NBN Web Services Workshop

Jon Cooper

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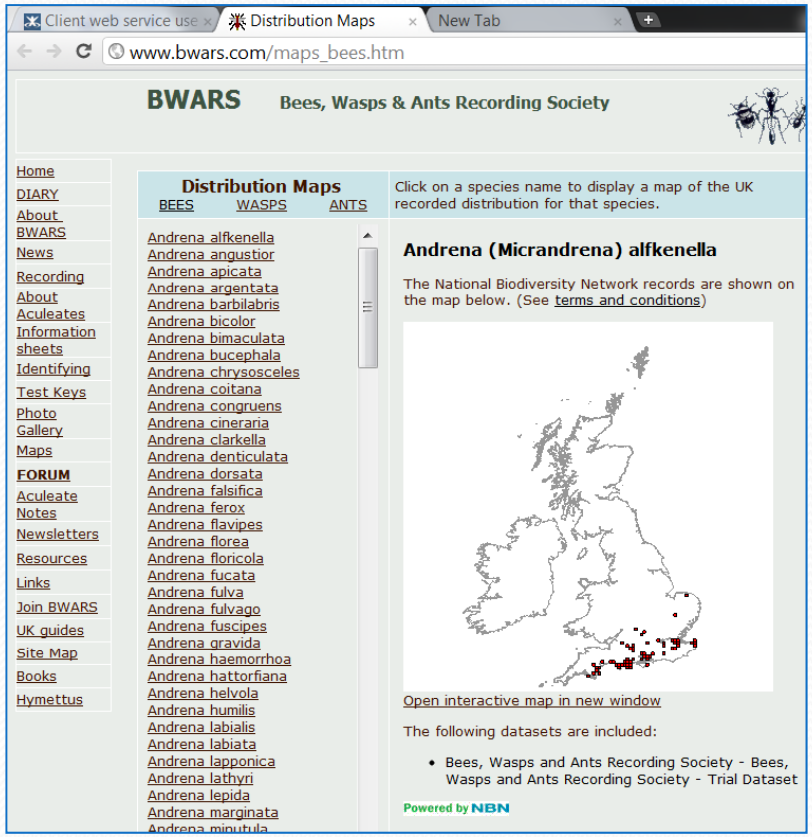
What is a web service?

- A service that is called across a network
- Defines an interface for communication
  - Eg What to call + arguments
- Communication is independent of technology
  - Eg .NET client and Java web service
- Does not provide a Graphical User Interface (GUI)
  - Client provides GUI – eg web page

Example of NBN web service being used

ww.bwars.com/maps_bees.htm

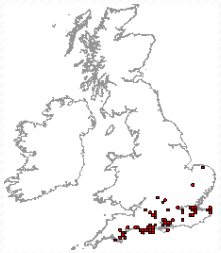


Whole web page request

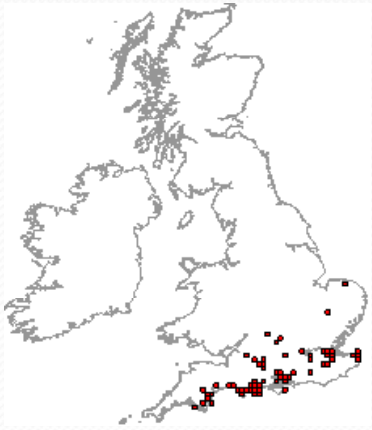
BWARS web server

Just the map bit

NBN web service



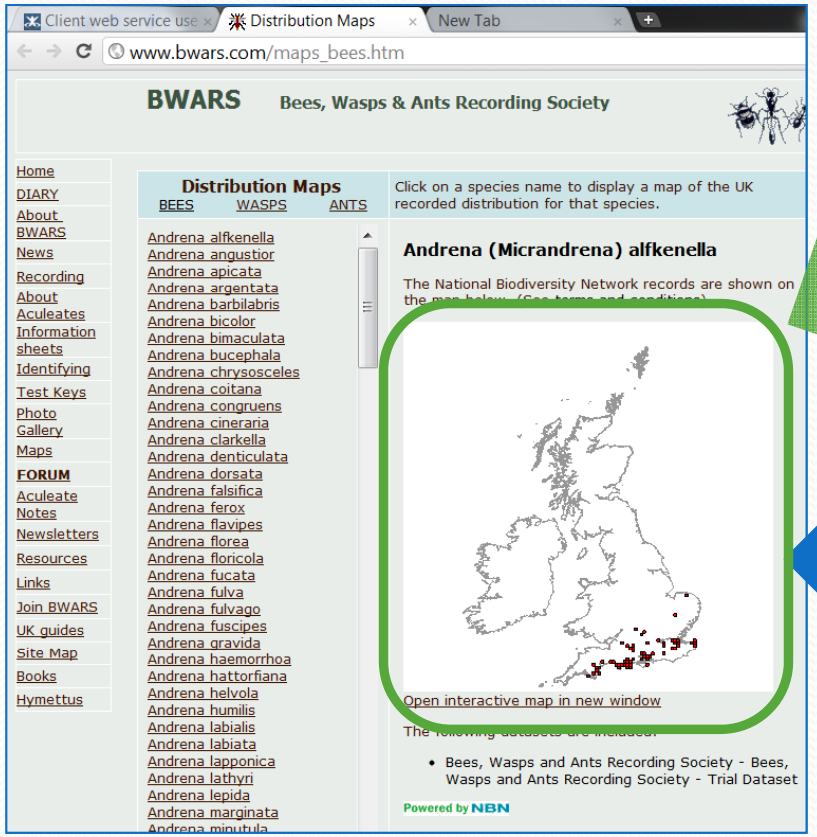
Easy Maps



- Simplifies using the Grid Map web service
- Developed by Biological Records Centre
- Full documentation at http://www.brc.ac.uk/schemes/NBNWidget/Easy_Maps_v6.pdf
- A ‘wrapper’ around the Grid Map web service
- Applies Terms and Conditions out-of-the-box
- Allows styling and customisation

How Easy Maps works

ww.bwars.com/maps_bees.htm



Everything but the map

iFrame

BWARS web server

Easy Maps web server

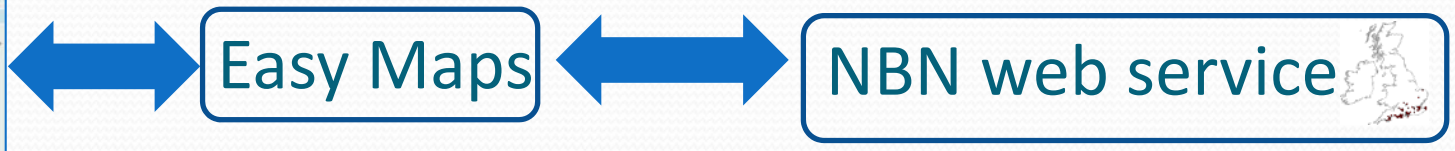
NBN web service

First practical session

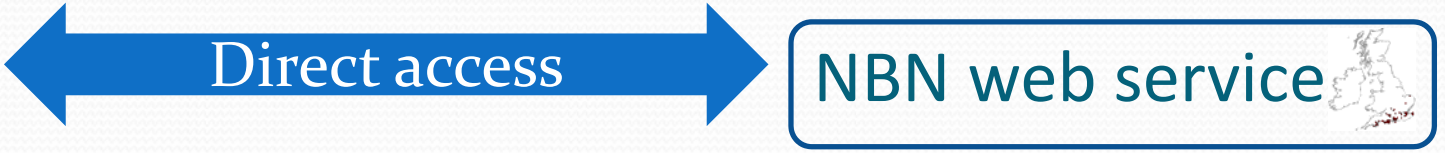
- Exercise 1: Using Easy Maps
  - Create a basic distribution map
  - Customise map – colours, background, region, etc

Using NBN web services directly

- Easy Maps is a client between the web page and Grid Map web service



- All other NBN web services do not have such a client
- We'll now look web pages that access web services directly



- First some background…

Most NBN web services use SOAP

- Messaging protocol that uses xml
- Request-response dialog usually via HTTP
- Web Service Definition Language (WSDL) file

Clients – eg today's php exercises

XML messages over internet

NBN web services

Listening for SOAP requests + WSDL file

Second practical session

- Exercise 2: Build a Grid Map request
  - Use WSDL in soapUI to view all NBN web services
  - Create working Grid Map request
  - Edit request ready for exercise 3
- Exercise 3: Grid map in php
  - Fire up php environment
  - Add Grid Map request to php web page
  - View in browser

Nusoap – a php SOAP library

- All your php exercises have this line:

```
require_once('..\lib\nusoap.php');
```

- This is a reference to a free SOAP library from:

  http://sourceforge.net/projects/nusoap

- It allows php to easily communicate with SOAP web services

Overview of data access model

- A guide to the NBN data access model is here: http://www.nbn.org.uk/Guidebooks/Gateway-users/Data-Access-Controls/NBN-Gateway-Access-Controls.aspx
- Access is controlled per dataset by an administrator
- Access is given to users, groups of users and the public
- Almost all datasets have a public level of access
- You can apply for better access to datasets
- Two important controls for web services:
  - Records in map images
  - Records in data

Records in maps and raw data

Site name	Gridref	Date Recorded	Date Accuracy
Ramsey	TL28	July, 1943	Month
Woodwalton Fen NNR	TL28	26/7/1986	Day
Woodwalton Fen	TL28	4/9/1913	Day
Woodwalton Fen	TL28	13/8/1913	Day
Woodwalton Fen	TL28	29/7/1990	Day
Monks Wood	TL17	1900	Year
Great Stukeley	TL27	16/9/1969	Day

Squares on maps

Record data

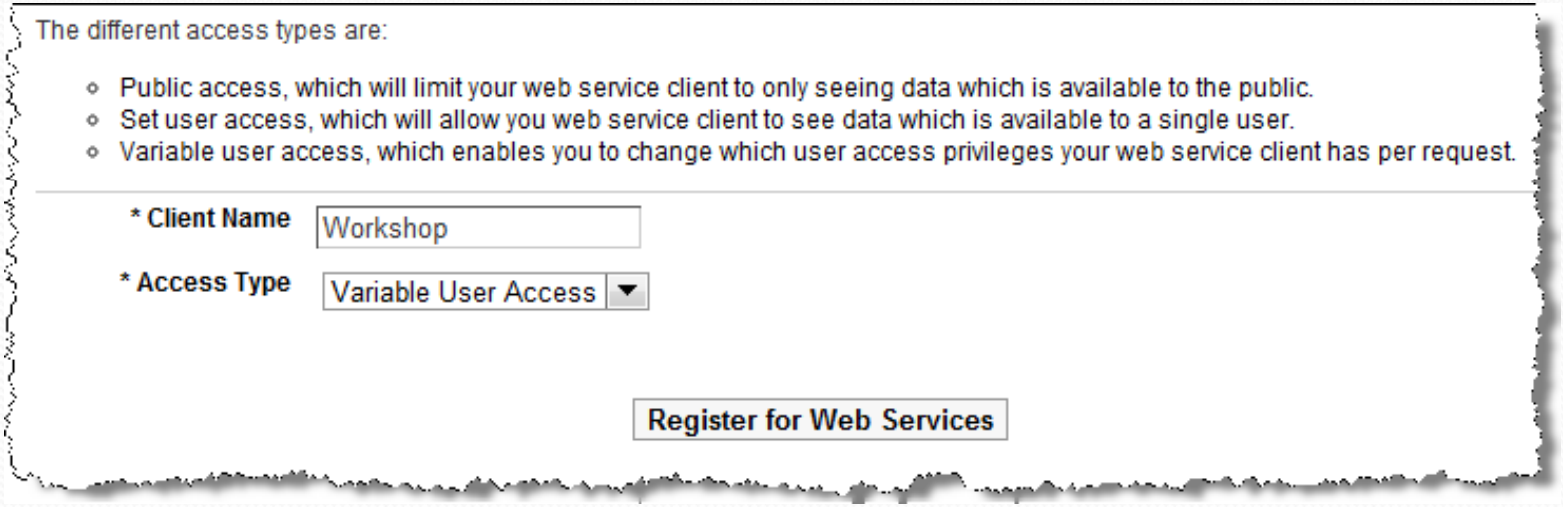
Use	Dataset (sort by: Number of records / Organisation name)	Dataset Resolution	Your Resolution	Sensitive access	Download raw data	View Attributes	View Recorder
	Dragonfly Recording Network						
☑	Dragonfly records from the British Dragonfly Society's Dragonfly Recording Network for the period up to 2010	100m	1km				
	Suffolk Biological Records Centre						
☑	Suffolk Biological Records Centre (SBRC) dataset	100m	10km		✓		
	RSPB						
☑	Odonata records from RSPB Reserves 1970-2009	1km	Full		✓	✓	✓
	Biological Records Centre						
☑	Dragonfly and Damselfly (Odonata) records for Britain to 1992, from the former Dragonfly Recording Scheme	100m	Full	✓	✓	✓	✓

Web service registration keys

- Registration keys are explained fully here: http://data.nbn.org.uk/Documentation/Web_Services > Registration
- Register your client to obtain a registration key
- Three types of key:
  - Public access: access to publicly available data
  - Fixed user access: one specific account's access
  - Variable user access: allows credentials to be passed
- Include key in your request
  - Eg as seen in exercise 4: <map:GridMapRequest registrationKey="a85d4c129728e58…

Steps to get a registration key

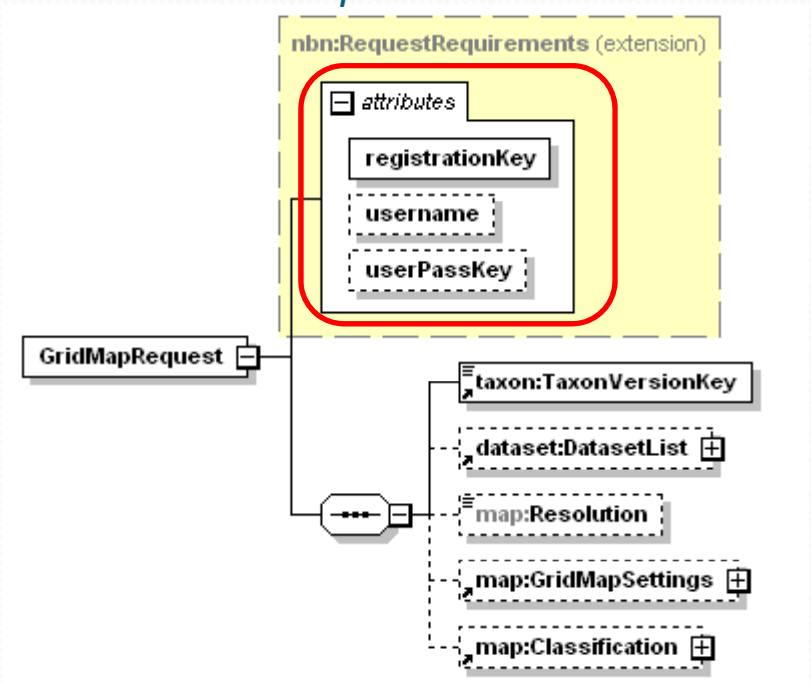
- Log onto http://data.nbn.org.uk
- Go to My Account
- Select Web Services > Apply for Access
- Provide a client name, choose a key type and submit
- Accept Ts & Cs and you will be e-mailed your key



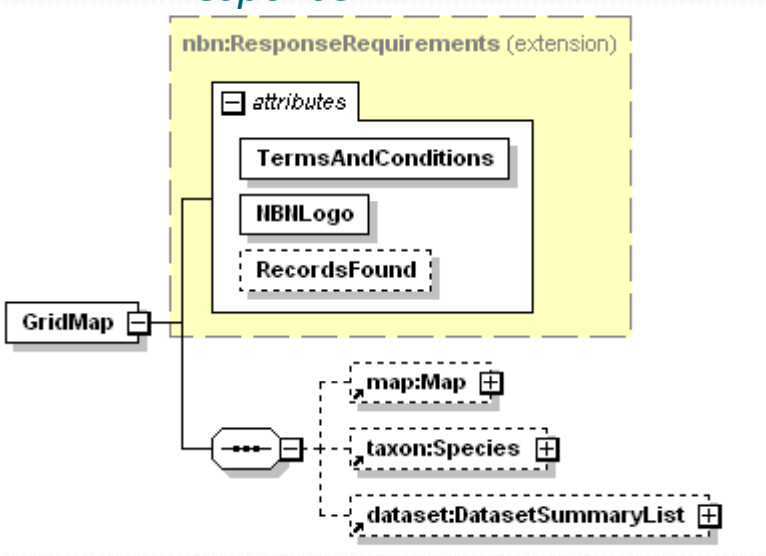
Documentation illustrating credentials

http://data.nbn.org.uk/Documentation/Web_Services

Request



Response



Third practical session

- Exercise 4: Using a Variable User Access key

The range of NBN web services

http://data.nbn.org.uk/Documentation/Web_Services

Main web services

Web service name	Data that is returned	Filters allowed in request (see table below)
Taxon reporting category list	List of taxon groups (eg bird, flowering plant)	A,B,C,D
Species list	List of species	A,B,C,D,E,F
Species density data	Counts grouped by grid square	A,B,C,D,E,F
One site data	All observation records for a single location	A,B,C,D,E,F

	Filter name	Restricts data to
A	GeographicalFilter	A grid square, administrative boundary or user defined polygon (mandatory for **One site data** service)
B	DateRange	A specific date range
C	DatasetList	One or more specific datasets
D	Designation	A single designation (eg BAP 2007)
E	TaxonReportingCategoryKey	A single taxon group (eg bird)
F	TaxonVersionKeys	One or more specific taxa (eg Otter)

Single species web services

Web service name	Data that is returned	Filters allowed in request (see table below)
One species data	All observation records for a single species	A,B,C
One species location data	Unique locations where the species is found	A,B,C
Grid map	Single species distribution map with dataset list	A,B,C

	Filter name	Restricts data to
A	TaxonVersionKey	A specific taxon (eg Otter) - **mandatory**
B	DateRange (or Classification)	A specific date range
C	DatasetList	One or more specific datasets

Support web services

Helper services for building lists, finding keys and converting keys to names

Web service name	Data that is returned
Dataset summary list	List of datasets and their descriptions
Designation list	List of designations and their descriptions
Site boundary discovery	List of site layers on the NBN Gateway (eg SSSI, SAC)
Site boundary list	List of sites for a single site layer
Site boundary query	List of sites that intersect your polygon or grid square
Site boundary name	Name of a site for it key
Taxon reporting category name	Name of a taxon category from its key
Taxonomy and species search	List of species that match a search term or key

Fourth practical session

- Exercise 5: Interactive site selection and species lists
  - Get example running
  - Illustrates multiple web services working together
  - Edit example for different list of sites

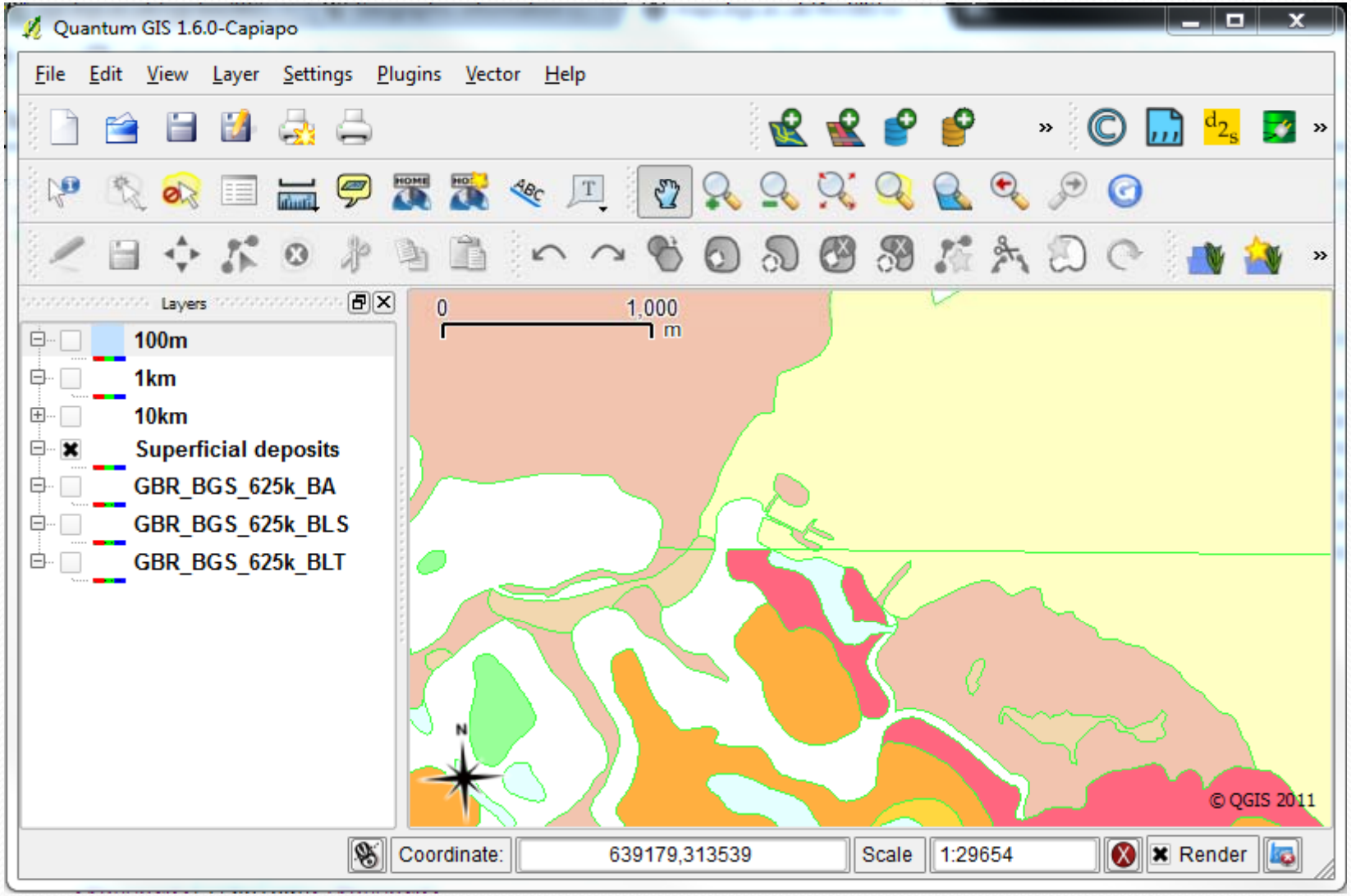
Video:
consuming web services in Java

- Use WSDL to create client proxy classes
- Proxy classes hide client-web service communication
- Proxy are classes very intuitive to use
- .NET provides similar technology
- Focuses on SummaryDatasetList
- http://www.youtube.com/watch?v=6DKW27gFDWM
- (local flash or try vlc)

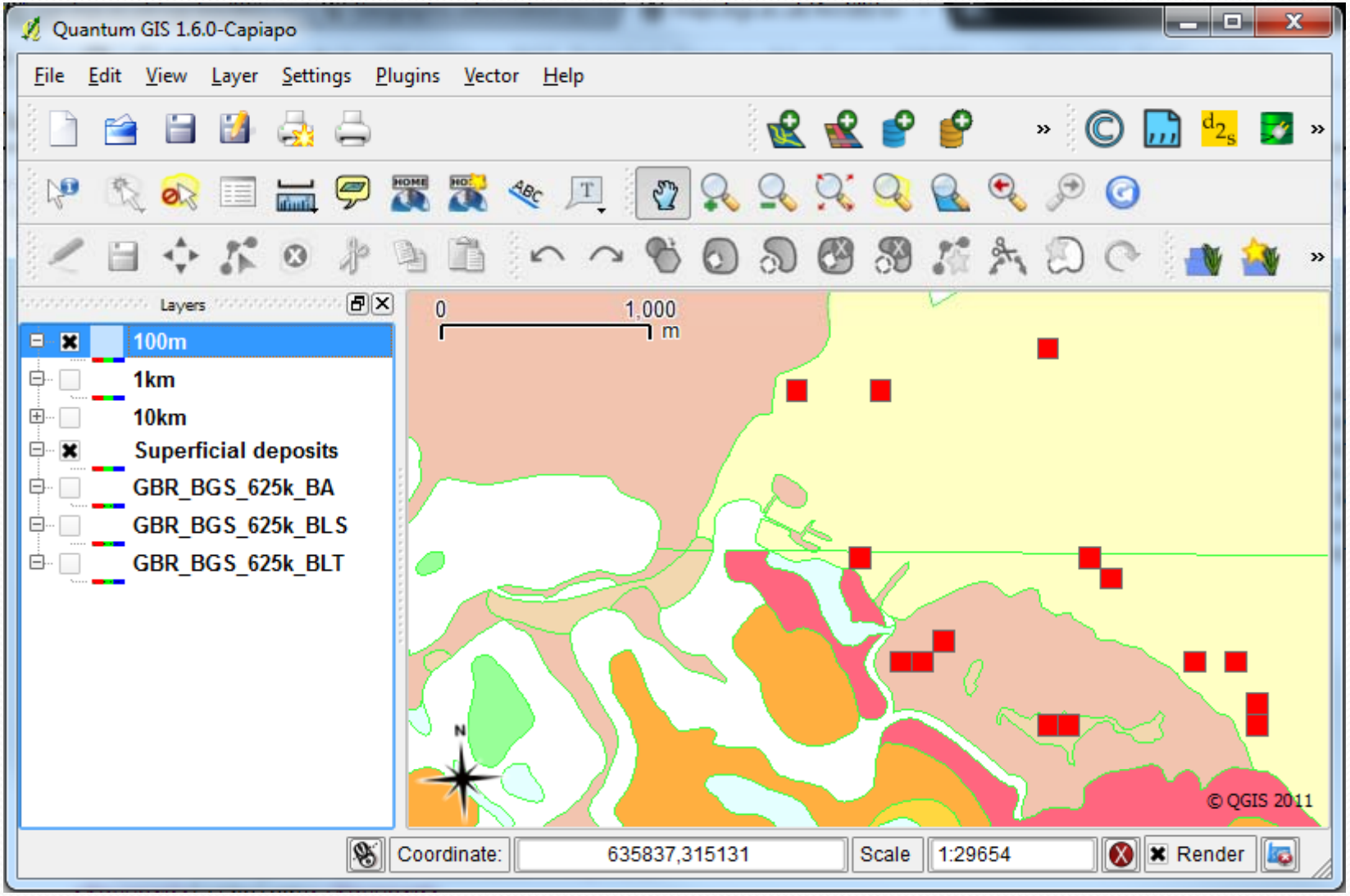
GIS and NBN WMS

- GIS systems work with geographic data
- Most GIS systems can use WMSs
- WMS = Web Map Service
  - Georeferenced map image
  - Served over the internet
  - Standard protocol

Example: geology WMS in Q-GIS



Example: NBN WMS added



NBN WMS

- Full documentation:

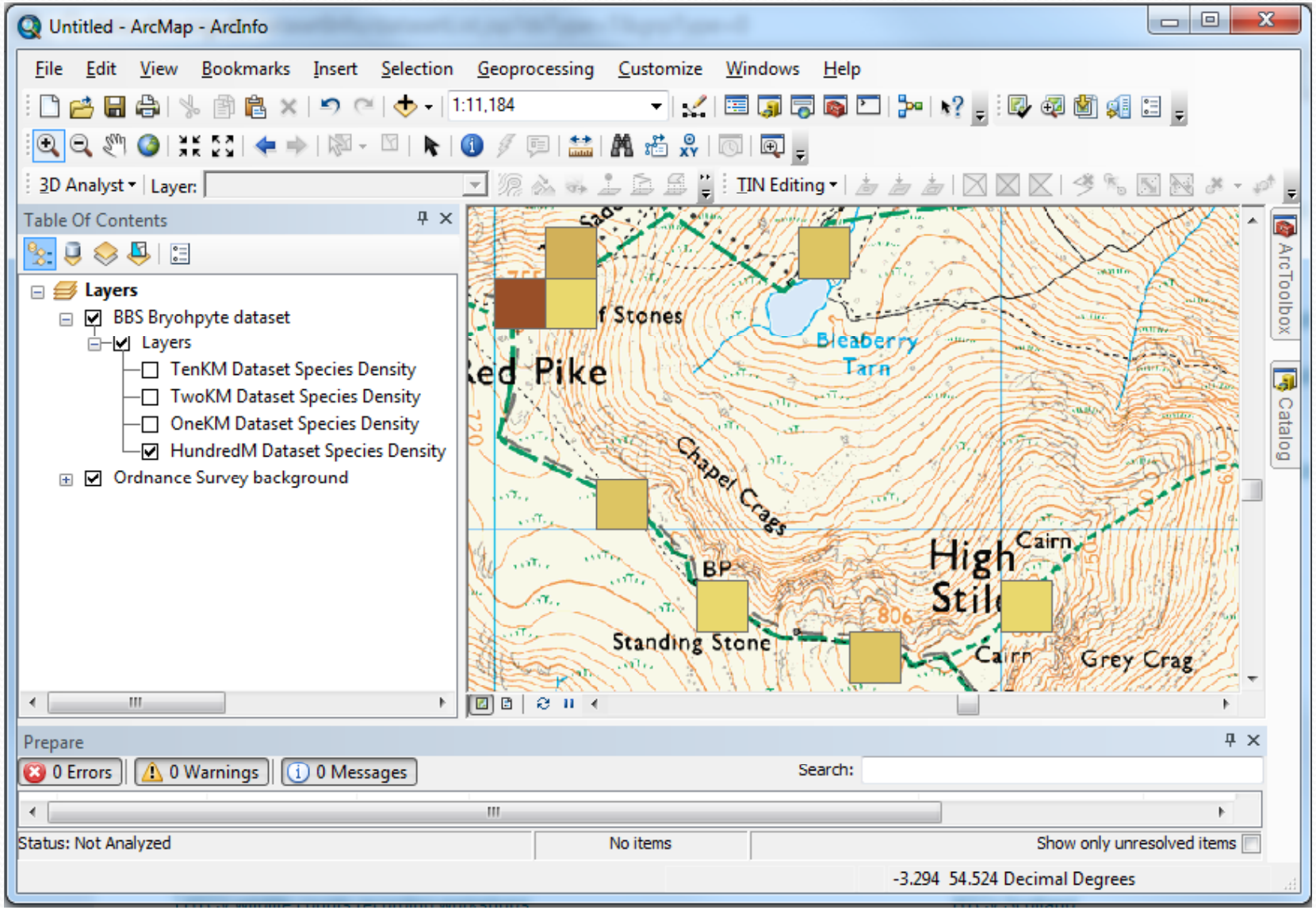
  http://data.nbn.org.uk/Documentation/Web_Services > Web Map Services

- GIS system requires this url:

`http://gis.nbn.org.uk/arcgis/rest/services/grids/<SERVICETYPE>/<REQUIREDNBNKEY>/WMSServer?`

Type of map	<SERVICETYPE>	<REQUIREDNBNKEY>
Single species records	`SingleSpeciesMap`	Taxon key (eg NBNSYS0000005629)
Species density for a single dataset	`DatasetSpeciesDensityMap`	Dataset key (eg GA000858)
Species density for a designation	`DesignationSpeciesDensityMap`	Designation code (eg ECCITES-A)

Example: Species density in bryophyte dataset



Fifth practical session

- Exercise 6: Use NBN WMS in a GIS system
  - Add geology WMS as background
  - Add NBN WMS species WMS
  - Explore data – panning, zooming, etc

Help

- Use the documentation:

  http://data.nbn.org.uk/Documentation/Web_Services

- Use the forum:

  http://forums.nbn.org.uk/viewforum.php?id=15

- Use the help desk: support@nbn.org.uk

Extra time: Species List web service

- A list of species
- http://data.nbn.org.uk/Documentation/Web_Services > Species List
- Can be filtered by:
  - Site boundary or geographical area
  - Designation (eg BAP)
  - Date
  - Datasets
  - Species keys (aka Taxon Version Keys)
  - Species group key (aka Taxon Reporting Category key)
- Try Exercise 7 – which creates a species list for a dataset

Extra time: Taxonomy web service

- Taxonomic search service
- http://data.nbn.org.uk/Documentation/Web_Services > Taxonomy and Species Search
- Allows searching by:
  - Scientific name
  - Common name
  - Taxon Version Key
- Can include a designation filter (eg BAP)
- Returns with a list of species items
- Exercise 8 illustrates a simple example