2 digit	ISO - 3 digit	Version 12	Version 11
			2014	2013
Albania	AL	ALB	yes	no
Austria	AT	AUT	yes	yes
Bosnia - Herzegovina	BA	BIH	no	no
Belgium	BE	BEL	yes	yes
Bulgaria	BG	BGR	yes	yes
Switzerland	CH	CHE	yes	yes
Czech Republic	CZ	CZE	yes	yes
Cyprus	CY	CYP	no	no
Germany	DE	DEU	yes	yes
Denmark	DK	DNK	yes	yes
Estonia	EE	EST	yes	yes
Spain	ES	ESP	yes	yes
Finland	FI	FIN	yes	yes
France	FR	FRA	yes	yes
Greece	GR	GRC	yes	no
Croatia	HR	HRV	yes	yes
Hungary	HU	HUN	yes	yes
Ireland	IE	IRL	yes	no
Iceland	IS	ISL	yes	yes
Italy	IT	ITA	yes	yes
Liechtenstein	LI	LIE	no	no
Lithuania	LT	LTU	no	yes
Luxembourg	LU	LUX	no	yes
Latvia	LV	LVA	yes	yes
Monaco	MC	MCO	no	no
FYROM	MK	MKD	yes	yes
Malta	MT	MLT	yes	yes
Montenegro	ME	MNE	yes	no
Netherlands	NL	NLD	yes	yes
Norway	NO	NOR	yes	yes
Poland	PL	POL	no	no (only spatial data)
Portugal	PT	PRT	yes	no
Romania	RO	ROU	yes	yes
Serbia	RS	SRB	yes	yes
Sweden	SE	SWE	yes	yes
Slovakia	SK	SVK	yes	yes
Slovenia	SI	SVN	yes	yes
Turkey	TR	TUR	yes	yes
United Kingdom	UK	GBR	yes	yes
Kosovo (UNSCR 1244/99)	XK	XKX	yes	yes

The national CDDA data were delivered as table and as spatial dataset. The specifications are available in the Data Dictionary.

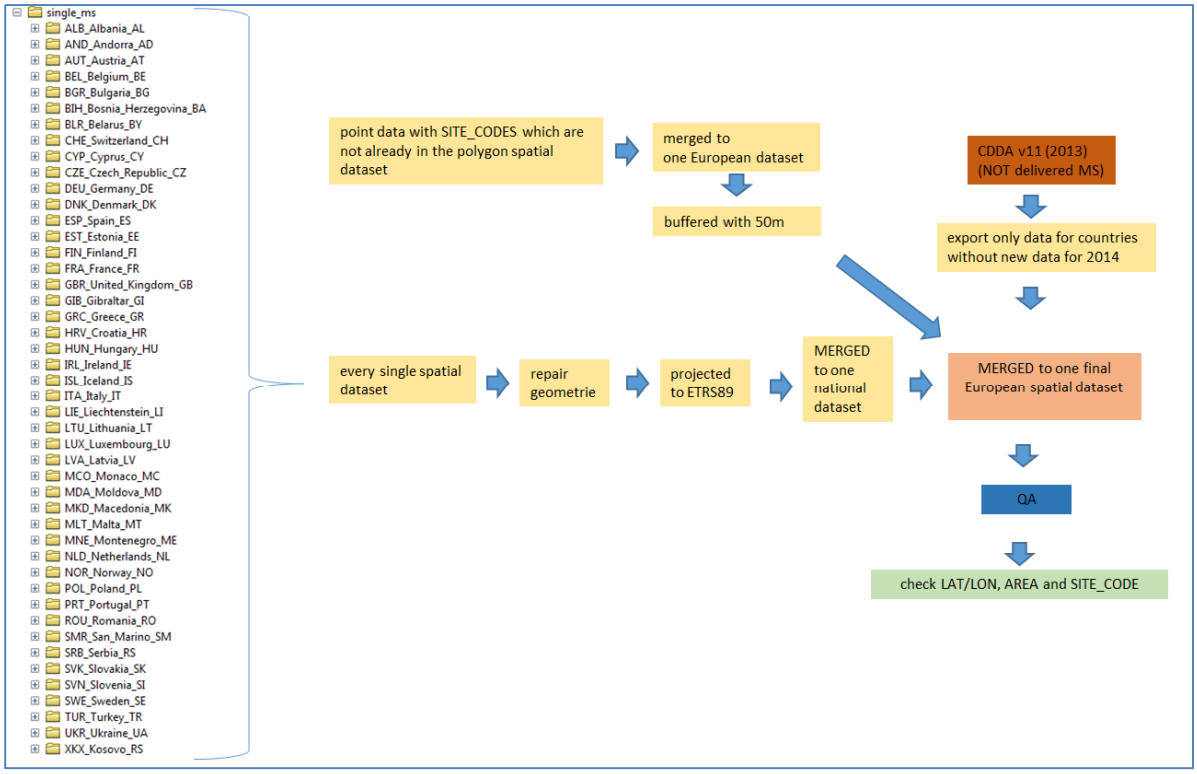
2 CDDA Production

The final CDDA v12 dataset is the union of all single national datasets, tabular and spatial.

TABULAR:
Once the data deliveries could pass the quality check without errors the single tables were imported to a new MS-Access database.

SPATIAL:
Once the data deliveries could pass the quality check without errors the single vector data were first merged to a national spatial dataset. Next all merged spatial datasets were used for the construction of the final spatial CDDA dataset in a file-geodatabase.

Figure 2-1 Workflow spatial map production



3 Verification

The spatial and tabular data were checked at different points during the CDDA v12 production. First the input deliveries were checked for completeness. Then semantic checks of the single deliveries were carried out. After the final production of the full CDDA versions a second verification was done.

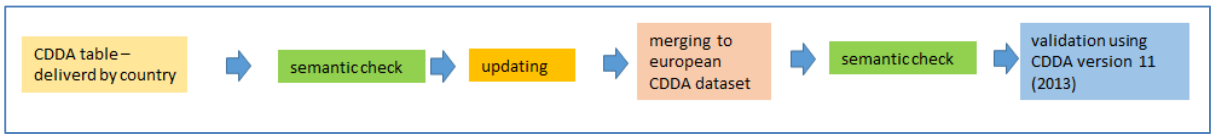
3.1 Verification overview

Tabular and spatial data were checked using different methods.

Tabular:

The countries uploaded the national CDDA v12 MS-Access versions on the CDR. An automatic QA, which is integrated in the database, performed semantic checks of the different tables. Errors were analysed and corrected. If necessary information were missing, the countries were asked for a updating the data.
After a successful quality check of the deliveries, the single tables were imported to the CDDA-v12 database template (provided by the EEA). Afterwards final QA checks were done using the integrated QA tool.

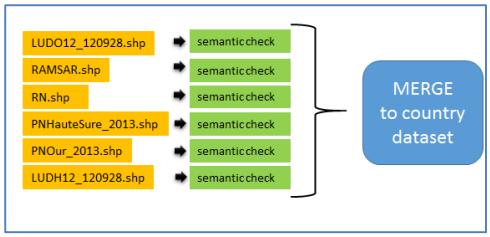
Figure 3-1 Tabular data verification overview



Spatial:

The countries delivered various kinds and numbers of spatial data. Some countries delivered one polygon vector file, others more than 20 different polygon and point vectors files.

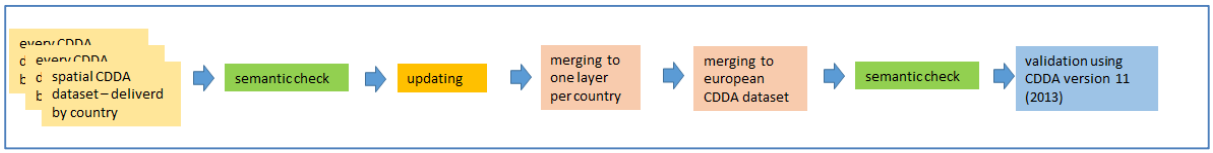
Figure 3-2 Example: spatial delivery by one country



Therefore the first step of the verification was to check all the single spatial datasets. After the data passed the semantic check without errors, they were transferred to a new national CDDA-v12 dataset in ETRS-LAEA89 projection (EPSG: 3035). Next the single national spatial datasets were merged to one European CDDA dataset in a file-geodatabase. If countries did not deliver new data, the corresponding data from the CDDA version 11 was imported.

If spatial data was delivered as point dataset the points were buffered using a 50m buffer and merged with the polygon layer. With this operation the final spatial dataset only consist of polygon vector layers.

Figure 3-3 Spatial data verification overview



3.2 Verification steps

In the following chapter only the verification of the spatial data will be explained. Information of the QA/QC of the tabular data can be found in the MS-Access database and on the CDR.
For improving the entire verification process, a python script was created. For the python script the typical standard python modules were used (qgis, arcpy, gdal, …).
The different verification processes can be divided into three major steps:

1. Formal check
2. Mapping check
3. Topology check

The different checks were carried out with all single delivered spatial data and the results were documented.

1. Formal check
   - file format (shp, gdb, mdb, …)
     (file readable?)
   - data type (point, line or polygon)
     (only point and polygons allowed)
   - attributes name
     (check if all necessary attributes available)
   - projection (WGS84, …)
     (if projection not ETRS-LAEA, the dataset was projected)

2. Mapping check
   - Unique identifiers (SITE_CODE)
     ([SITE_CODE] is necessary!)
   - Valid site codes
     (double values existing?, NULL values existing?, …)

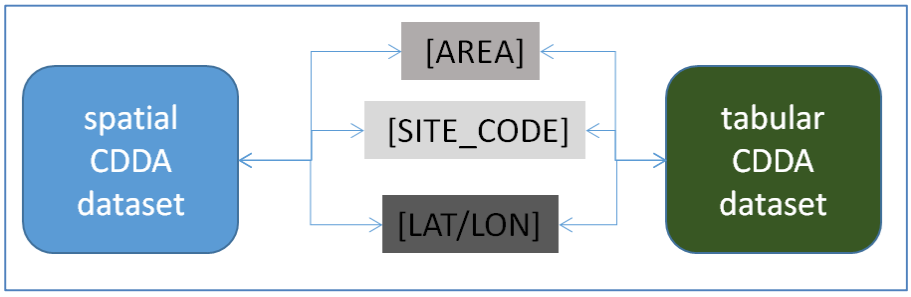
3. Topology & location check
   - Multipart polygons

Multipart polygon – dissolved by SITE_CODE – are allowed. No double SITE-CODES in the attribute table are allowed!

- Geometry
  The geometry was automatically check and repaired
- Data location (CDDA sites should be inside the corresponding country)
  The location of the single CDDA sites of the every country was checked using a European boundary layer: EuroBoundaryMap (full European coverage) - version 7.0, Oct. 2013
  https://sdi.eea.europa.eu/data/continental/europe/external_db/eurogeographics/EuroBoundaryMap/EuroBoundaryMap_v70/EuroBoundaryMap_v70_shape/FullEurope/
- LAT/LON attribute in spatial data
  Some countries delivered LAT/LON attributes (in WGS84 projection), a check was done, if the coordinates a located inside the country

After the first spatial and tabular verification checks, some comparisons between both deliveries were made:

Figure 3-4 Verification of cross relationships between spatial and tabular dataset



- SITE_CODE: it was checked if all spatial codes are found in the tabular data (and vice versa).
- LAT_LON: the location of the tabular LAT_LON values were checked using a GIS
  The centroid of the polygon was calculated to be located within the polygon. The location of this centroid was compared with the latitude and longitude as described in the descriptive database, where it exists. Four situations were distinguished, where the differences is >5km, >10km, >50km and >100km
- AREA: The area of the polygons for each site was calculated and compared to the areas in the descriptive database for the same site, where the area was given.

4 QA/QC Results

In this chapter a selection of information and results about the new CDDA dataset will be presented.

4.1 First spatial verification information

The single spatial delivery were analysed and checked.

Figure 4-1 Semantic check

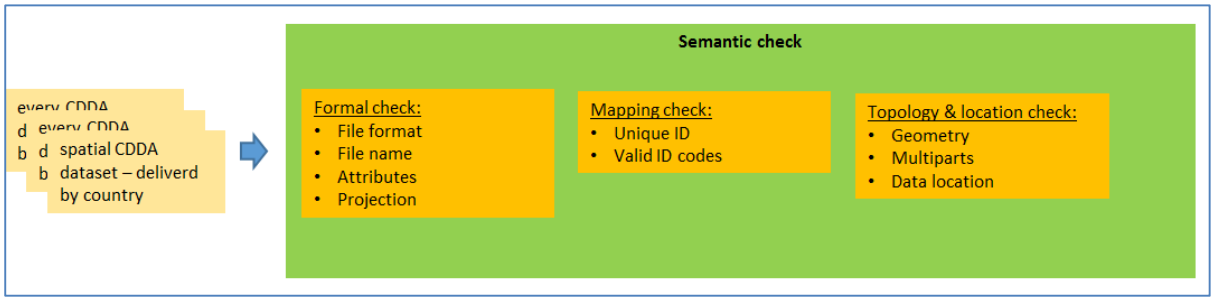


Table 5-1 Selection of semantic check results and information

Country	ISO3	Comment
Albania	ALB	• Two polygon shp files • National projection • no SITE_CODE attribute • no LAT/LON attribute
Austria	AUT	• One polygone shp file • MGI_Austria projection • 1281 features
Bosnia - Herzegovina	BIH	no new data delivery
Belgium	BEL	• 18 different polygone shp files • Belge_Lambert_1972 projection •
Bulgaria	BGR	• 6 different polygones shp files • WGS_1984_UTM_Zone_35N projection • no LAT/LON attribute
Switzerland	CHE	• One polygone shp file • CH1903_LV03 projection • no LAT/LON attribute
Czech Republic	CZE	• One polygone shp file • S-JTSK_Krovak_East_North projection • no LAT/LON attribute
Cyprus	CYP	no new data delivery
Germany	DEU	• 3 different polygones shp files • DHDN_3_Degree_Gauss_Zone_3 projection • no LAT/LON attribute
Denmark	DNK	• Two different polygones shp files (the CDDA-DNK-v11 version plus the NEW single CDDA sites) • ETRS_1989_LAEA projection • no LAT/LON attribute

Country	ISO3	Comment
Estonia	EST	• 2 polygons & one point shp file • MI_0 projection • no LAT/LON attribute
Spain	ESP	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute
Finland	FIN	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute
France	FRA	• 43 polygons & 1 point shp file • Different projections: o ETRS_1989_LAEA o WGS_1984_UTM_Zone_20N o RGFG95_UTM_Zone_22N o WGS_1984_UTM_Zone_38S o IGN62_UTM_Zone_42S o RGR92_UTM_Zone_40S o WGS_1984_UTM_Zone_21N o GCS_WGS_1984 • no LAT/LON attribute
Greece	GRC	• One polygone shp file • GREEK_Grid projection • no LAT/LON attribute
Croatia	HRV	• 2 polygons & one point shp file • GCS_WGS_1984 • no LAT/LON attribute
Hungary	HUN	• One polygon shp file • GCS_WGS_1984 • no LAT/LON attribute
Ireland	IRL	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute
Iceland	ISL	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute
Italy	ITA	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute Comments: The data was not put on the CDR. Therefore the data was downloaded from an Italian server and copied to the correct place
Liechtenstein	LIE	no new data delivery
Lithuania	LTU	no new data delivery
Luxembourg	LUX	• Six polygone shp files • LUREF projection • For two files no SIDE_CODE exists (SITE_CODE was manually updated) • no LAT/LON attribute
Latvia	LVA	• One polygone shp file • LKS_1992_Latvia_TM projection • no LAT/LON attribute
Monaco	MCO	no new data delivery
FYROM	MKD	• 2 polygons & one point shp file • GCS_WGS_1984 • no LAT/LON attribute
Malta	MLT	• One polygone shp file • MLT national projection • no LAT/LON attribute
Montenegro	MNE	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute
Netherlands	NLD	• Two polygone shp files

Country	ISO3	Comment
		• NLD national projection • no LAT/LON attribute
Norway	NOR	• Two polygone shp files • WGS_1984_UTM_Zone_33N projection • no LAT/LON attribute
Poland	POL	no new data delivery
Portugal	PRT	• Six polygone shp files • Different projections: o GCS_WGS_1984 o Porto_Santo_1995_UTM_Zone_28N • Some missing SITE_CODES (SITE_CODE was manually updated) • no LAT/LON attribute
Romania	ROU	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute
Serbia	SRB	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute
Sweden	SWE	• 2 polygons & one point shp file • GCS_WGS_1984 • no LAT/LON attribute
Slovakia	SVK	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute
Slovenia	SVN	• 2 polygons & one point shp file • GCS_WGS_1984 • no LAT/LON attribute
Turkey	TUR	• 10 polygons point shp files • Missing SITE_CODE • different projections: o GCS_European_1950 o GCS_WGS_1984 • no LAT/LON attribute Comments: Inside the spatial data a high number of sites are without SITE_CODE information. It was not possible to update all missing SITE_CODE information's
United Kingdom	GBR	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute
Kosovo (UNSCR 1244/99)	XKX	• One polygone shp file • ETRS_1989_LAEA projection • no LAT/LON attribute

After the first verification all data were transformed to the ETRS_1989_LAEA projection and merged into a national CDDA_v12 layer and finally to the European CDDA_v12 spatial dataset. Using the final aggregated spatial dataset different additional tests were done. First for all sites the area and coordinates were calculated. Then the total CDDA area was compared between version 12 and 11 country by country, see table 5-2.

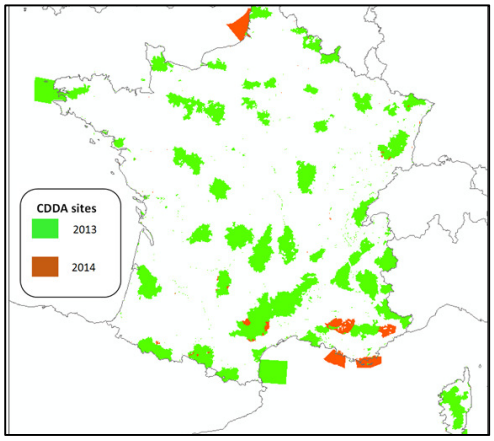
Table 5-2 CDDA area comparison: CDDA_v12 vs CDDA_v11

name	iso2	iso3	count 2013	count 2014	Difference 2014-2013	km² 2013	km² 2014	Difference km²2014-2013
Albania	AL	ALB	48	54	6	2464,79	4810,06	2345,28
Austria	AT	AUT	1182	1198	16	26500,12	26273,66	-226,46
Bosnia - Herzegovina	BA	BIH	33	33	0	99,06	99,06	data from 2013
Belgium	BE	BEL	1357	1557	200	4966,56	5056,44	89,88
Bulgaria	BG	BGR	884	1042	158	17915,00	17926,11	11,10
Switzerland	CH	CHE	5877	5879	2	3032,00	3032,98	0,98
Czech Republic	CZ	CZE	2367	2434	67	13074,18	13101,51	27,33
Cyprus	CY	CYP	17	17	0	203,48	203,48	data from 2013
Germany	DE	DEU	16243	16814	571	133169,19	132773,40	-395,79
Denmark	DK	DNK	1917	1923	6	985837,12	985842,80	5,68
Estonia	EE	EST	10328	11482	1154	23129,94	22759,55	-370,38
Spain	ES	ESP	1561	1561	0	68171,94	74576,82	6404,87
Finland	FI	FIN	10625	10875	250	34410,53	34550,88	140,35
France	FR	FRA	2609	2779	170	214708,13	270635,47	55927,34
Greece	GR	GRC	773	799	26	34357,17	38034,61	3677,44
Croatia	HR	HRV	330	415	85	7216,44	7170,70	-45,74
Hungary	HU	HUN	218	218	0	8495,62	8495,62	0,00
Ireland	IE	IRL	155	155	0	603,62	603,62	0,00
Iceland	IS	ISL	109	108	-1	20065,14	19287,33	-777,81
Italy	IT	ITA	870	871	1	59446,00	59387,53	-58,48
Liechtenstein	LI	LIE	41	41	0	81,78	81,78	data from 2013
Lithuania	LT	LTU	352	352	0	10435,31	10435,31	data from 2013
Luxembourg	LU	LUX	104	104	0	1257,69	1257,69	0,00
Latvia	LV	LVA	704	707	3	16851,53	16839,08	-12,45
Monaco	MC	MCO						data from 2013
FYROM	MK	MKD	52	75	23	2042,02	2046,20	4,18
Malta	MT	MLT	200	203	3	337,62	337,75	0,13
Montenegro	ME	MNE		5	5		0,01	0,01
Netherlands	NL	NLD	301	256	-45	17250,72	12783,41	-4467,31
Norway	NO	NOR	2829	2863	34	181188,66	181980,78	792,12
Poland	PL	POL	1641	1641	0	60039,81	60039,81	data from 2013
Portugal	PT	PRT	223	186	-37	121249,44	121021,51	-227,92
Romania	RO	ROU	884	866	-18	20186,28	20032,82	-153,47
Serbia	RS	SRB	156	155	-1	5695,65	5692,64	-3,01
Sweden	SE	SWE	12114	13958	1844	56387,95	57330,54	942,59
Slovakia	SK	SVK	1127	1123	-4	11326,69	11321,87	-4,81

name	iso2	iso3	count 2013	count 2014	Difference 2014-2013	km² 2013	km² 2014	Difference km²2014-2013
Slovenia	SI	SVN	1071	2045	974	27062,84	27974,74	911,90
Turkey	TR	TUR	350	1302	952	21909,76	38441,69	16531,93
United Kingdom	UK	GBR	9079	9080	1	94636,54	102761,22	8124,68
Kosovo (UNSCR 1244/99)	XK	XKX		26	26		1245,18	1245,18

During the area comparison large differences were detected. The extreme values such as France (increase CDDA area: 55 927 km ² between 2013 & 2014) were checked in detail. Both CDDA versions were imported to a GIS and analysed.

Map 5-1 CDDA France 2013 vs. 2014



The 5-1 map shows the changes between 2013 and 2014 reports for France. In the 2014 version a number of new, large sites (marine and terrestrial) were reported. No errors were found and the data were imported.

In the Netherlands, about 4500km² was "lost" between the 2013 and the 2014 reports. The delivery includes additional documentation with the clarification on the reduction in reported area:

Category 'natuurreservaten met beheersubsidie'/'Nature reserve' (Designation type NL21)
A major change has taken place here. As these areas are not truly protected under any kind of national law (they have no legal status), and do not represent actual sites with consistent additional data as "Name", "Year of establishment", "Management", etc., we decided to remove these areas from the CDDA database and deliver them as "Spatial coverage of Protected Areas not defined as Sites" only.
These sites have some kind of protection, being owned or managed by a national, regional or local nature protection organisation, such as the Dutch State Forestry, but no legal status.

5 Concluding remarks

- The majority of the data delivered under the CDDA reporting cycle is of a high quality.
- The download of datasets from Reportnet and the merging of datasets into the European CDDA is currently a mainly manual, time consuming task.
- The provision of the helpdesk, as well as the initial automatic QA/QC of the tabular data in addition to communication with data providers, where necessary in case of data issues, is considered as being very beneficial in order to assure - or where necessary to improve - the high quality of the CDDA data flow.
- The countries delivered the spatial data in very different forms:

Table 5-1 Overview of the different types of spatial data delivery

Some countries delivers point and polygon data	Some countries only polygon layers
Some countries delivers **one** polygon	Some countries delivers more than 20 different polygons
Some countries upload all spatial data in national projection	Some countries delivers the data already in the final LAEA89 projection
Some countries produced a high number of attributes	Some countries upload spatial data with no SITE_CODE information
different attribute names [SITE_CODE]; [SITECODE]; [CODE]; …	
no clear file name convention (RN.shp, TB_31122013.shp, de07_lsg2013.shp,..)	
not all files are delivered with metadata information	

As shown in the table, the entire spectrum of types of spatial data deliveries were uploaded to the EEA server. Therefore, first all data had to be brought up to the same standard (LAEA89-projection, same attributes, etc). This situation means than an automatic validation is very difficult to achieve. Therefore, for the next CDDA data collection a more strict specification for the spatial data deliveries will be defined.