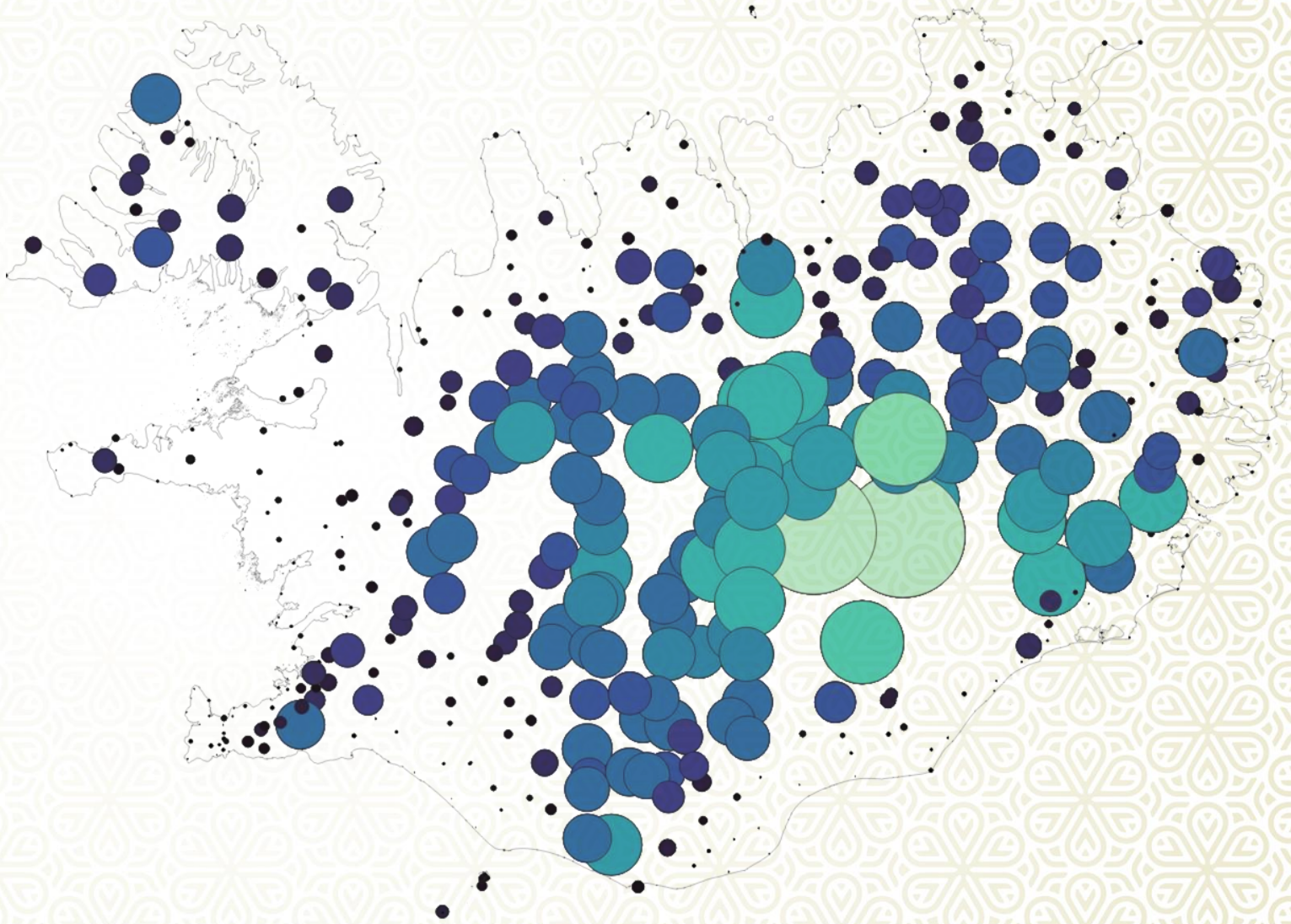
Náttúrufræðistofnun

QGIS Training NATT

Part 2: Data, Connections and Profiles.



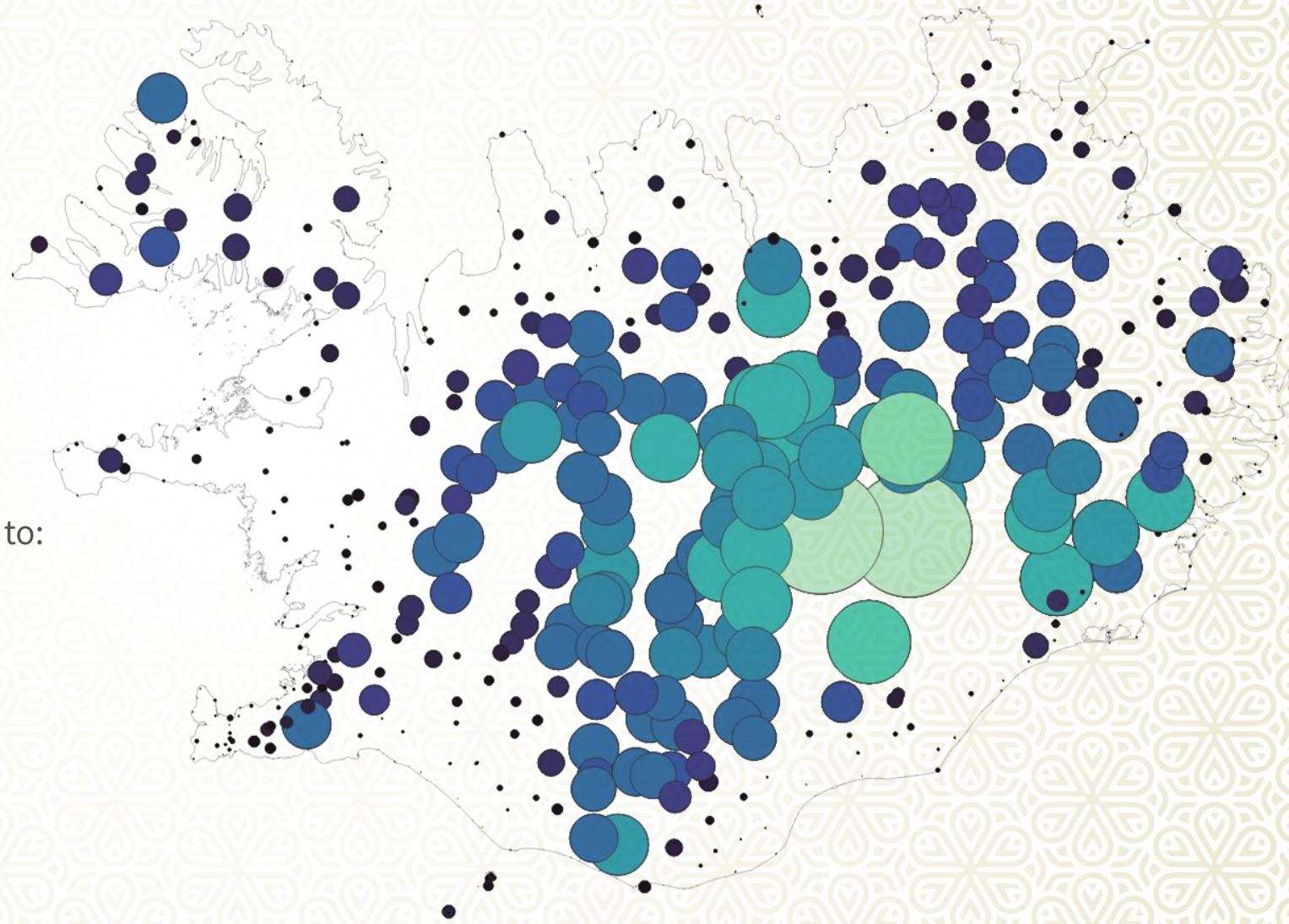
28 April 2026

Krummasalir

Náttúrufræðistofnun

QGIS Training NATT

Part 2: Data Connections



At the end of the training, you should be able to:

- Differentiate web service types
- Connect to different web services
- Understand map vs. feature data
- Connect to a database
- Understand geocatalogs

Next Courses in Series

- *Part 1: QGIS basics -- this course*
- ***Part 2: Data sources in Iceland, WMS/WFS, Postgres connection, how to find data -- this course***
- Part 3: QField and GPS surveying, height systems (May?)
- Part 4: Making sexy maps – Örnefni, styling, best practices with map making (June?)
- Part 5: Digging deeper into vectors (September?)
- Part 6: Working with raster data – DEMs and Satellite imagery (October?)

Náttúrufræðistofnun

Recap

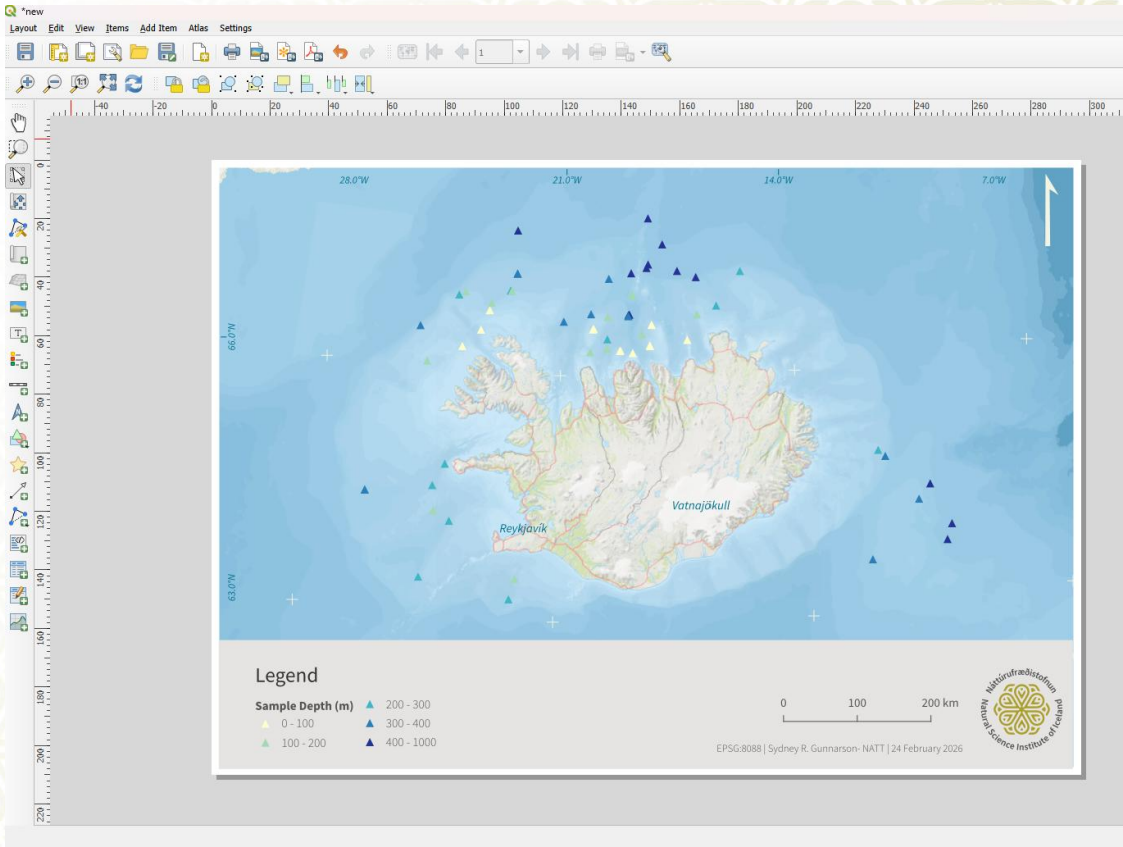
- We learned to navigate QGIS
- We learned different coordinate systems
- We loaded data from a CSV file
- We added a background image
- We produced a map

You can find this material here:

03_NATT_QIGS_NAMSKEID

Or on Teams:

General › Námskeið › Landupplýsingar › QGIS › **03_NATT_QIGS_NAMSKEID**



Náttúrufræðistofnun

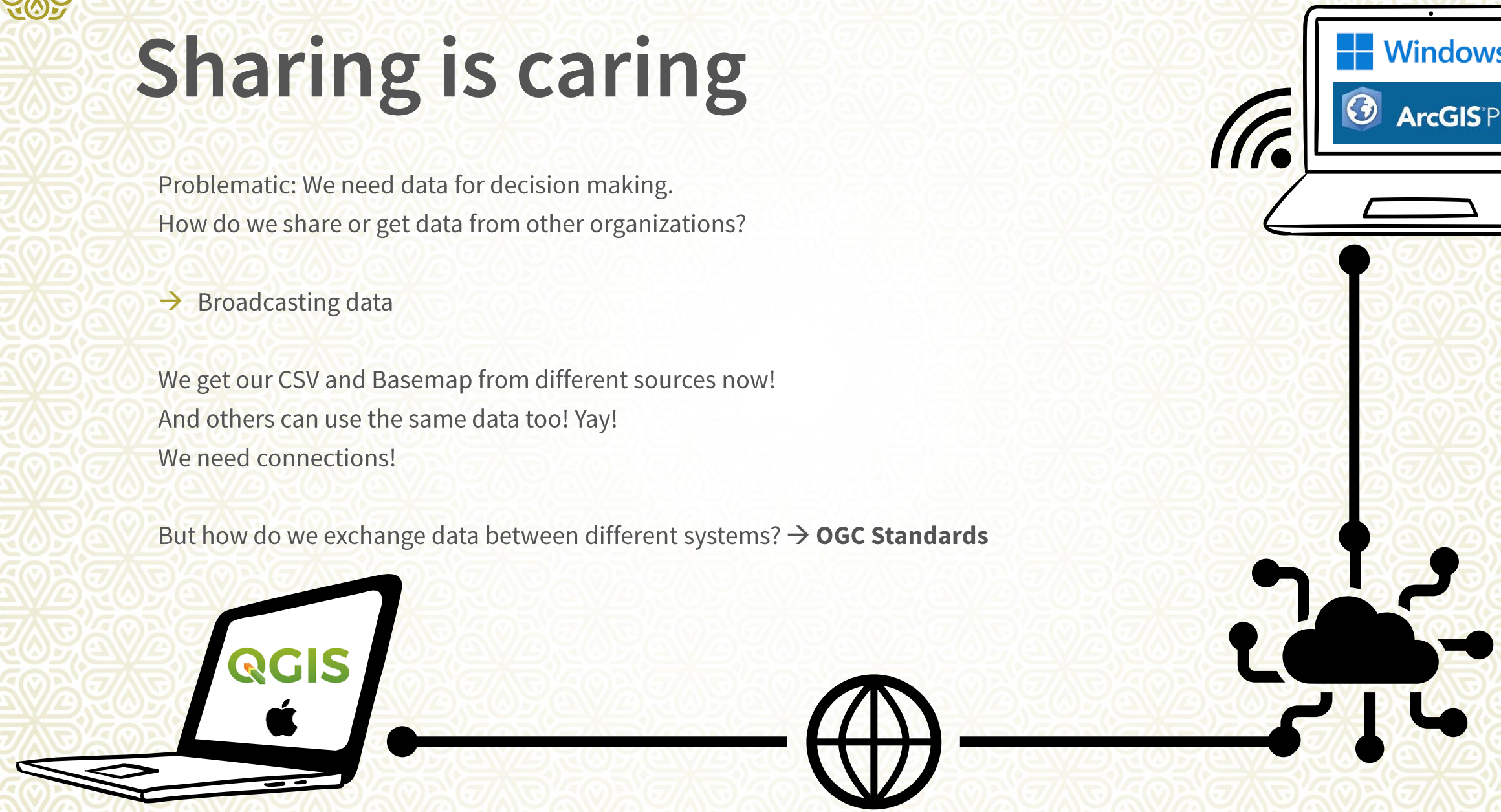
Sharing is caring

Problematic: We need data for decision making.
How do we share or get data from other organizations?

→ Broadcasting data

We get our CSV and Basemap from different sources now!
And others can use the same data too! Yay!
We need connections!

But how do we exchange data between different systems? → **OGC Standards**



Náttúrufræðistofnun

OGC Web Services (OWS)

- WMS – Web **Map** Service
- WMTS – Web **Map Tile** Service
- WCS – Web **Coverage** Service
- WFS – Web **Feature** Service
- … others like API Tiles – Vector Tiles

Non-OGC Services:

- REST API
- XYZ

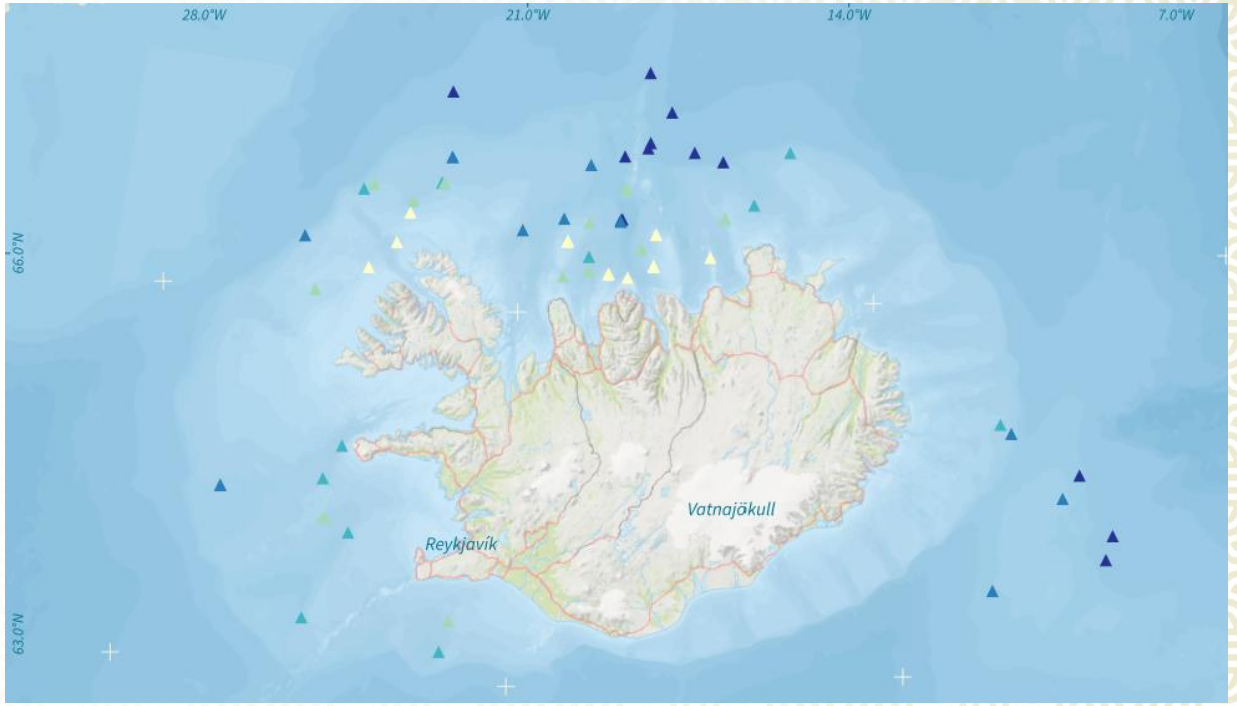
Open Geospatial Consortium

They define Geospatial Standards in order to collaborate

Náttúrufræðistofnun

WMS – Web Map Service

- Raster image
- Allows query of attributes
- Can get slow (heavy)



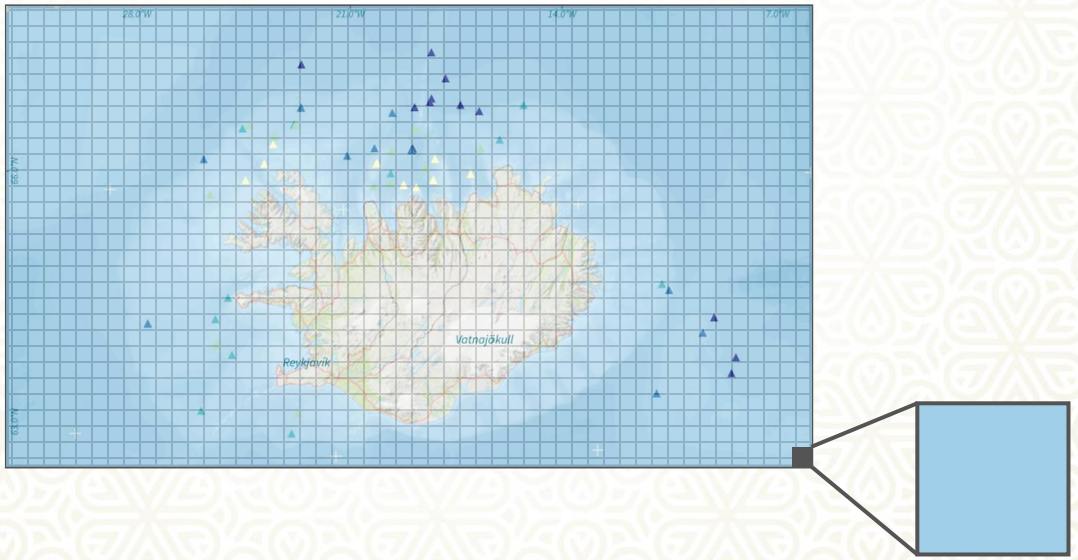
Náttúrufræðistofnun

WMTS – Web Map Tile Service

Lightweight and fast to load

Problems with tile overlapping data

No query of attribute inside the tile



https://www.ogc.org/standards/wmts

Náttúrufræðistofnun

XYZ tiles – Non OGC

Have their own tiling scheme and are normally served in a folder structure on the web.

Example of OpenStreetMap tiles:

https://tile.openstreetmap.org/{z}/{x}/{y}.png

{z} = is zoom level

{x} = tile position

{y} = tile position

https://tile.openstreetmap.org/0/0/0.png →

Sometimes it can be -Y

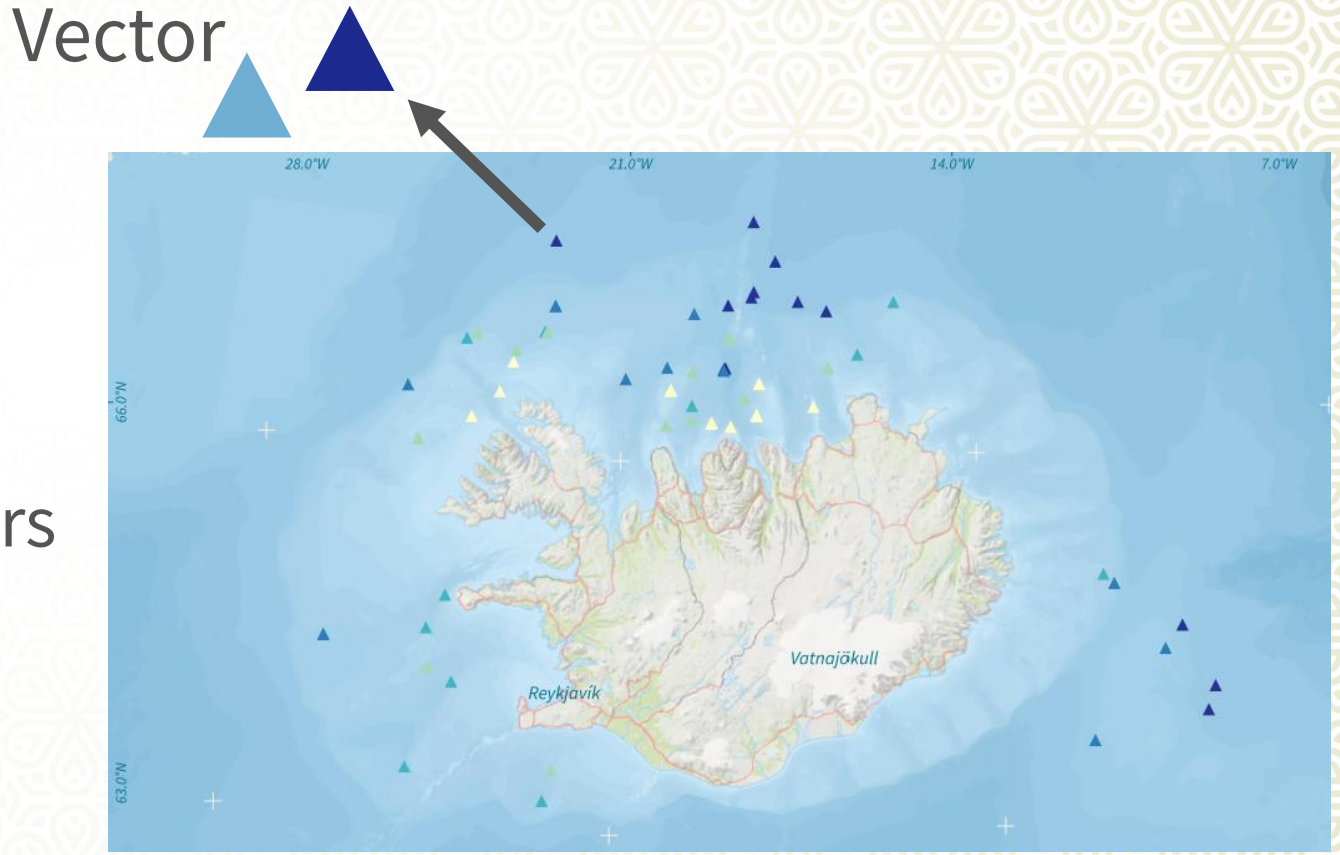
Náttúrufræðistofnun

WFS – Web Feature Service

- Download and edit
- Have attributes
- Can get heavy fast

→ Vistgerðakort 30 GB vectors

Possible solution: Vector Tile



Náttúrufræðistofnun

What is PostgreSQL/PostGIS

PostgreSQL

- Open-source relational database system
- Stores and manages structured data

https://www.postgresql.org/

PostGIS

- Adds support for geographic data types
- Stores points, lines, and polygons, and allows spatial queries

https://postgis.net/

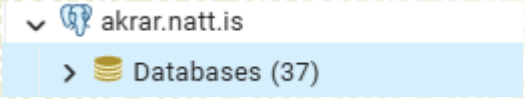
- Multiple-user access: read and edit data at the same time
- Data integrity where rules prevent incosistent or corrupt records
- Spatial queries and way more

Náttúrufræðistofnun

How we use PostgreSQL/PostGIS

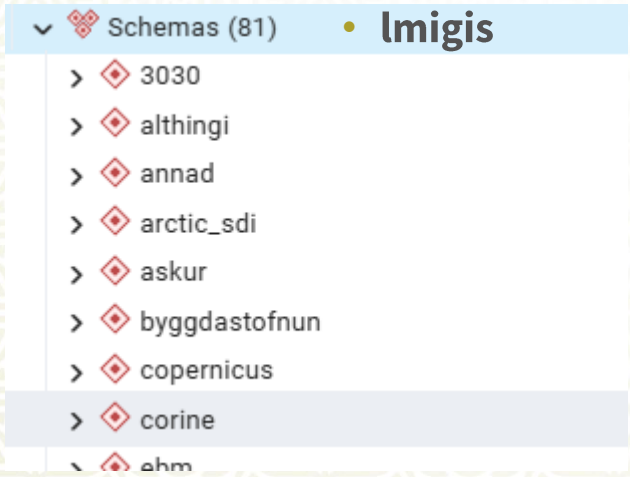
In-house setup

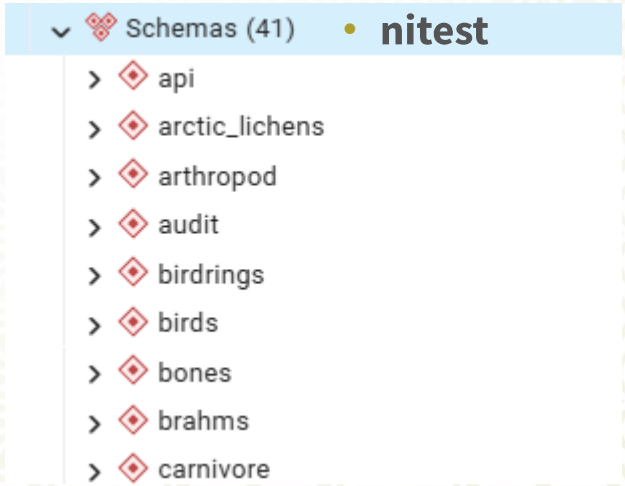
Database server



- Hostet on NATT infrastructure: **akrar-natt**
- Accessible from within NATT network
- PostgreSQL with PostGIS extension

Databases





Schemas/access

- Data is organized into schemas → for example you will work in the qgis_namskeid schema
- Different level of access → read access only, write access, admin access.

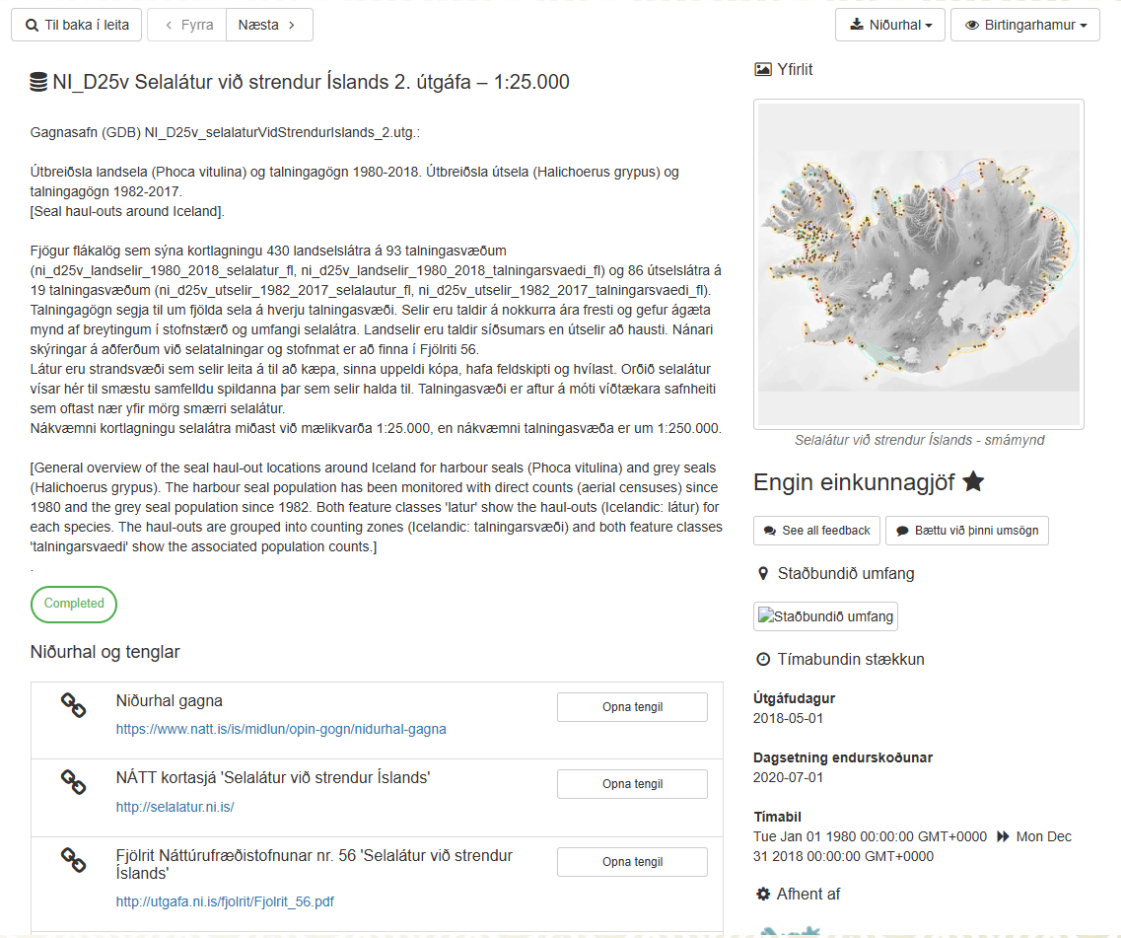
Náttúrufræðistofnun

Data about data → Metadata

To find datasets we need information about:

- Where is the data?
- How to get it?
- What it contains?
- Who produced it?
- When was the data produced?
- …

This information is called Metadata



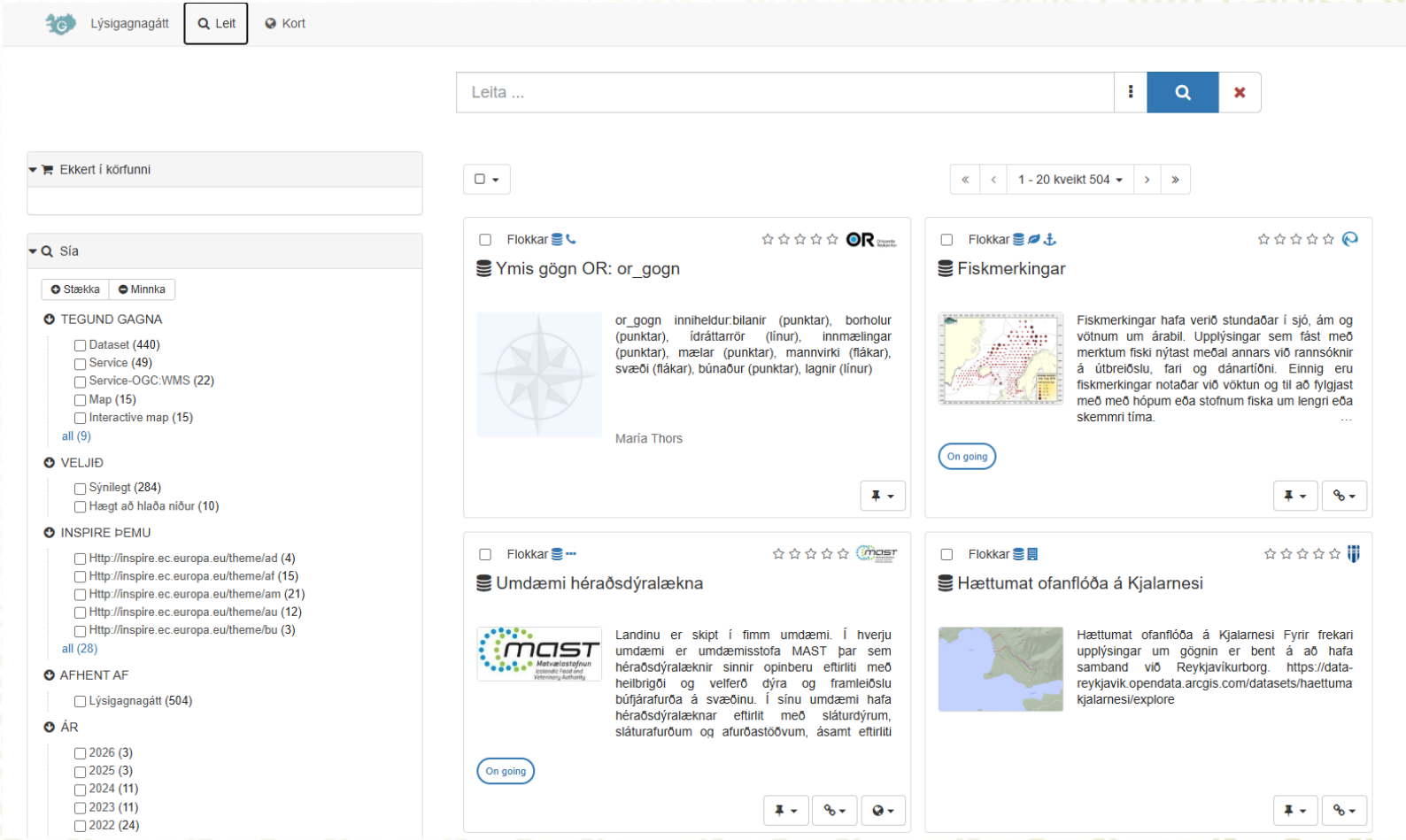
Náttúrufræðistofnun

Collection of Geospatial Data

A collection of metadata becomes a so-called Metadata Catalog

Lýsigagnagátt

→ https://gatt.natt.is



Náttúrufræðistofnun

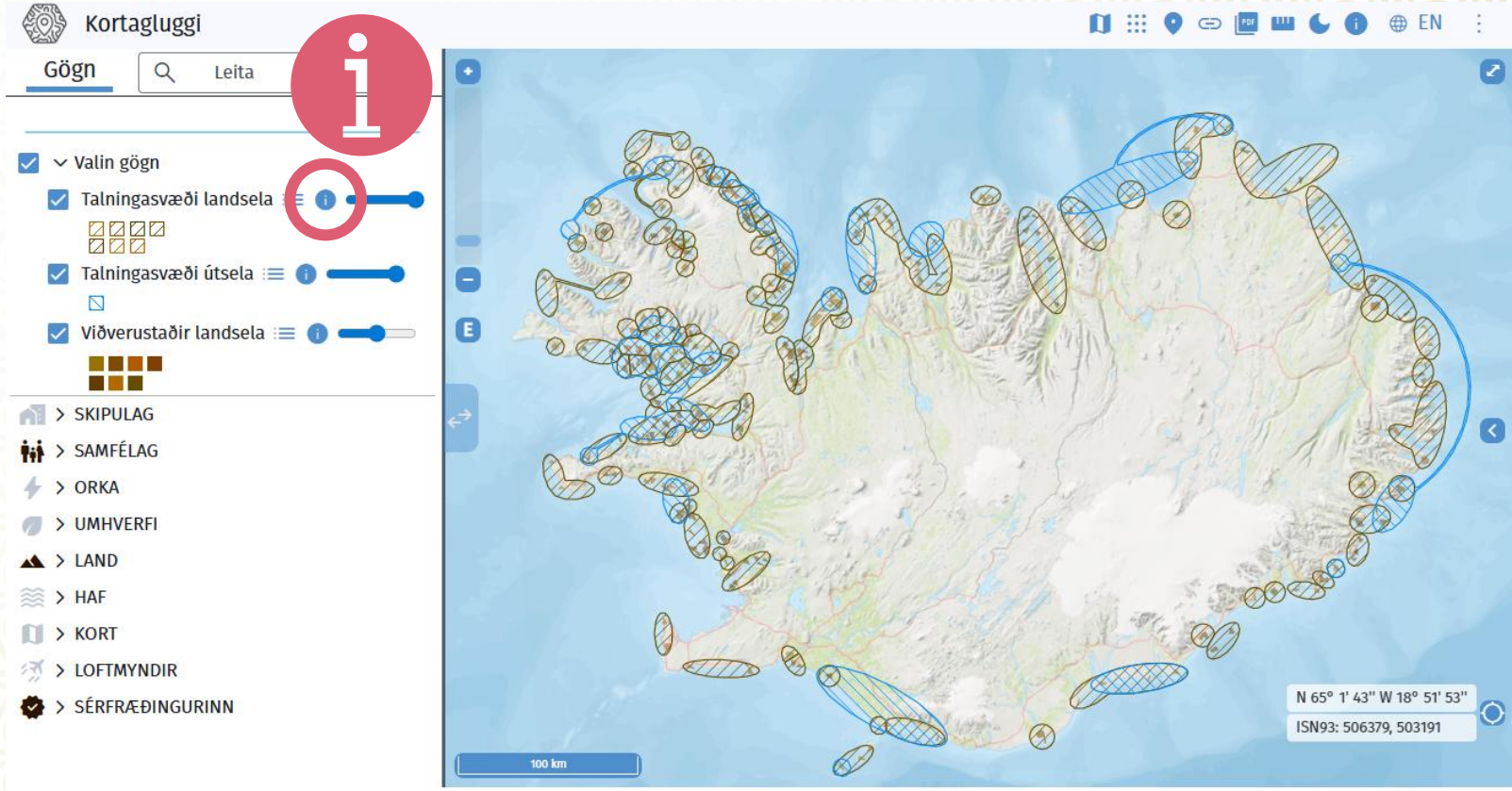
Collection of Geospatial Data on a map

We have it also in our webmap

Lýsigagnagátt

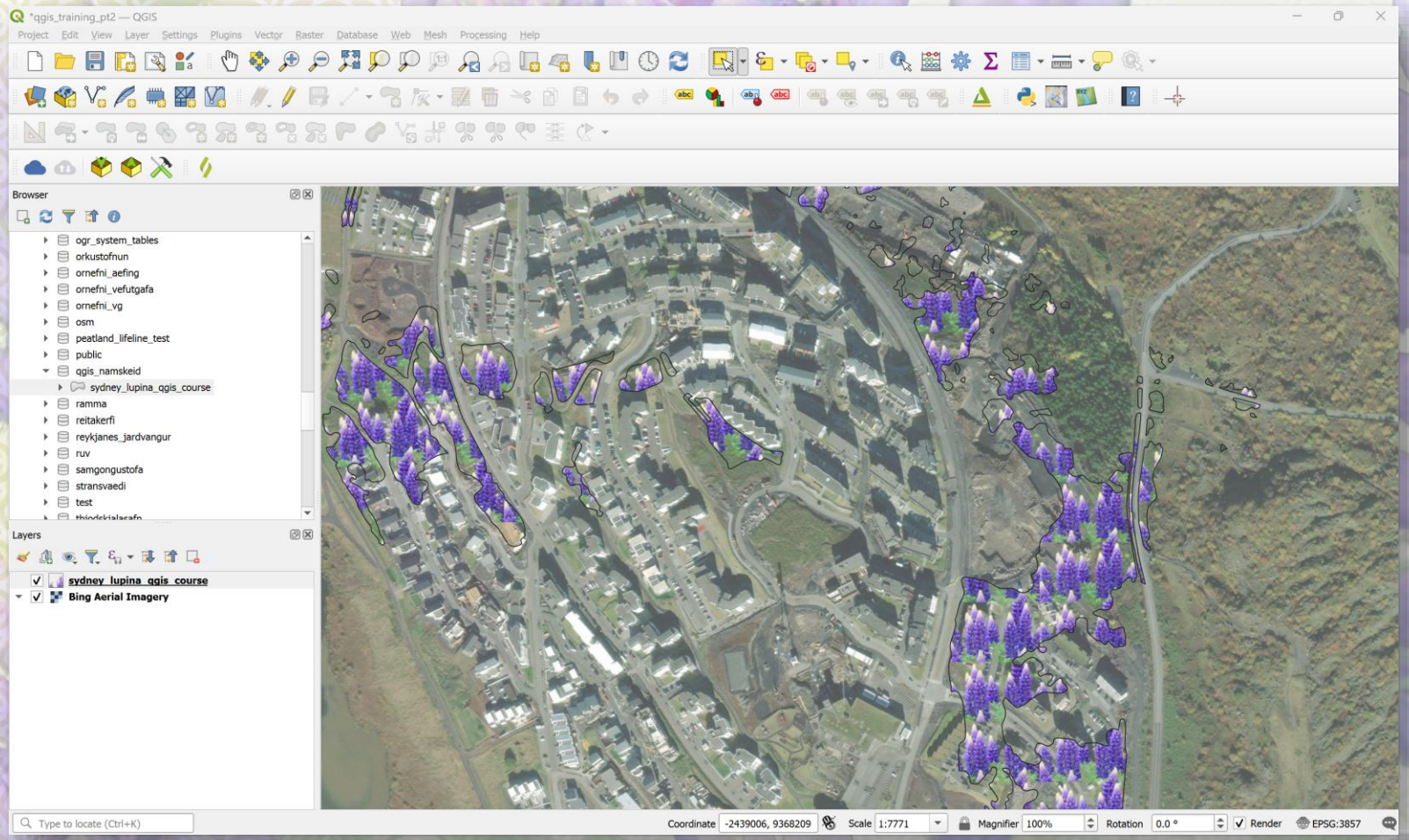
→ https:/kortagluggi.is

→ https://kort.gis.is/



Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS
Updating Alaska lúpína extent using satellite imagery



We will prepare a map using satellite imagery from XYZ tile map services and some data from the Náttúrufræðistofnun database to map out Lupine extent.

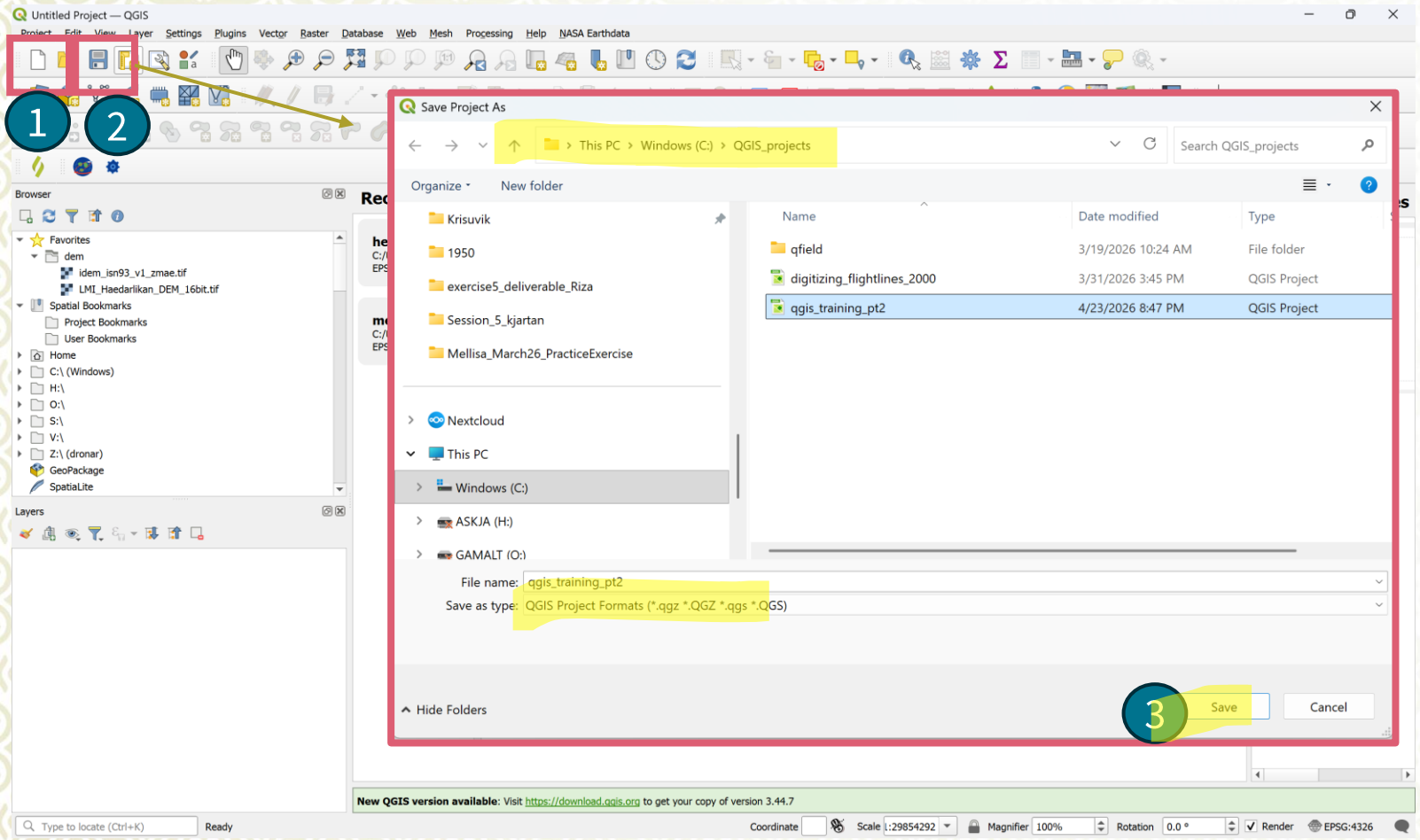
We will then use this map again in the next course (QField) where we will package it and prepare it for the field.

We will continue with the QField Lupina exercise in the next course.

But for now, lets start with the exercise

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



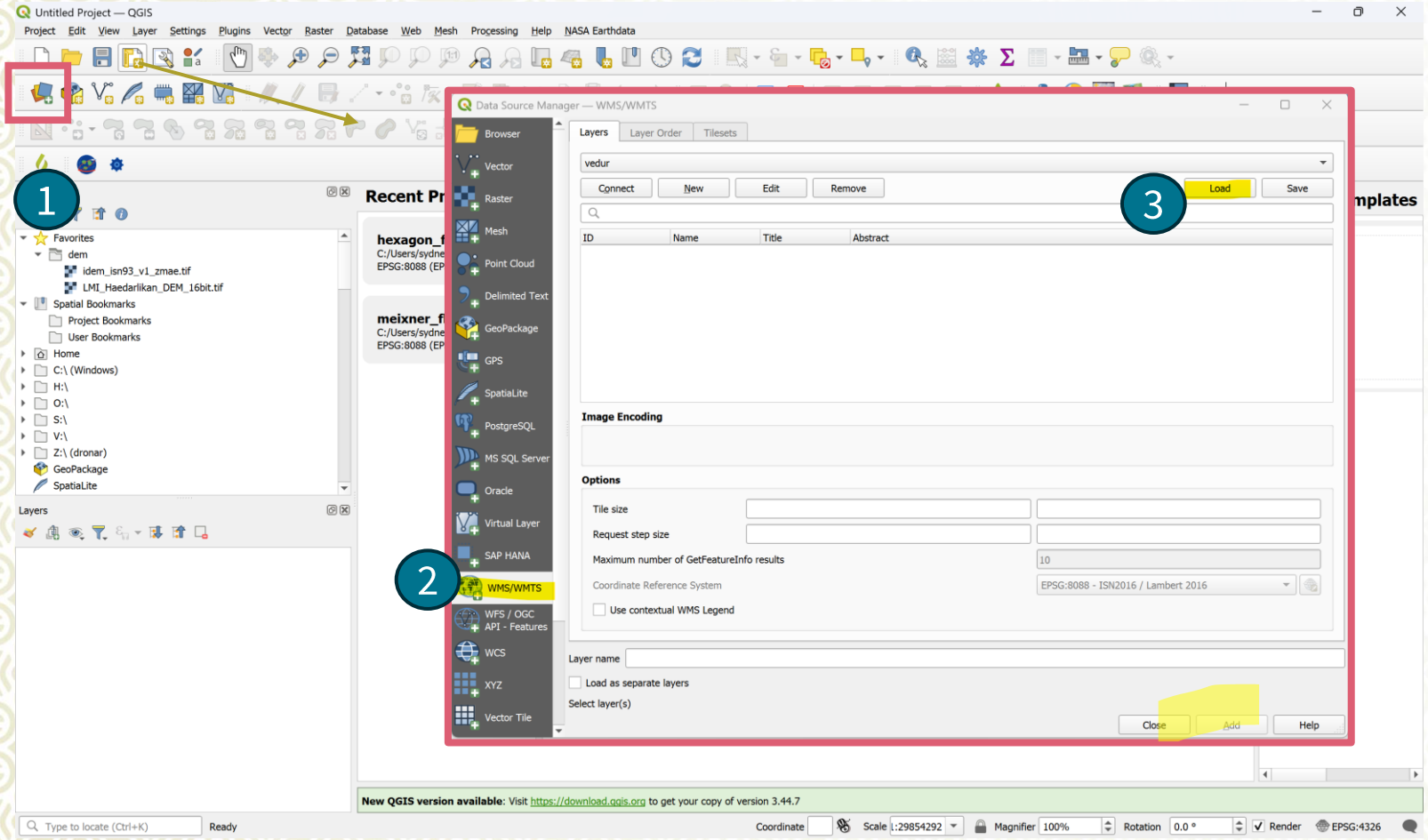
Start a new project

1. Start a new project by clicking the new project button
2. Save the project by clicking save project button
3. Save somewhere ***locally***. Beware that on many computers, Desktop and Documents are on OneDrive! Create a project folder, and save this QGIS project in the same folder. Give a descriptive name.

We will use this project in future lectures so keep it

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

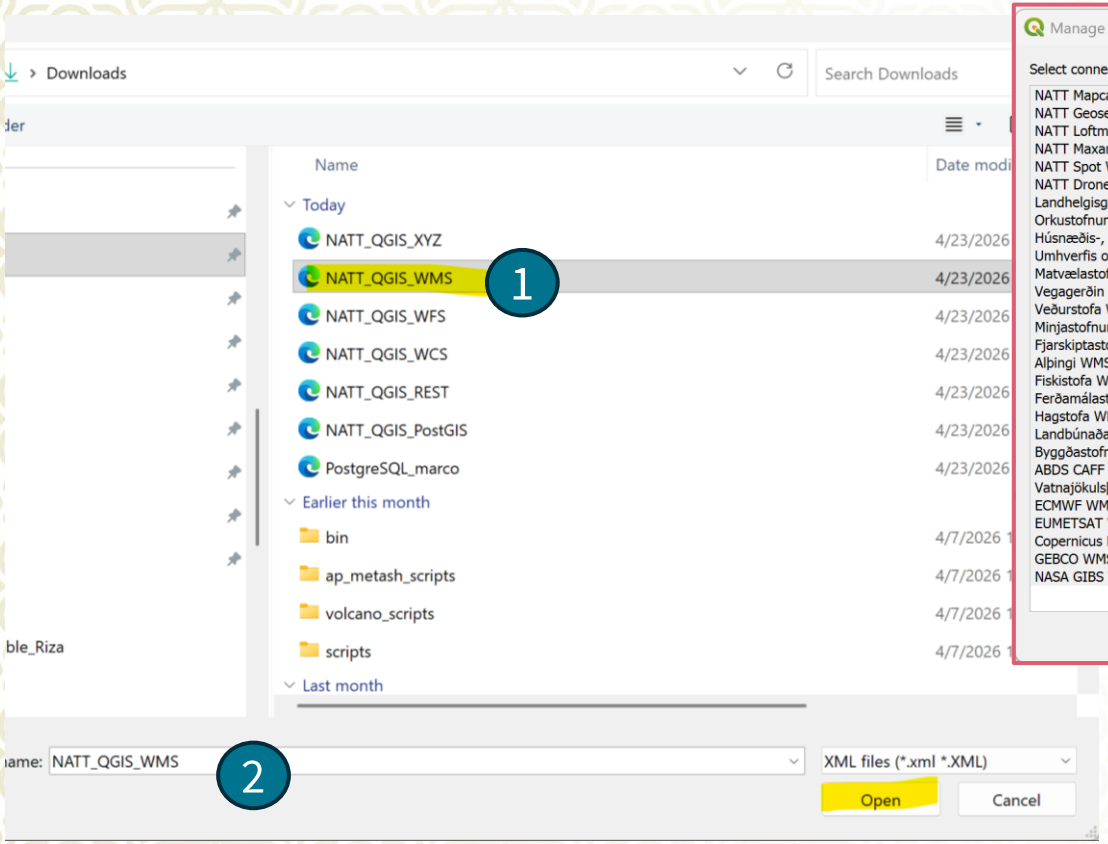


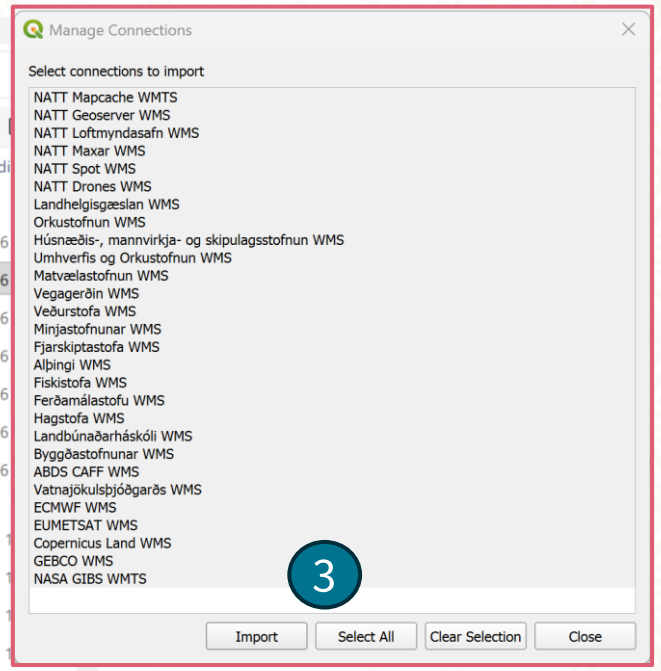
Import WMS services via .xml file

0. Download the ZIP file: https://ftp.natt.is/public/michaela/QGIS_course/NATT_QGIS_Connections.zip and extract it.
1. Select the Data Source Manager button
2. Select WMS/WMTS as the source type
3. Click ‘Load’…

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



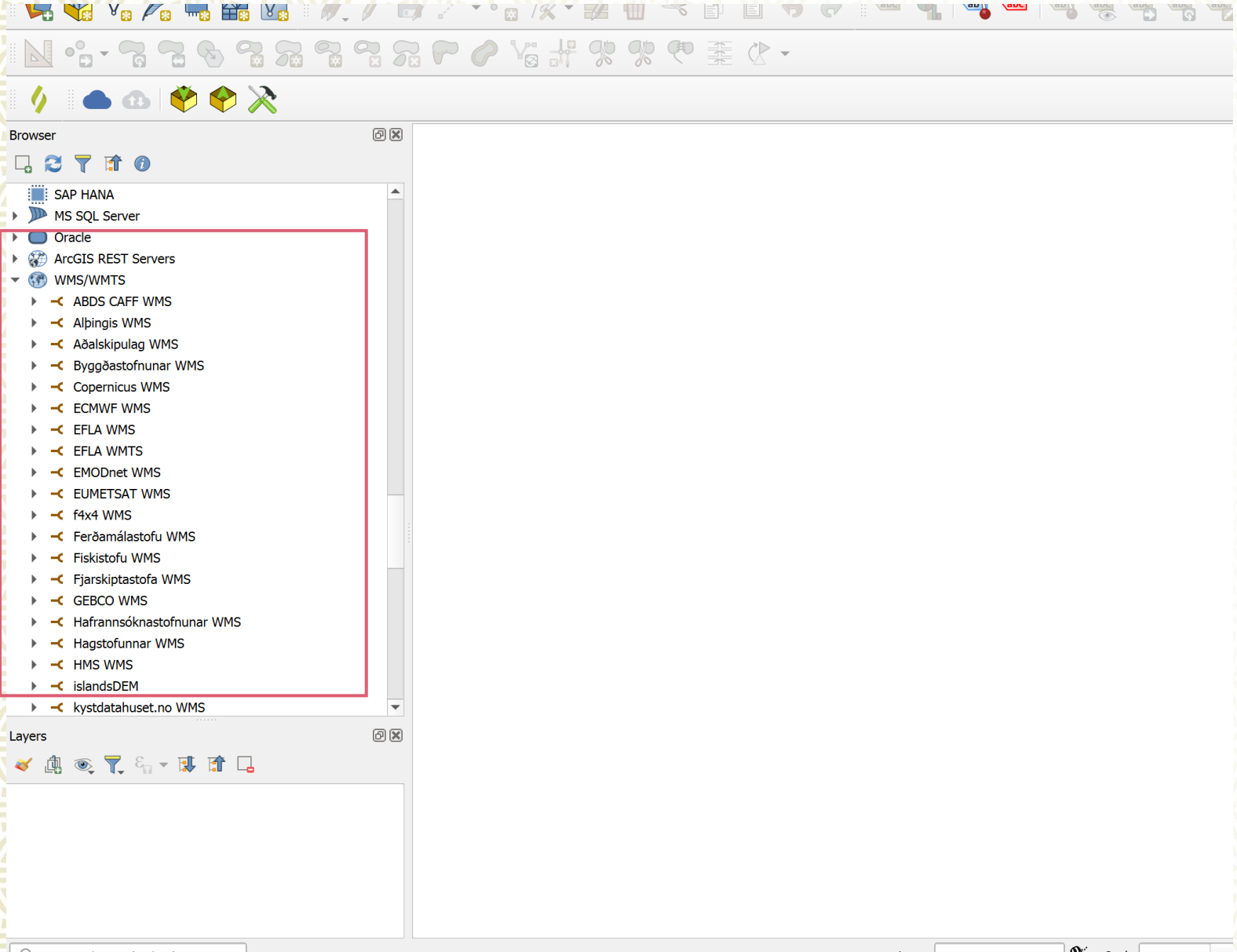


Import WMS services via .xml file

1. Navigate to where you saved your .xml files
2. Import the file called ‘NATT_QGIS_WMS.xml’
3. A list of connections will pop up in a new window. You can either select specific ones you want or simply click ‘Select All’ and ‘Import’ to import all of them (recommended).

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

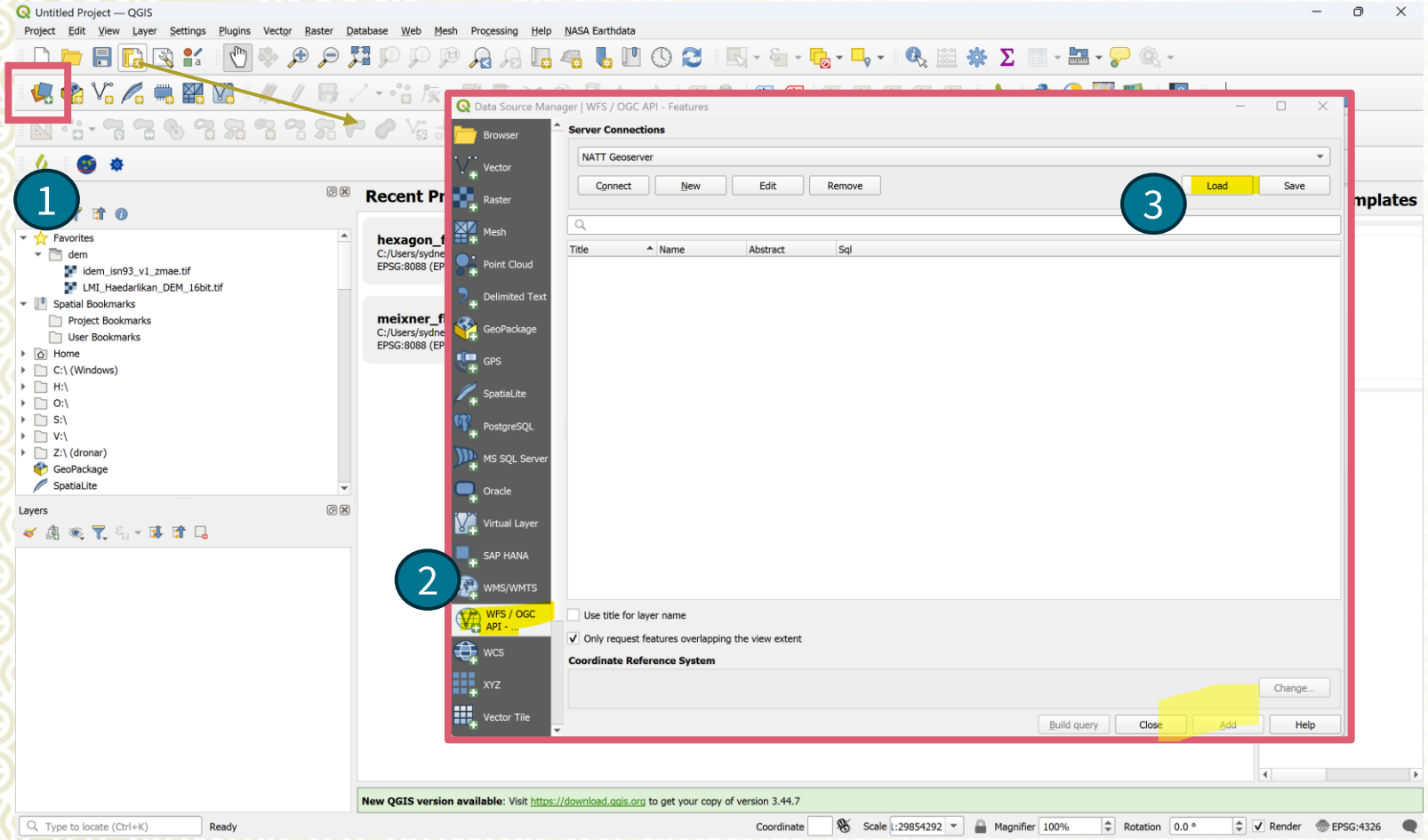


Import WMS services via .xml file

1. Now in your QGIS window, if you navigate to ‘WMS/WMTS’ in the Browser, you will see all the connections you just imported. (You might have to expand it by clicking the little arrow)

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

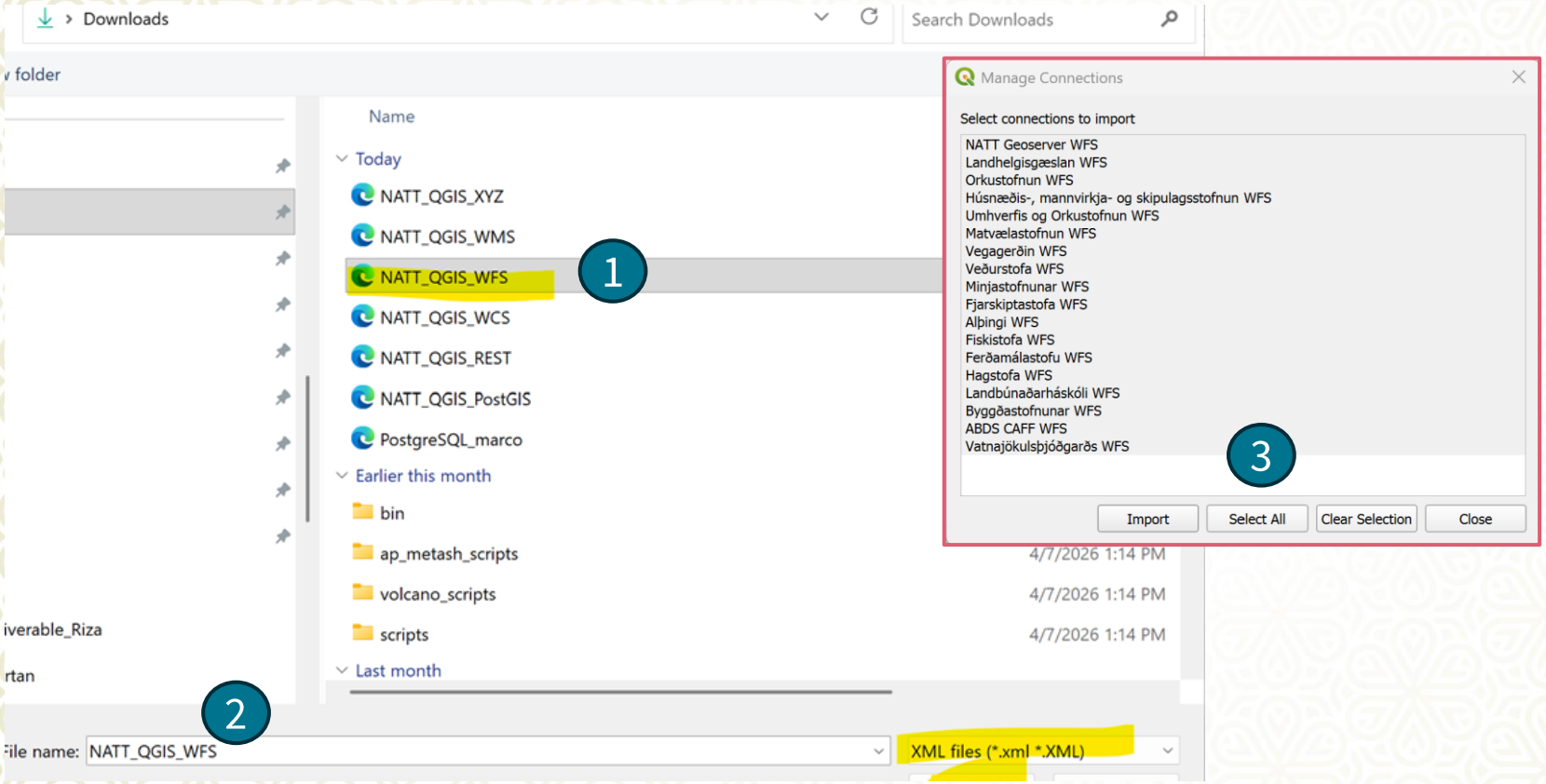


Import WFS services via .xml file

1. Select the Data Source Manager button
2. Select WFS / OGC API as the source type
3. Click ‘Load’…

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

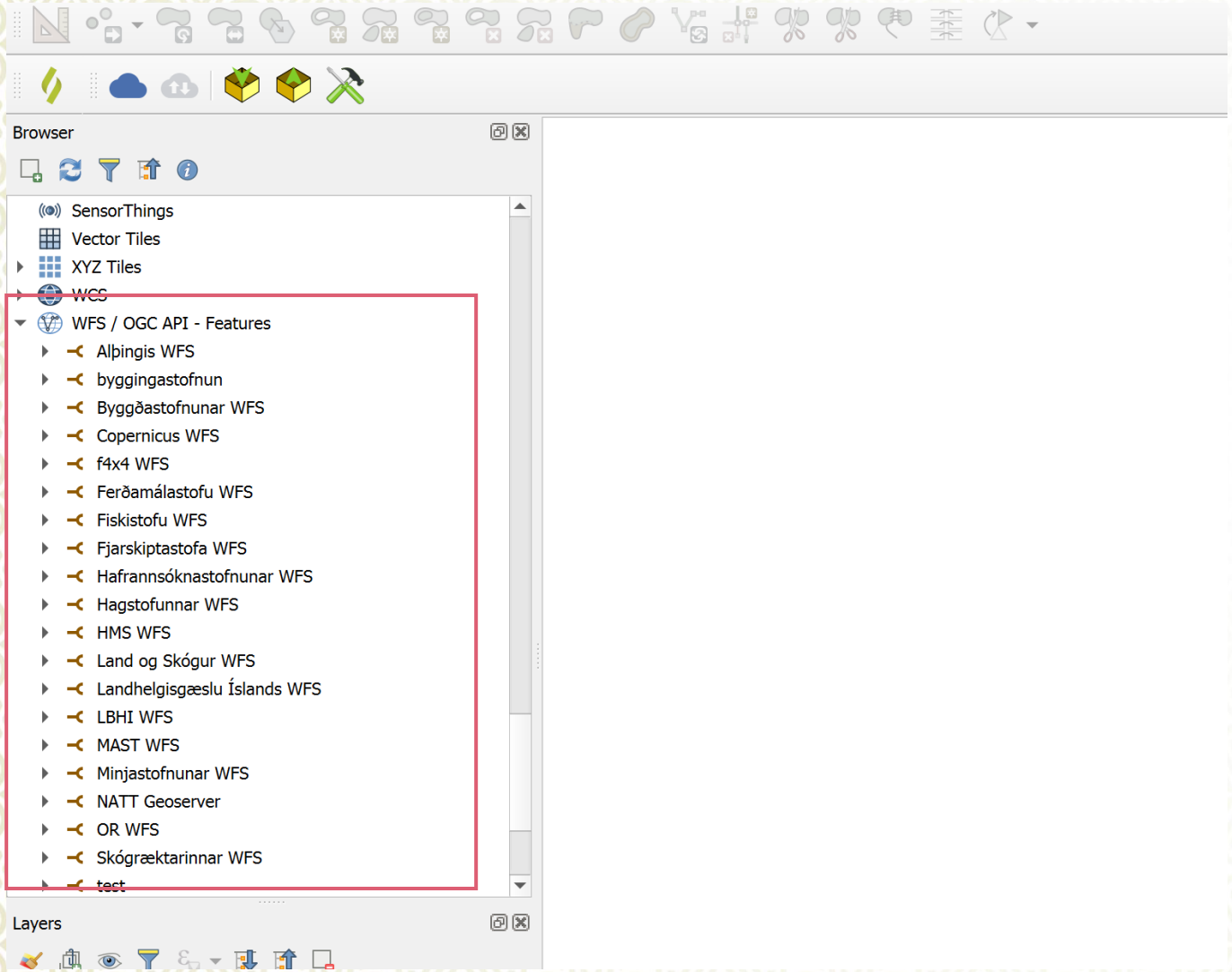


Import WFS services via .xml file

1. Navigate to where you saved your .xml files that were emailed to you before the course
2. Import the file called ‘NATT_QGIS_WFS.xml’
3. A list of connections will pop up in a new window. You can either select specific ones you want, or simply click ‘Select All’ and ‘Import’ to import all of them (recommended).

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

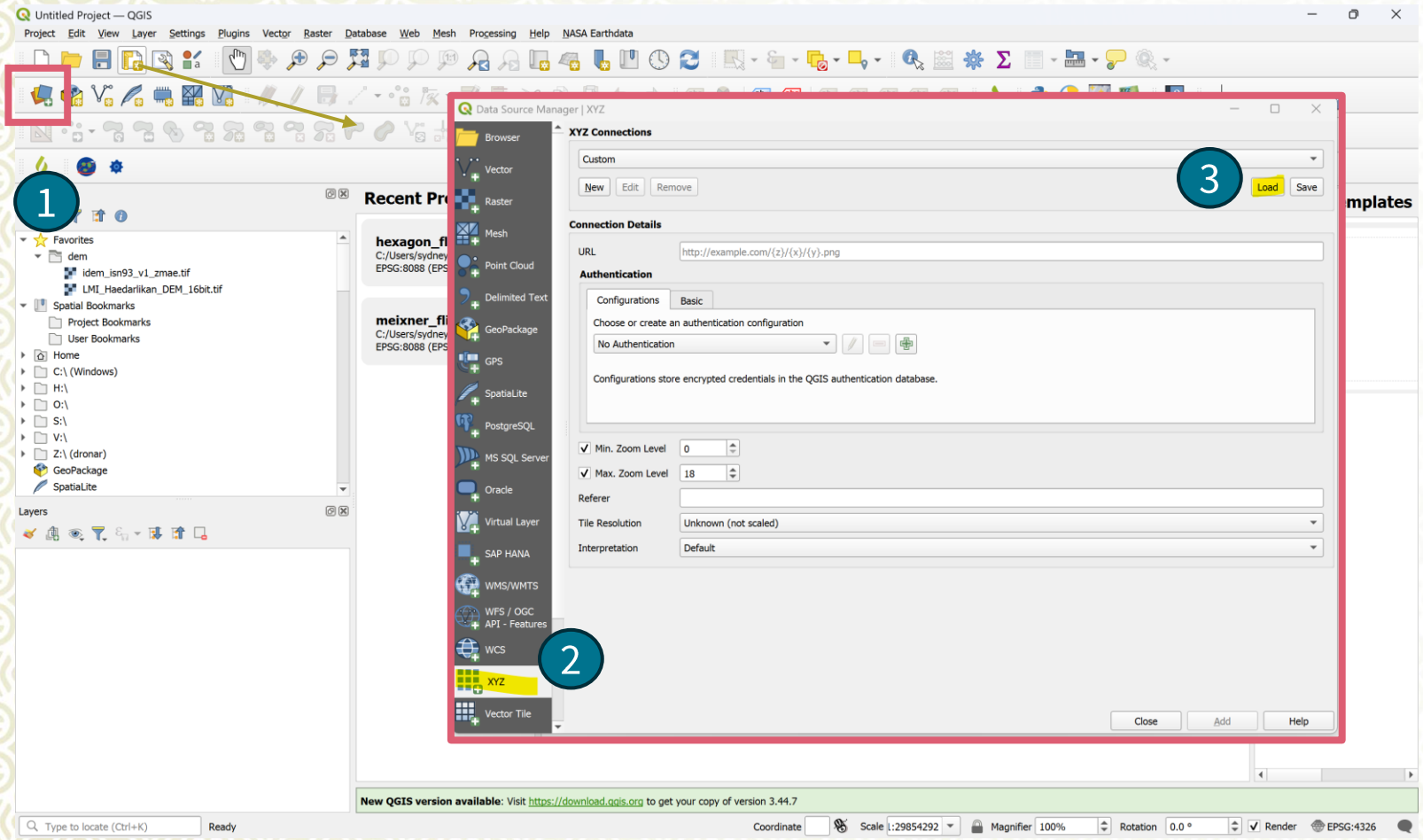


Import WFS services via .xml file

1. Now in your QGIS window, if you navigate to ‘WFS / OGC API’ in the Browser, you will see all the connections you just imported. (You might have to expand it by clicking the little arrow)

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

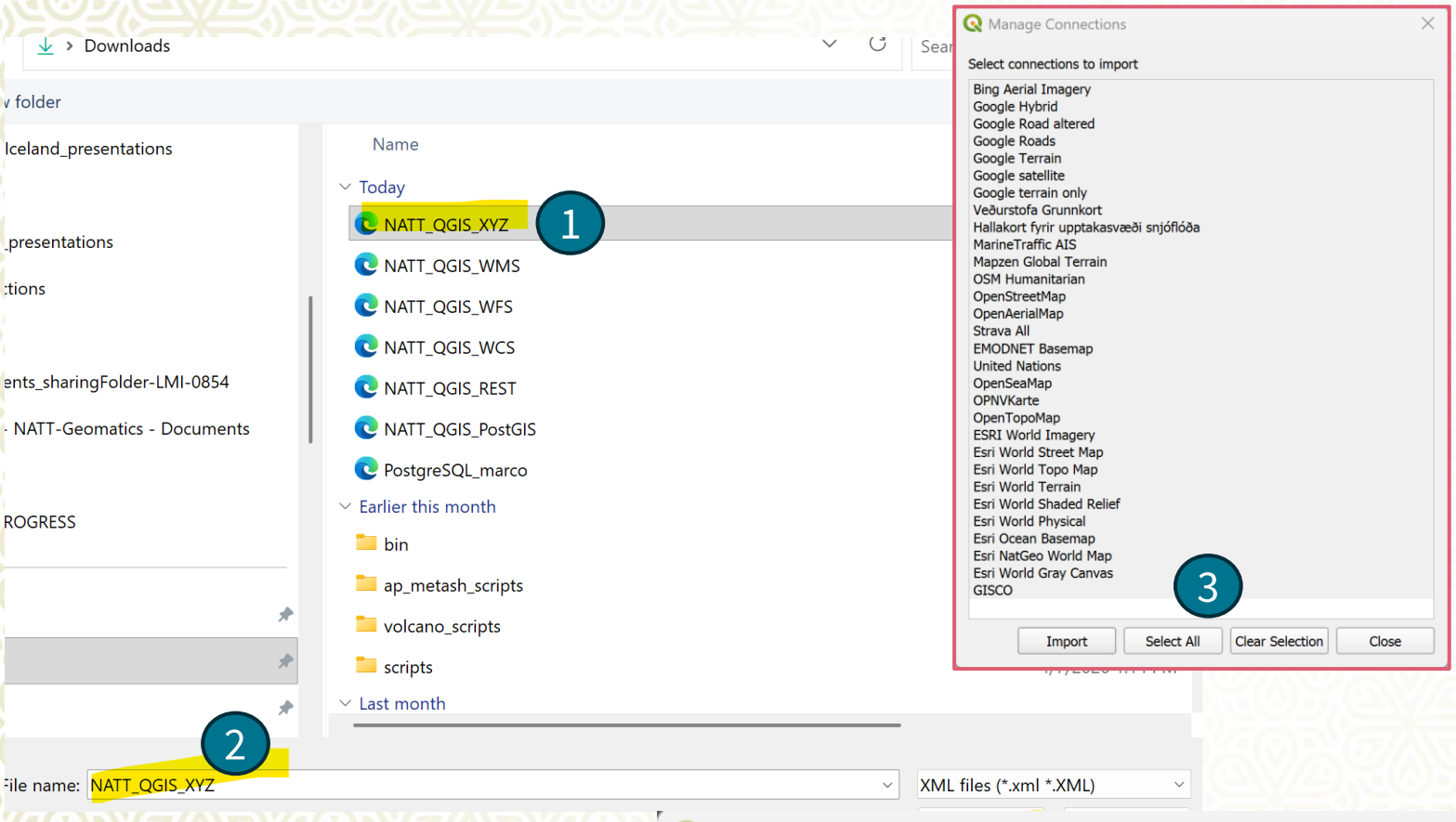


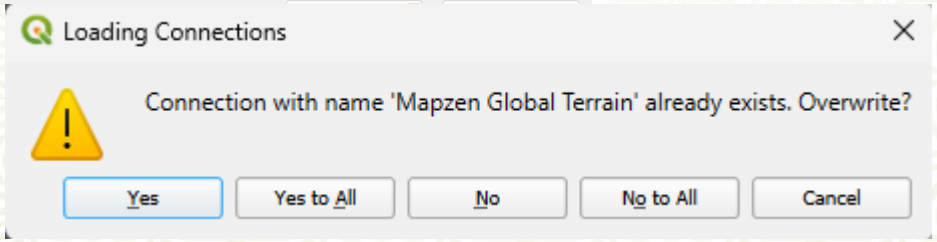
Import XYZ services via .xml file

1. Select the Data Source Manager button
2. Select XYZ as the source type
3. Click ‘Load’…

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



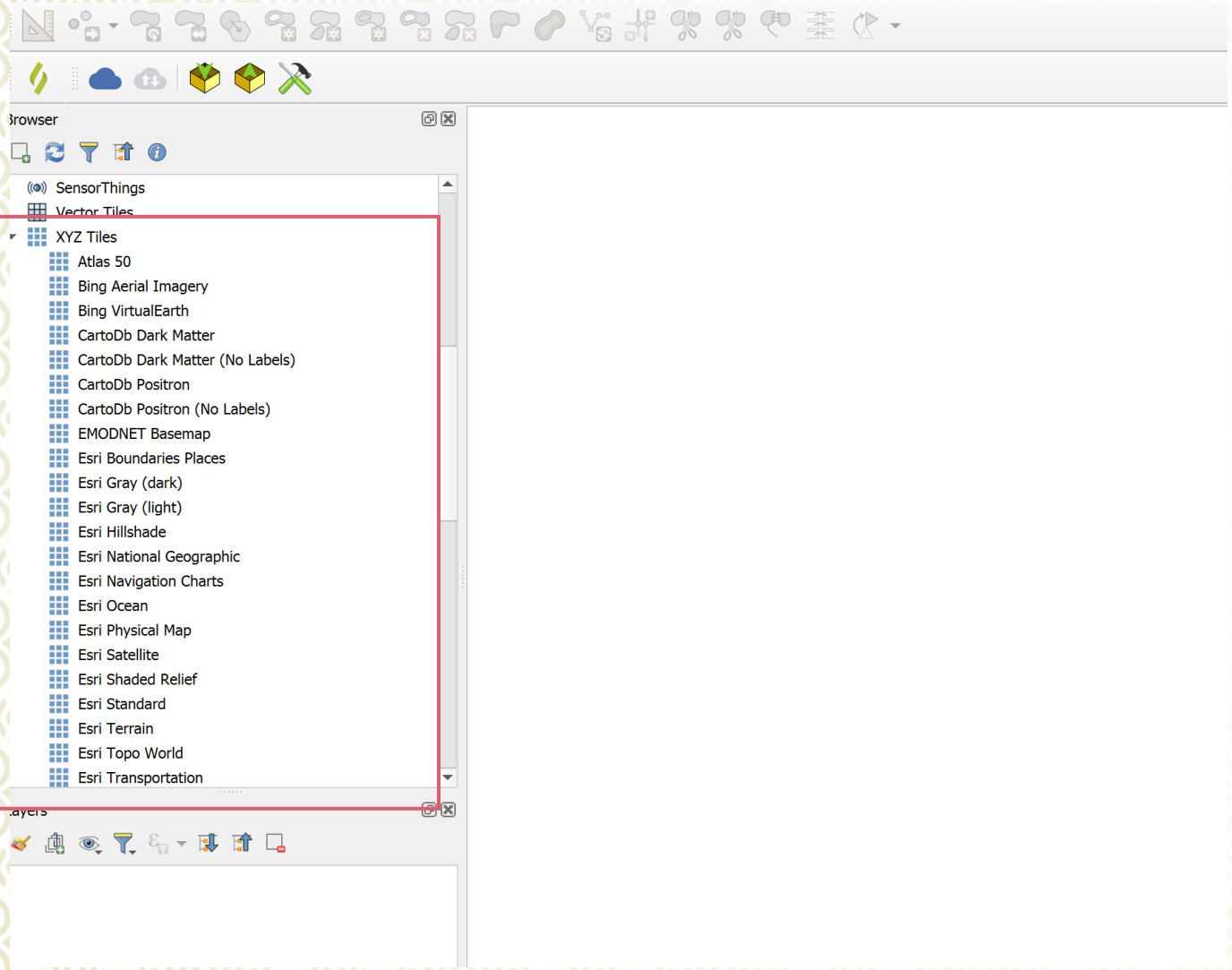


Import XYZ services via .xml file

1. Navigate to where you saved your .xml files that were emailed to you before the course
2. Import the file called ‘NATT_QGIS_XYZ.xml’
3. A list of connections will pop up in a new window. You can either select specific ones you want, or simply click ‘Select All’ and ‘Import’ to import all of them (recommended).
4. If asked to overwrite select “Yes to All”

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

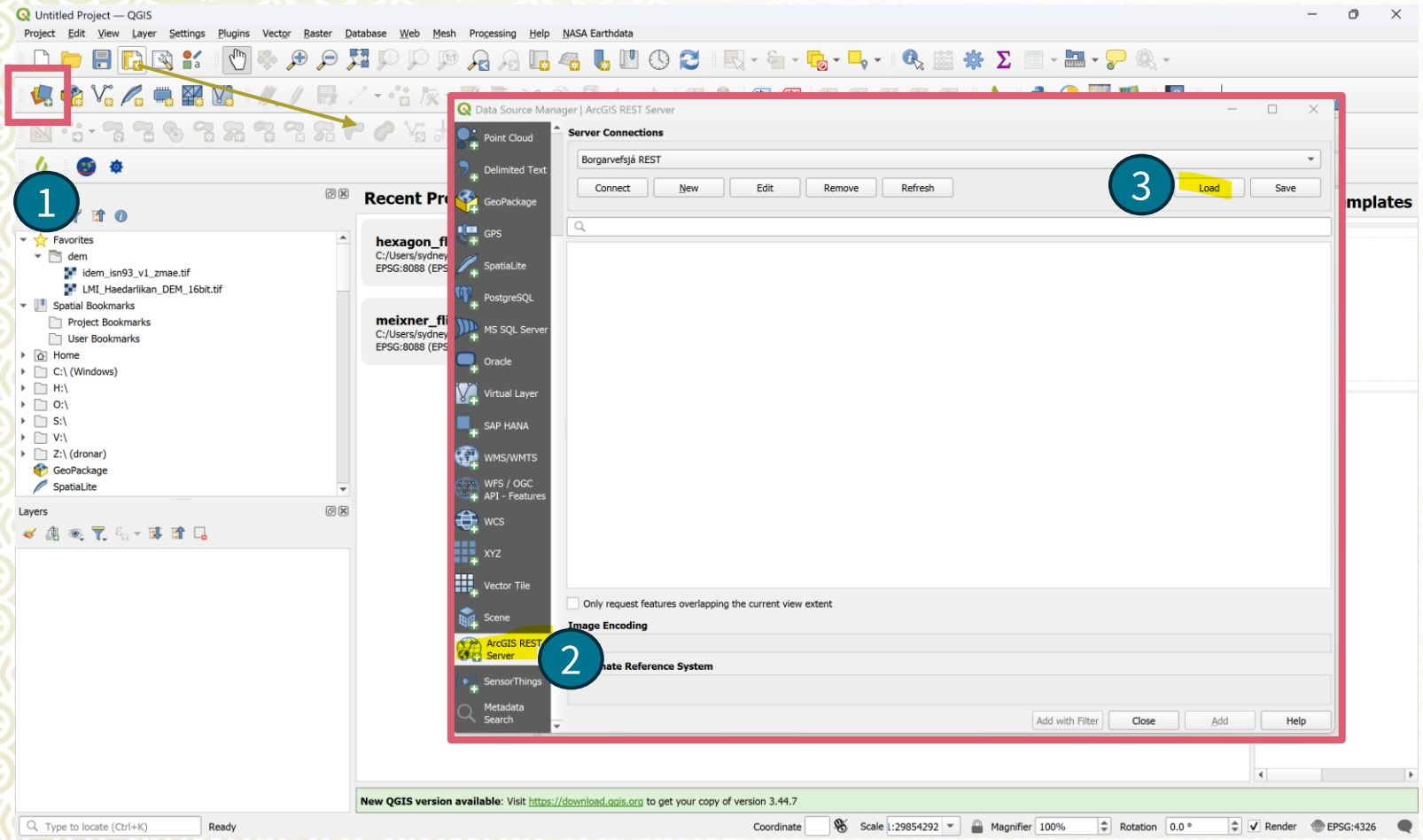


Import XYZ services via .xml file

1. Now in your QGIS window, if you navigate to ‘XYZ Tiles’ in the Browser, you will see all the connections you just imported. (You might have to expand by clicking the triangle on the left)

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

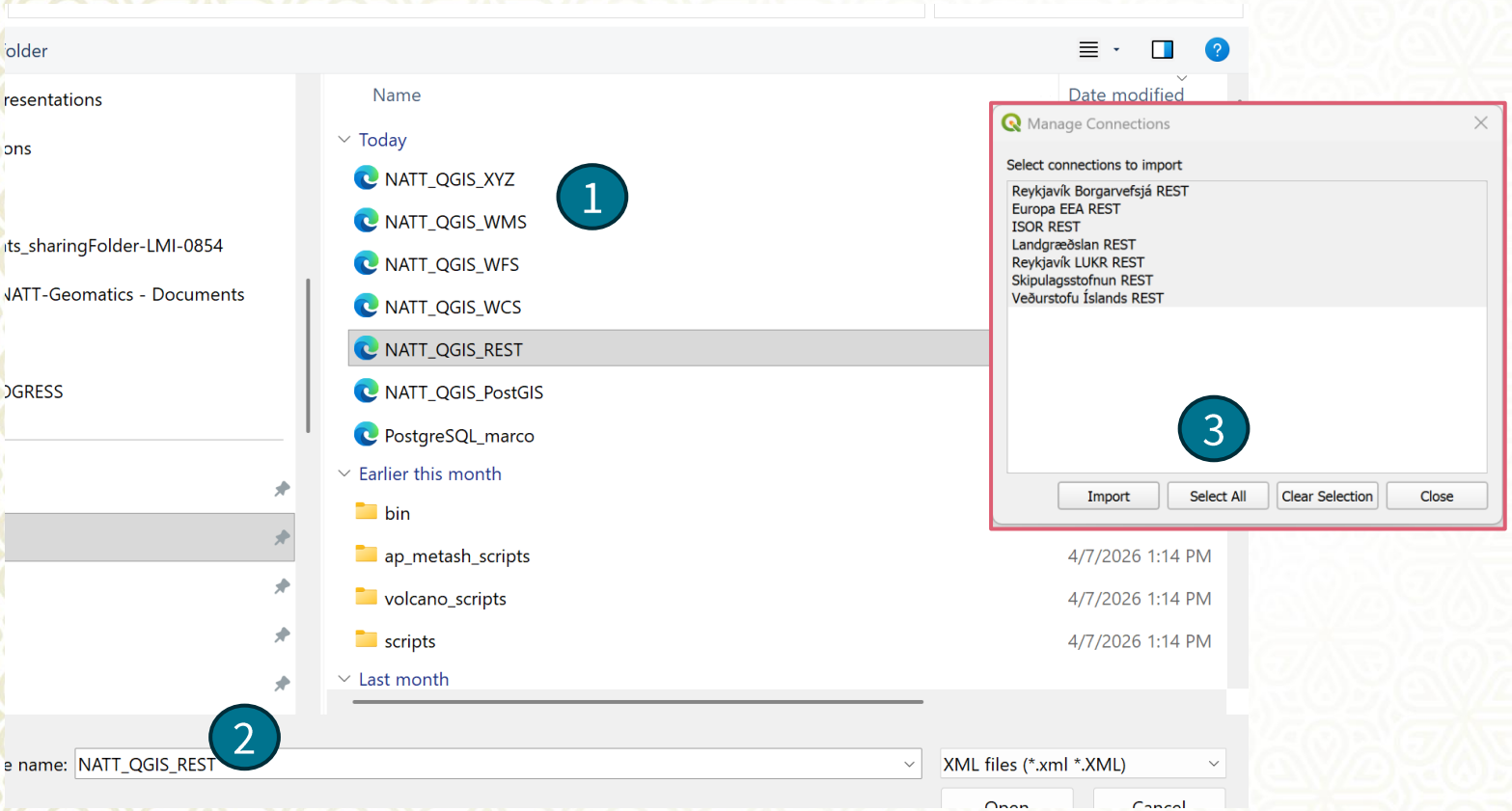


Import REST services via .xml file

1. Select the Data Source Manager button
2. Select ArcGIS REST Server as the source type
3. Click ‘Load’…

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

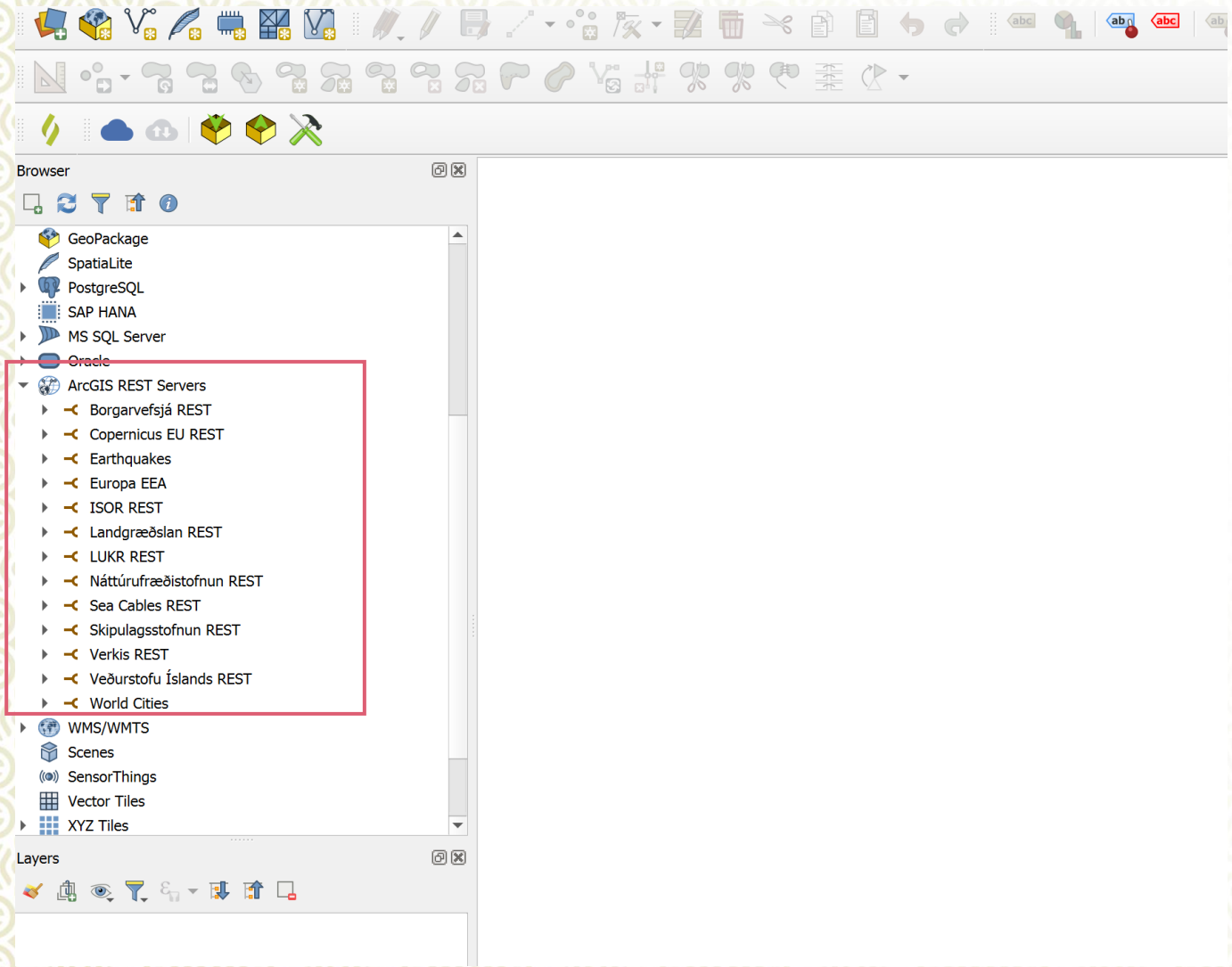


Import REST services via .xml file

1. Navigate to where you saved your .xml files that were emailed to you before the course
2. Import the file called ‘NATT_QGIS_REST.xml’
3. A list of connections will pop up in a new window. You can either select specific ones you want, or simply click ‘Select All’ and ‘Import’ to import all of them (recommended).

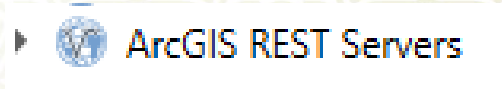
Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



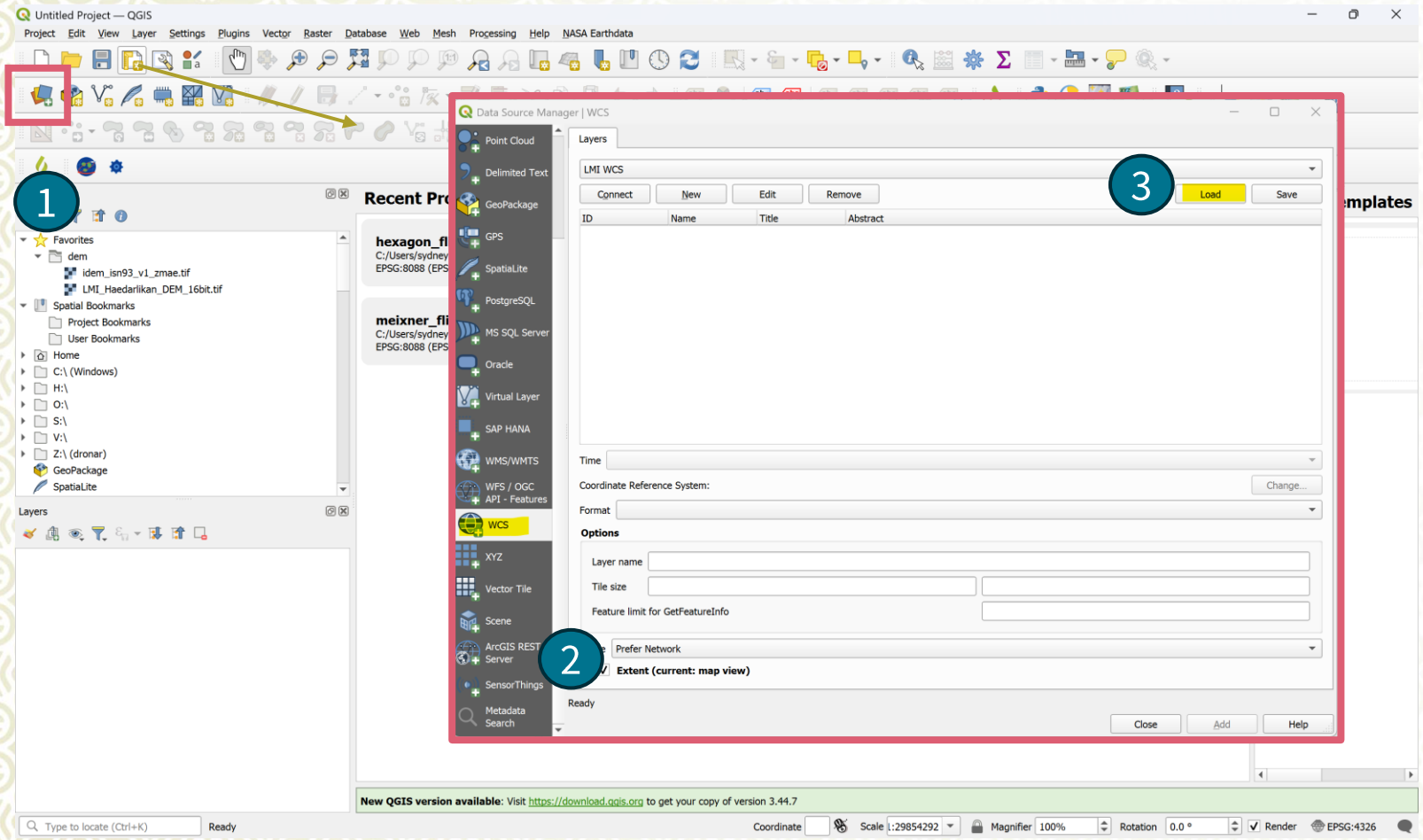
Import REST services via .xml file

1. Now in your QGIS window, if you navigate to 'ArcGIS Rest Services' in the Browser, you will see all the connections you just imported. (You might have to expand by clicking the triangle on the left)



Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

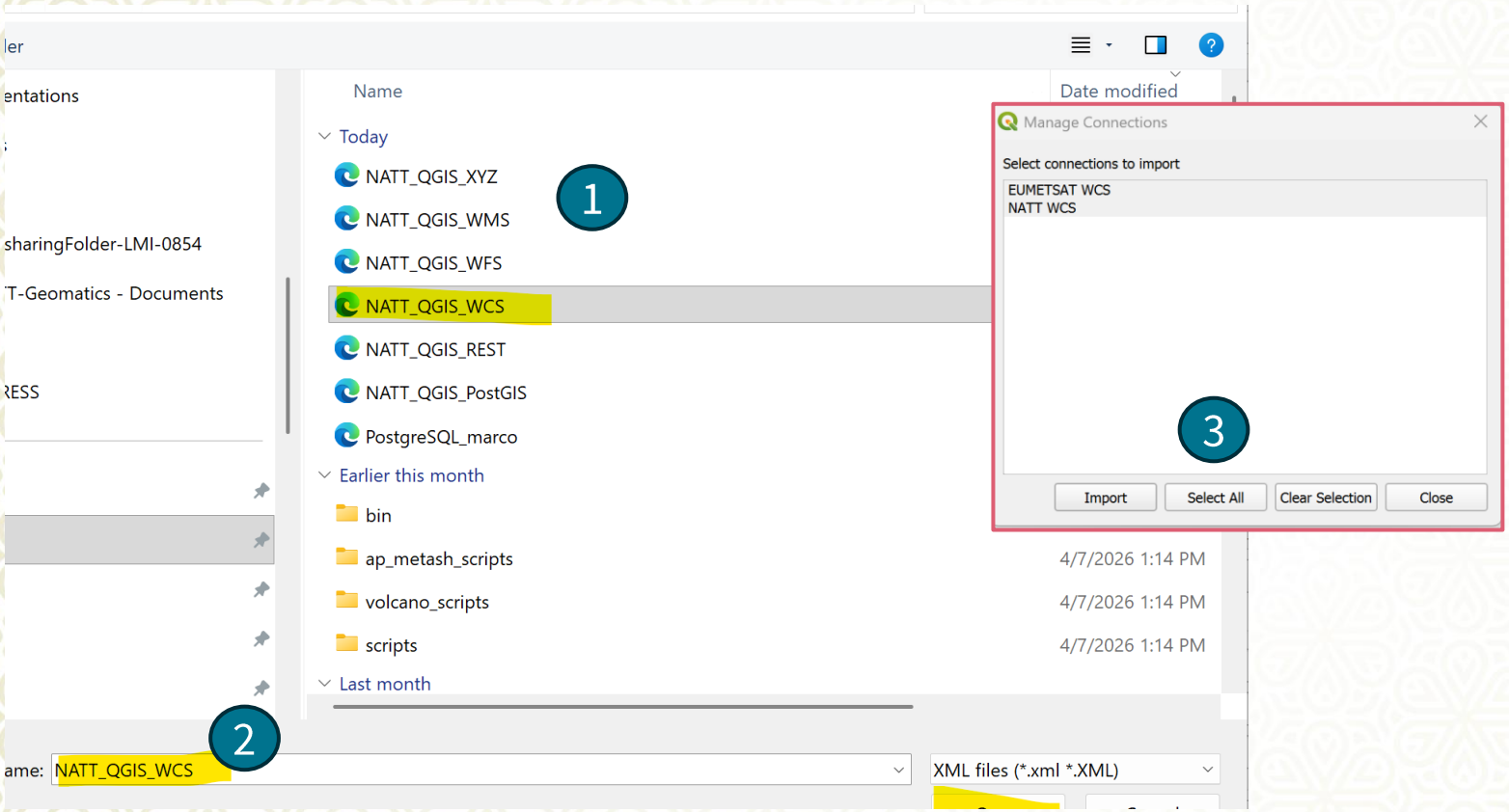


Import WCS services via .xml file

1. Select the Data Source Manager button
2. Select WCS as the source type
3. Click ‘Load’…

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

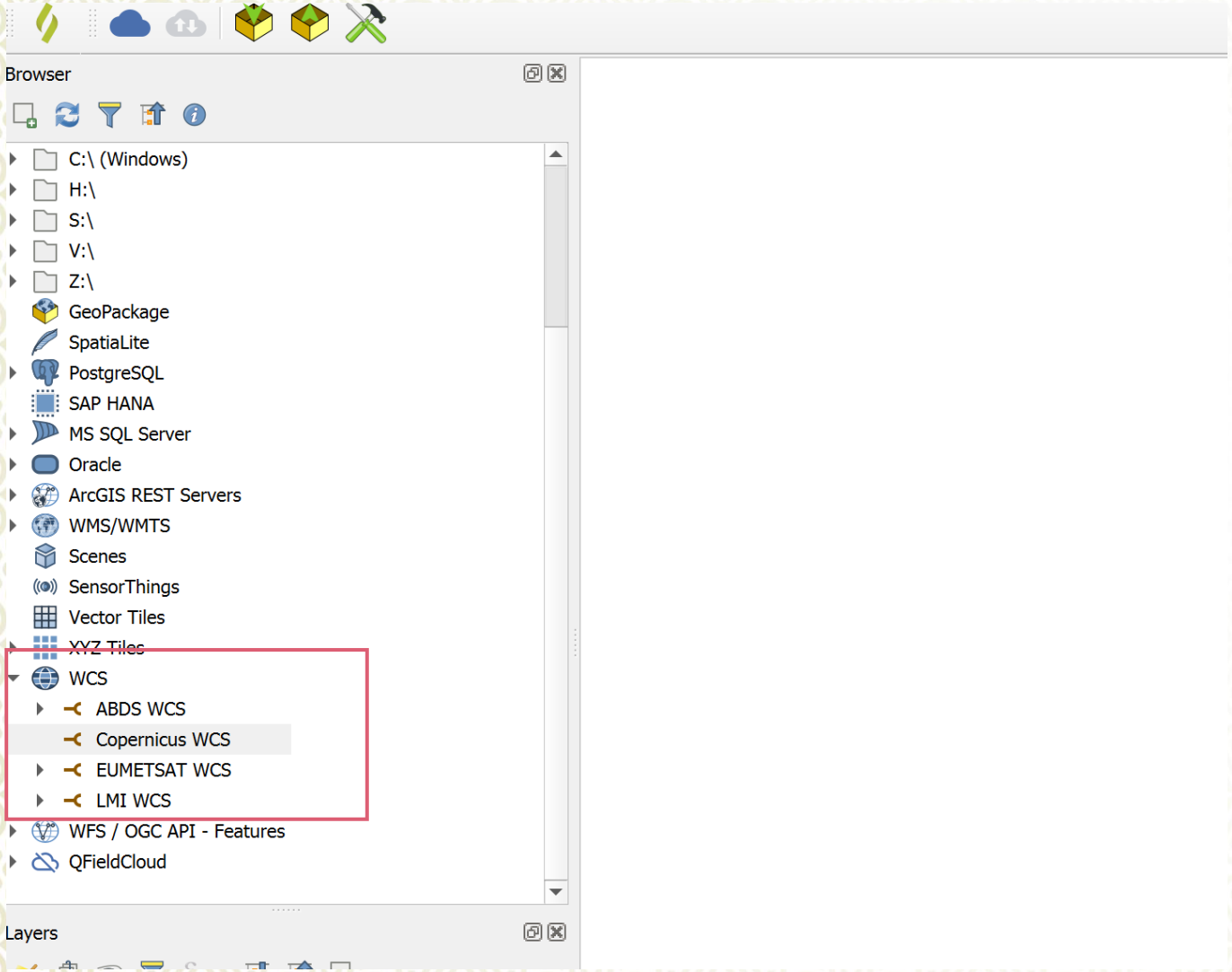


Import WCS services via .xml file

1. Navigate to where you saved your .xml files that were emailed to you before the course
2. Import the file called ‘NATT_QGIS_WCS.xml’
3. A list of connections will pop up in a new window. You can either select specific ones you want, or simply click ‘Select All’ and ‘Import’ to import all of them (recommended).

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

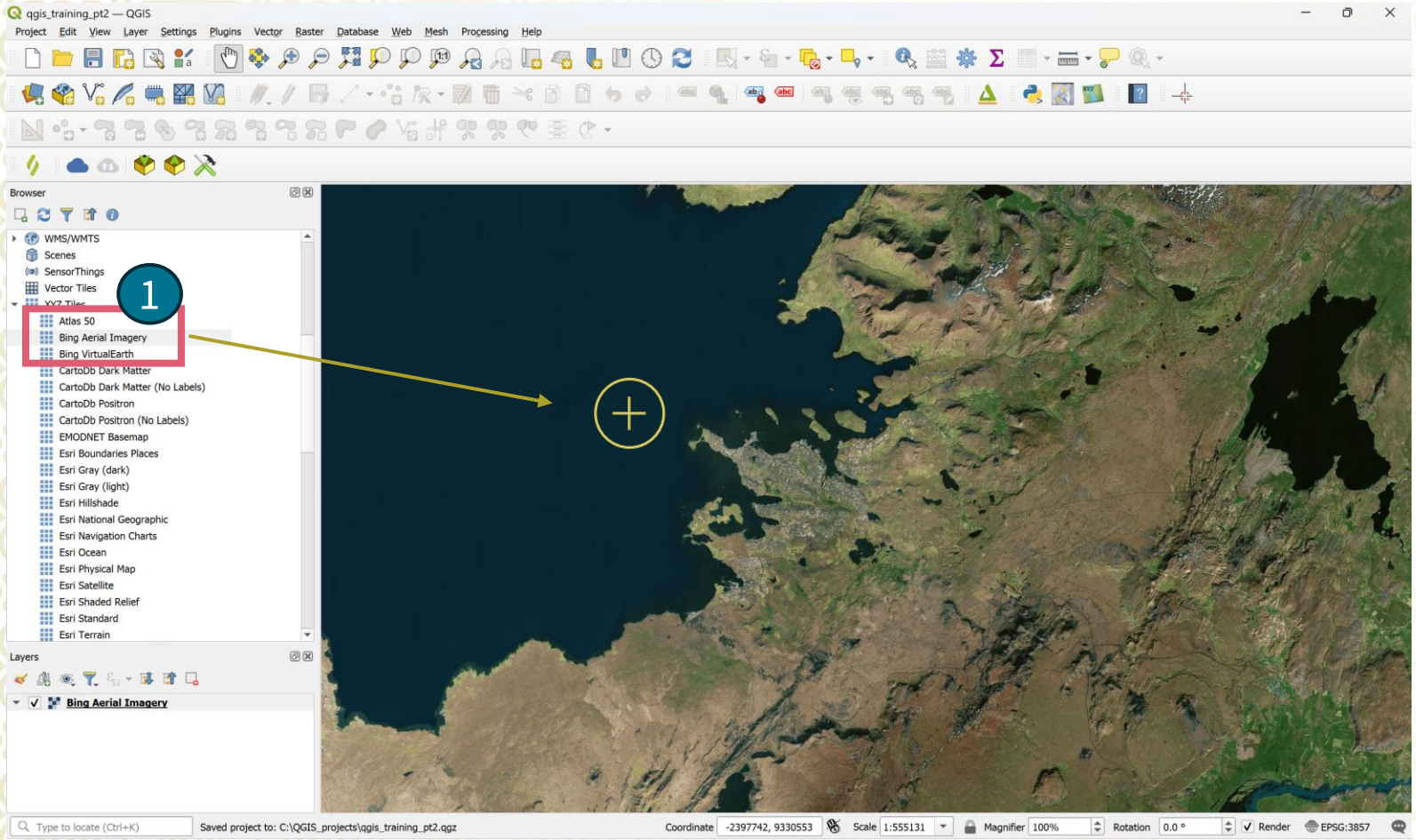


Import WCS services via .xml file

1. Now in your QGIS window, if you navigate to ‘WCS’ in the Browser, you will see all the connections you just imported.

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

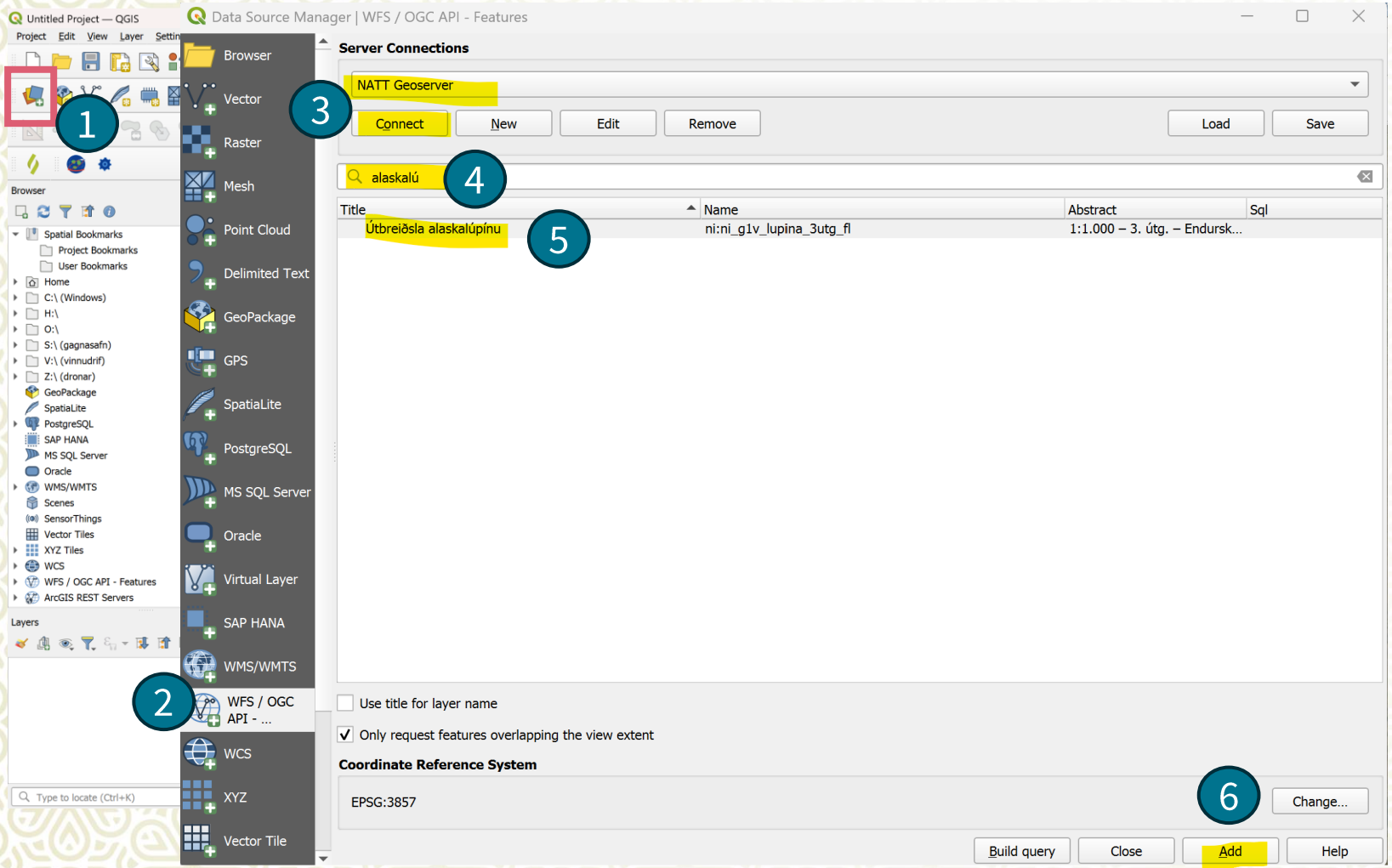


Add in a satellite imagery basemap

1. In the layer Browser, find XYZ tiles
2. Choose a basemap and import it by clicking and dragging it into the map canvas
3. You can zoom to your location on the map and see how the imagery looks.
4. Look through a few types of imagery and decide which one looks the best at your location.
5. Save the project when you decide

Náttúrufræðistofnun

WORKSHOP:
Basic Vector analysis and map creation

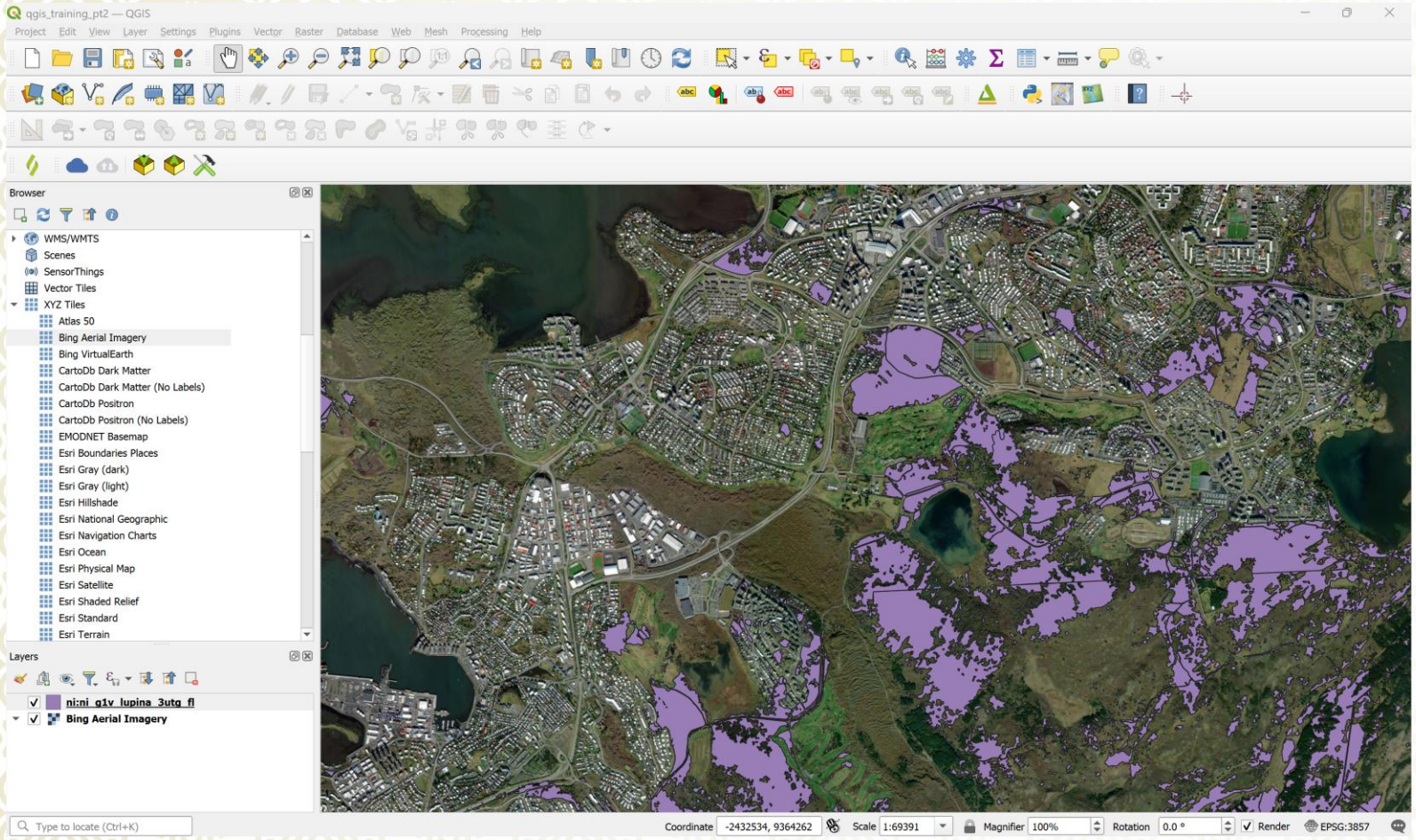


Grab lupine dataset from Nátt WFS

1. Click on the Data Source manager button
2. Go to WFS
3. From the dropdown menu, select ‘Nátt Geoserver’, and click ‘Connect’
4. Search in the search bar for ‘alaskalúpína’
5. Select ‘Útbreiðsla alaskalúpínu’
6. Add the layer (don’t change the coordinate reference system – since our map is in EPSG 3857 (satellite imagery) we will leave it this way)

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

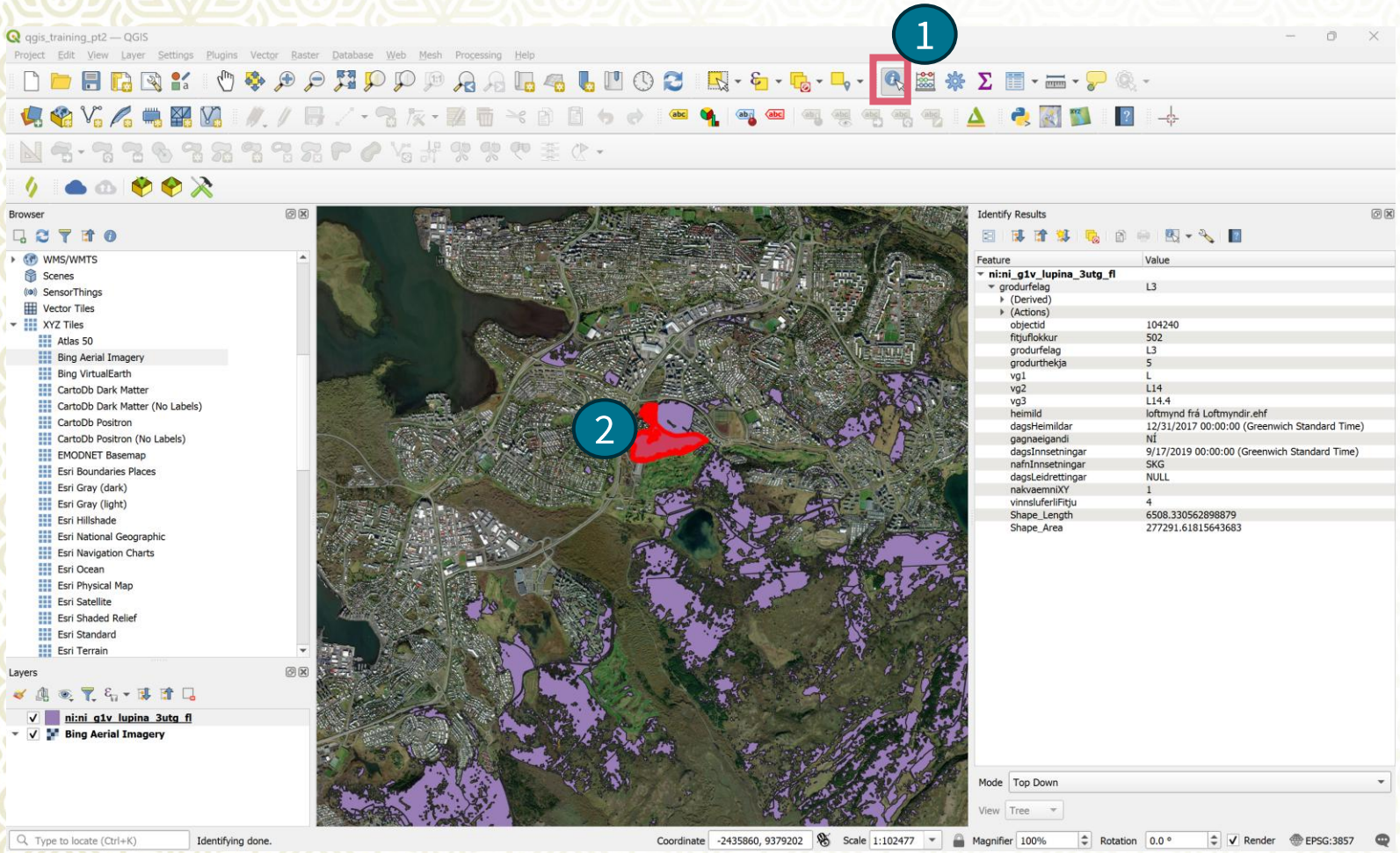


Query lupine WFS using identify tool

1. Your map now looks like this. It may take a while to load the lupine layer so be patient.
2. Since this layer is available from WFS, we cannot edit it. But, we can see information about each polygon

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

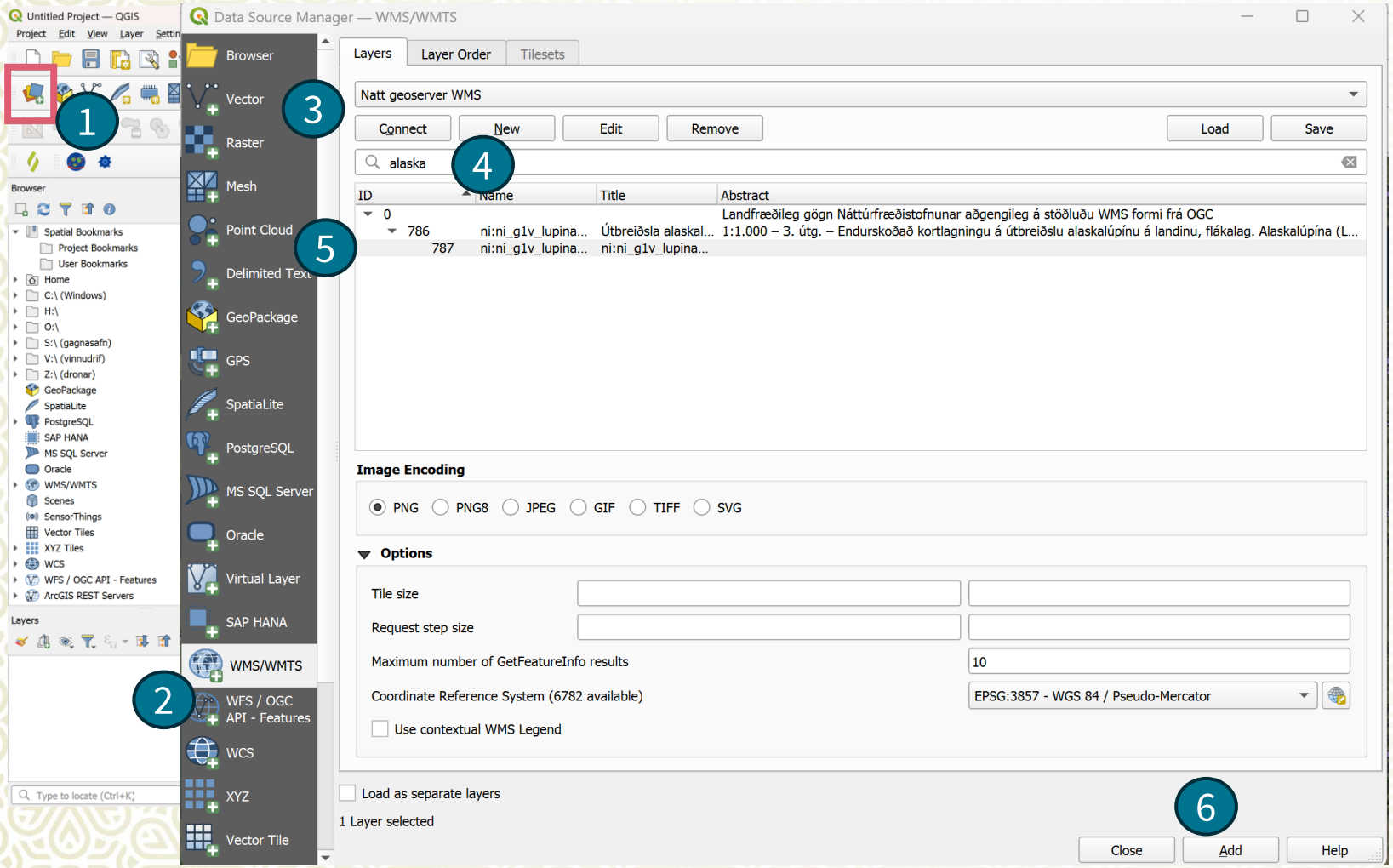


Query lupine WFS using identify tool

1. Click on the identify tool from the toolbar
2. Click somewhere on the map where lupine exists
3. You will see a pop up window showing you all the attributes behind the vector – the source used to digitize it (in this case imagery from Loftmyndir ehf., from the year 2017).
4. This is a nice way to get information behind the layer, but it is slow to work with and we cannot edit it.

Náttúrufræðistofnun

WORKSHOP:
Basic Vector analysis and map creation



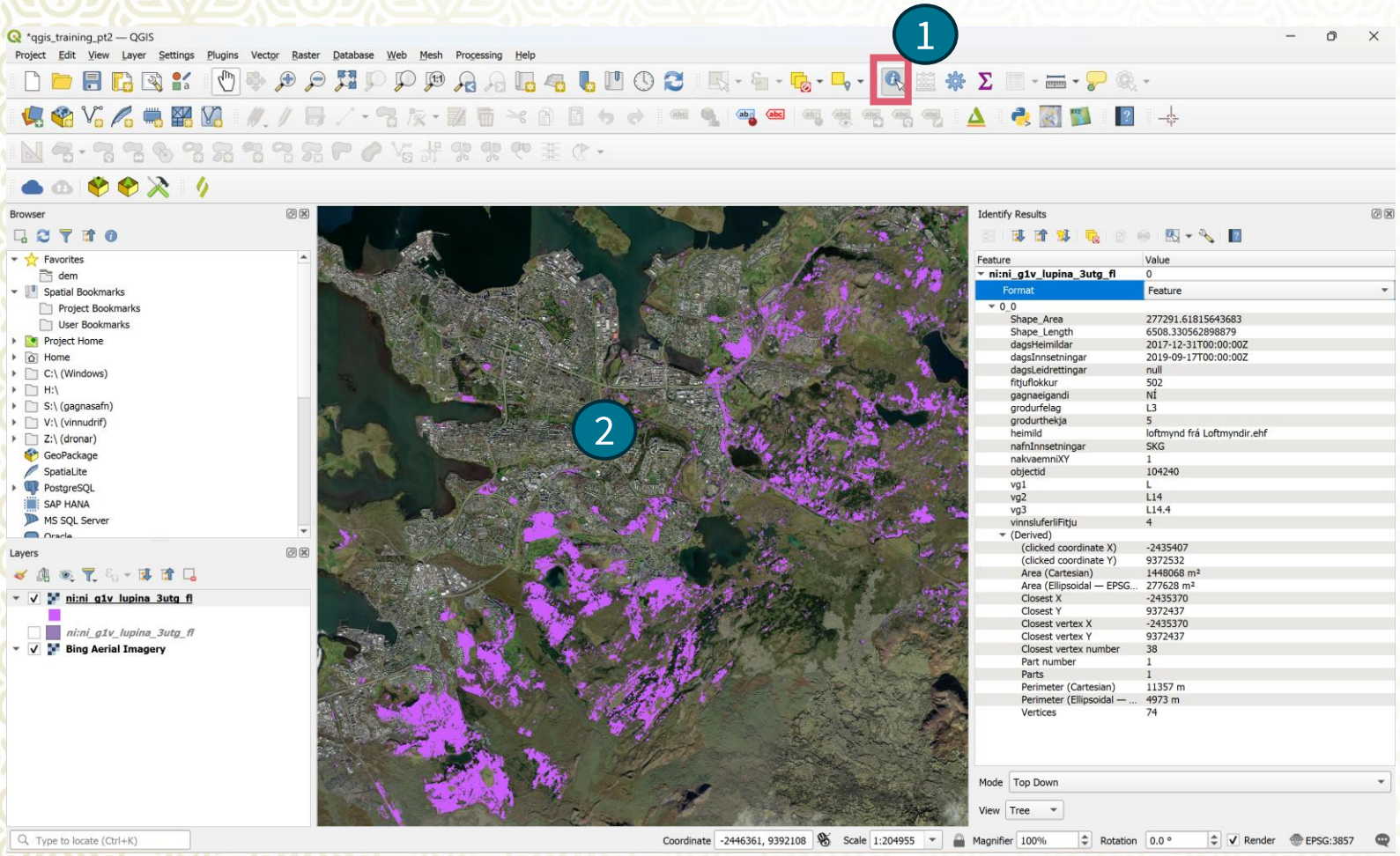
Grab lupine dataset from Nátt WMS

We will now load the same layer
As a WMS, to see how it is lighter
For viewing

1. Click on the Data Source manager button
2. Go to WFS
3. From the dropdown menu, select ‘Nátt Geoserver WMS’, and click ‘Connect’
4. Search in the search bar for ‘alaskalúpína’
5. Select ‘Útbreiðsla alaskalúpínu’ – BE PATIENT, this will take a while to load.
6. Add the layer (don’t change the coordinate reference system – since our map is in EPSG 3857 (satellite imagery) we will leave it this way)

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



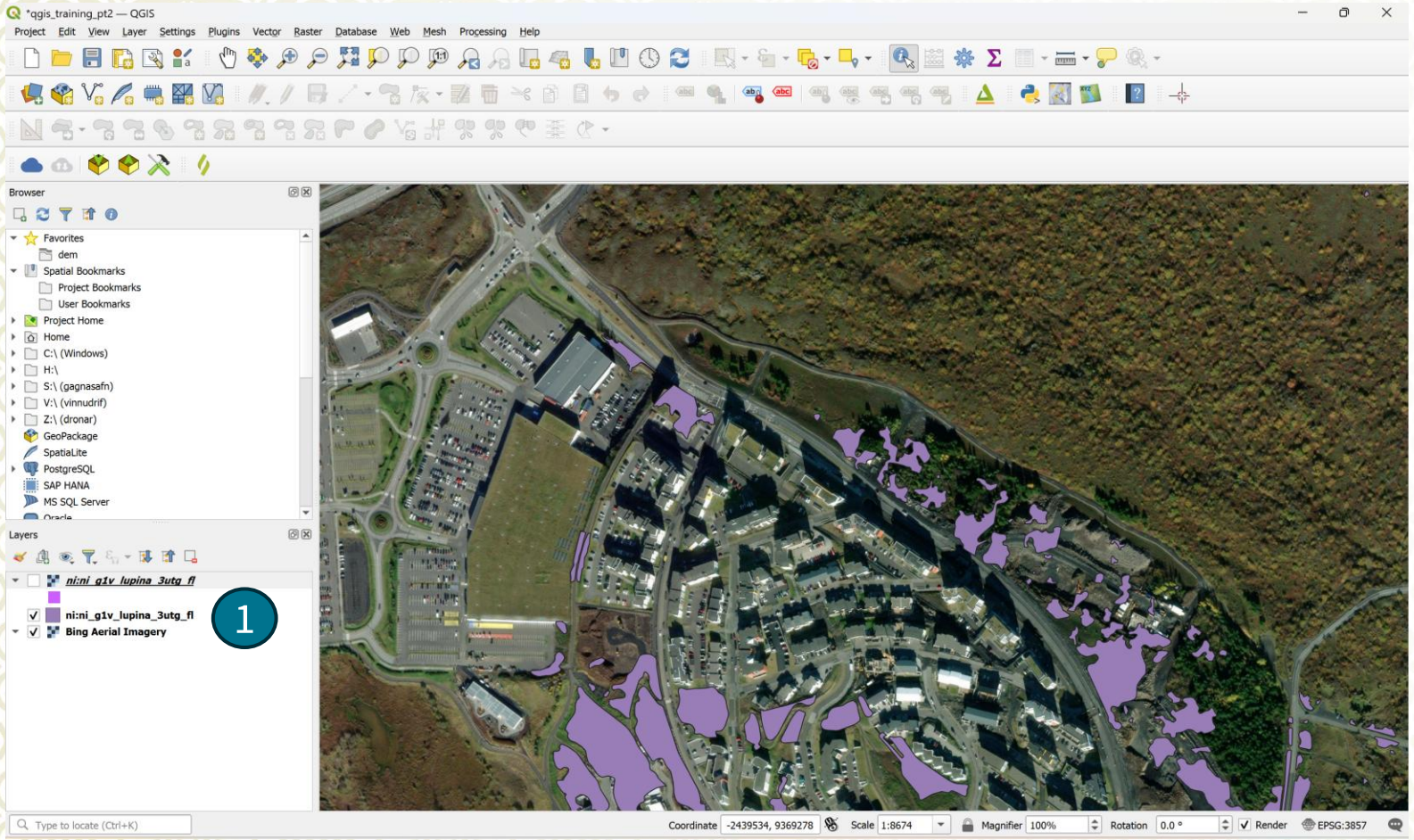
Query lupine WMS using identify tool

1. Click on the identify tool from the toolbar
2. Click somewhere on the map where lupine exists
3. You will see a pop up window, select ‘feature’ instead of HTML from the dropdown to get the full feature attributes as we had before with the WFS.

Since this is not actually a vector layer, we cannot change/edit the extent of the lupine. We will have to therefore use the WFS layer to create a new vector layer, upload to the database, then edit directly on the database.

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

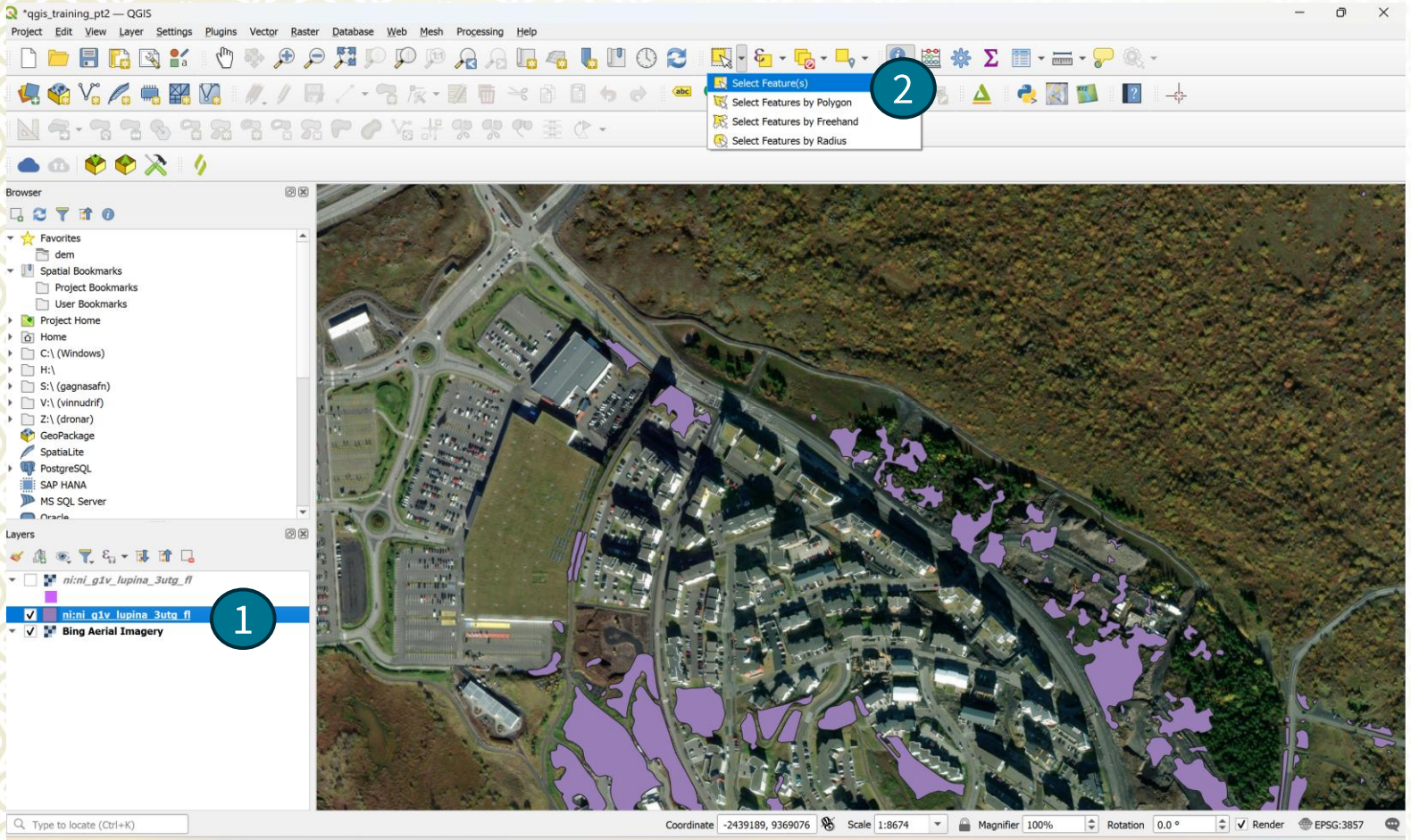


Create a copy of lupine from WFS

1. Zoom into your area of interest (in this example, Urridaholt). Un check the WMS layer, and check the WFS layer again (vector layer that we imported first). Now you should only be able to see the WFS layer.

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

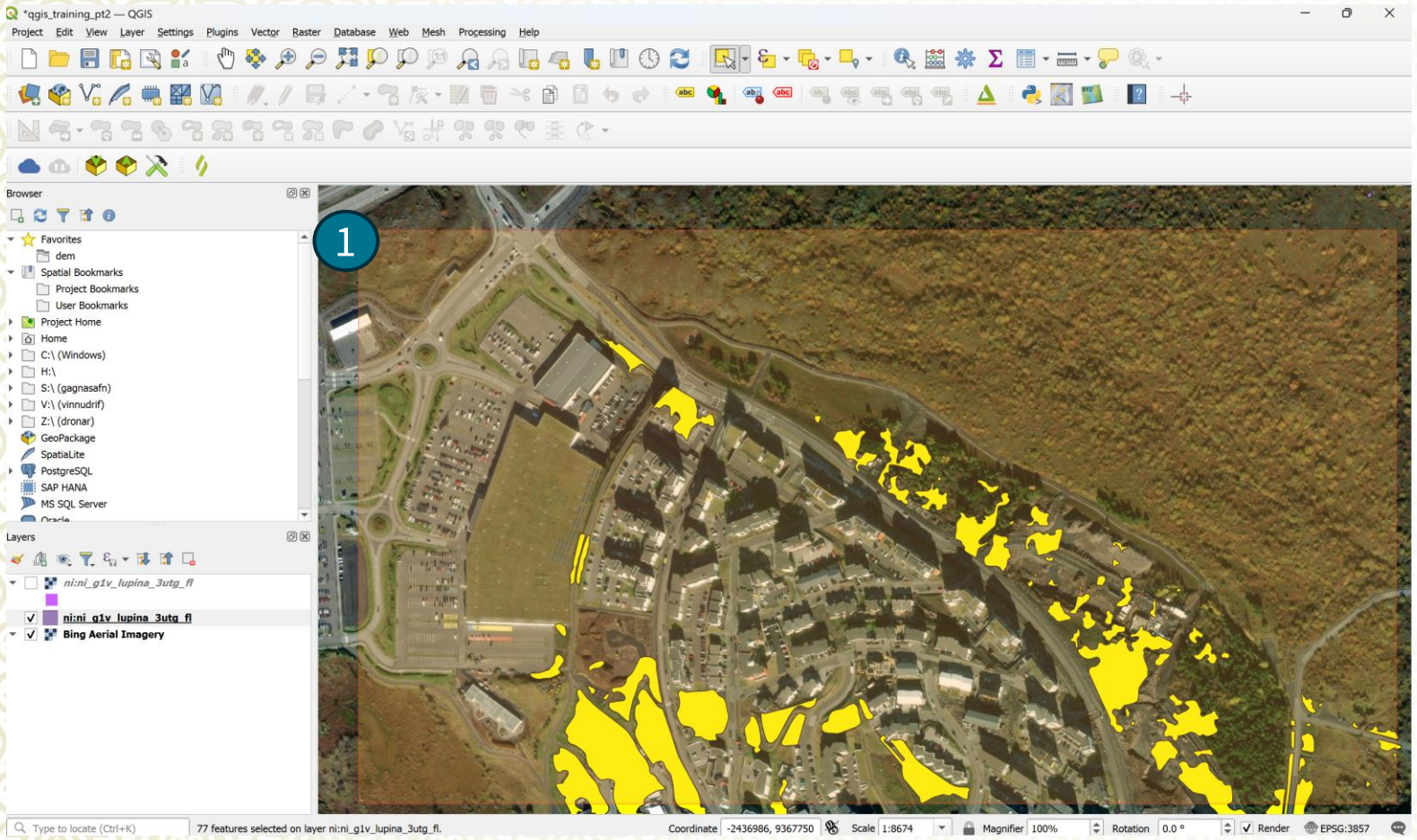


Create a copy of lupine from WFS

1. Left click once on the WFS layer to select it in the Layers tab.
2. In the top toolbar, find ‘Select Features’. We are going to select only the features nearby the area of interest to make sure we don’t create a file that is too heavy.

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

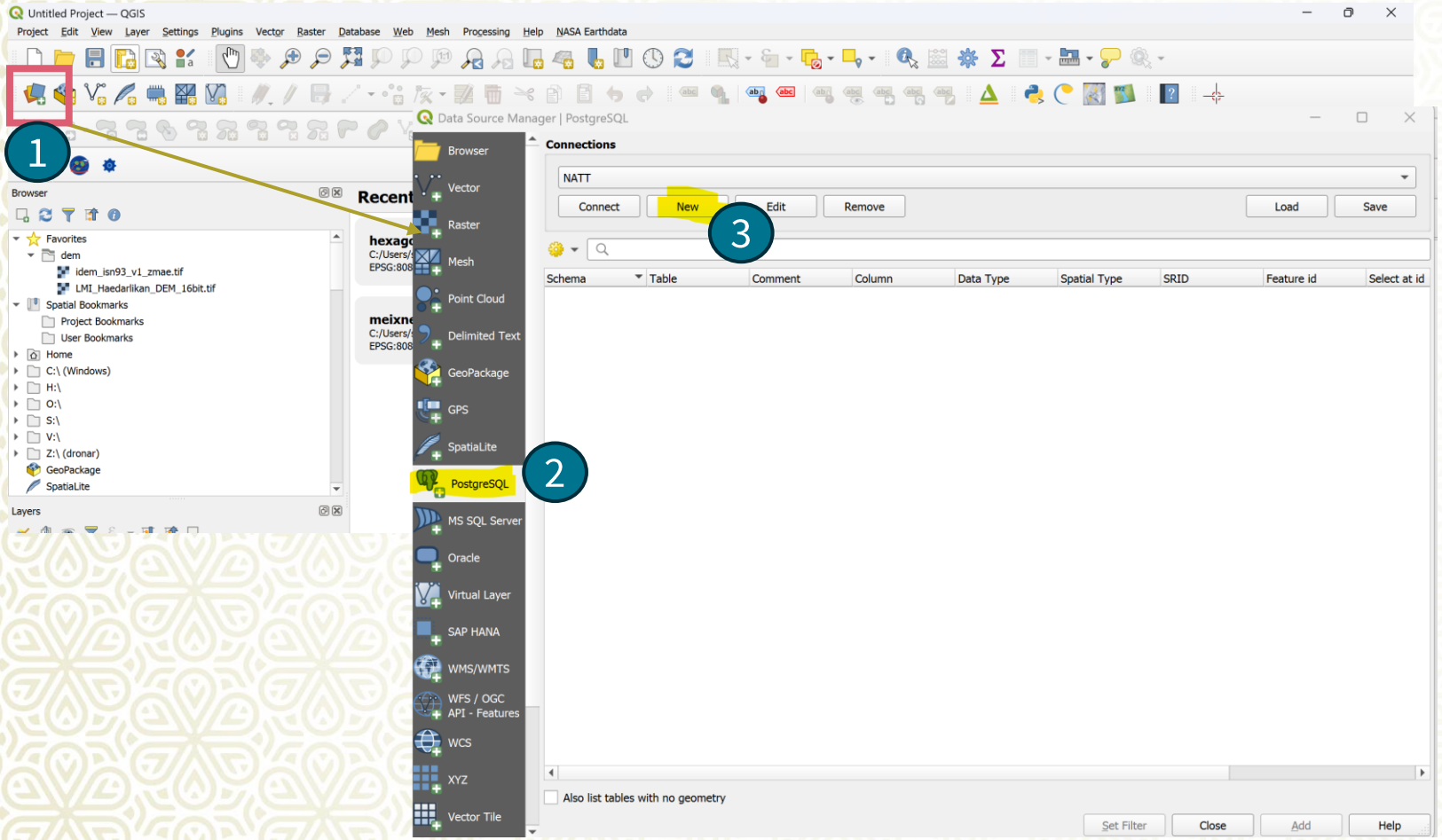


Create a copy of lupine from WFS

1. Click and drag a rectangle on the map canvas over the area you are interested in to select it. The vector polygons in the area should now appear yellow (meaning they are selected)

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

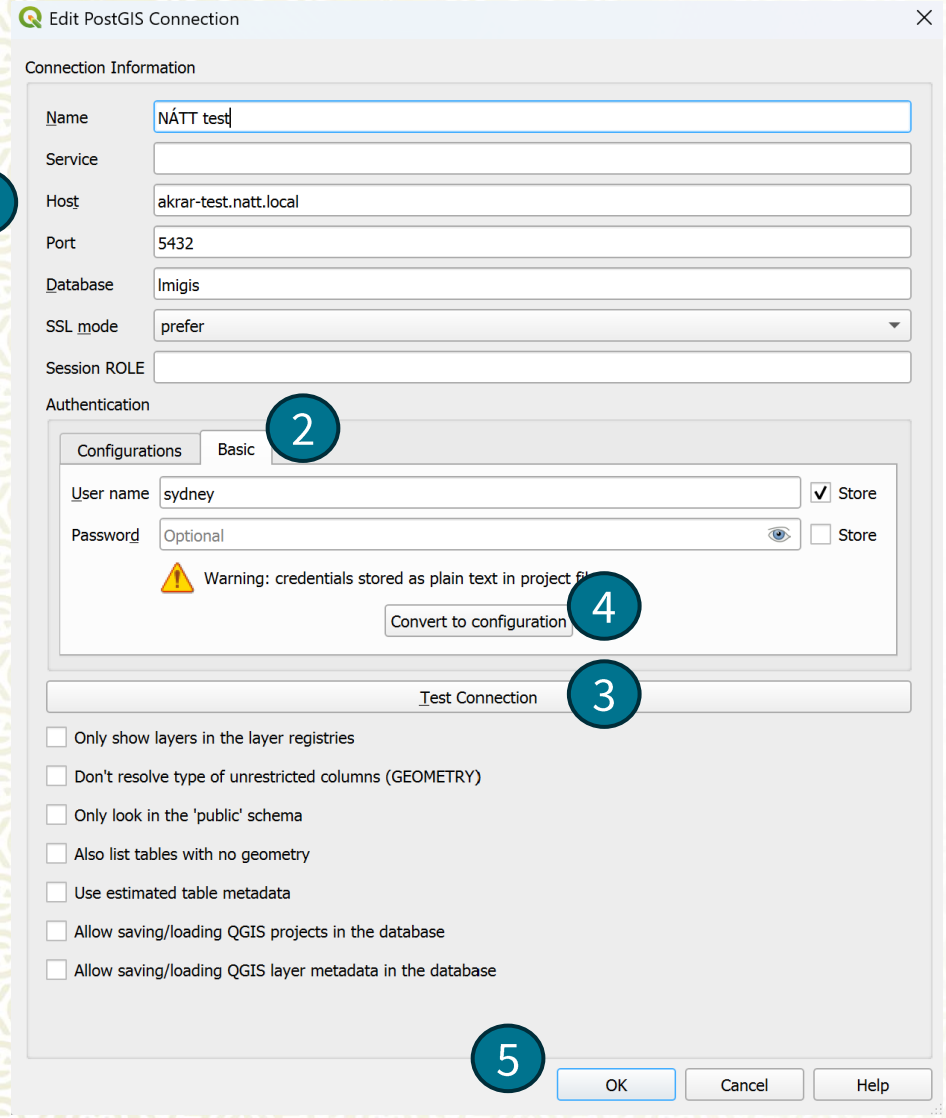


Connect to the database

1. Make sure you are connected to the VPN. Click on ‘Add layers’ button
2. Select ‘PostgreSQL’ for the source
3. And click ‘New’ to create a new connection to the database

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



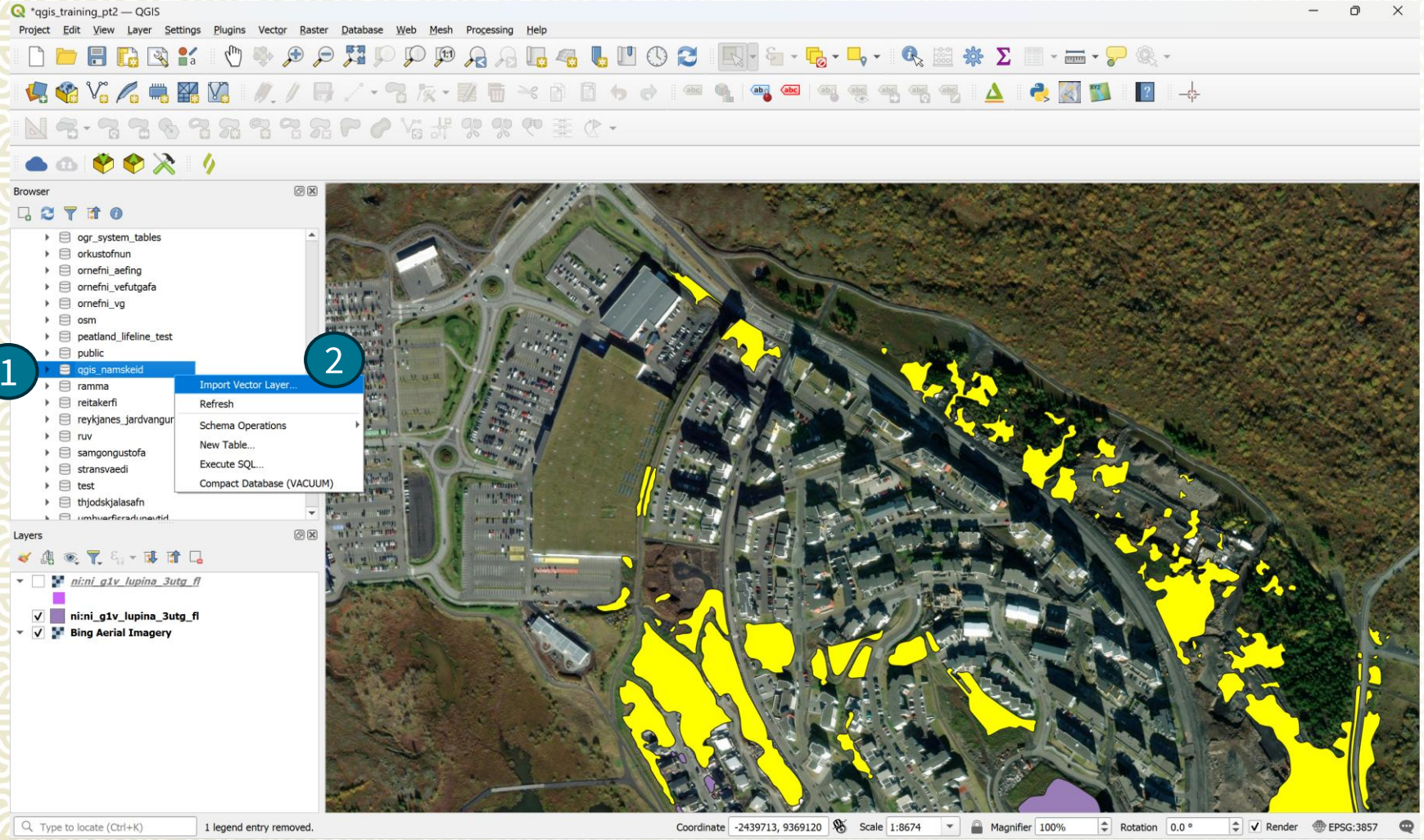
Connect to the database

1. Set up your connection like this,

2. Under Authentication, select ‘basic’. Put in your username and password that was emailed to you for this course
    1. If your name is not listed, you need to contact Valdimar Hjaltason
3. Test your connection.
4. If it works then click ‘Convert to configuration’ to store
5. Click ok.

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

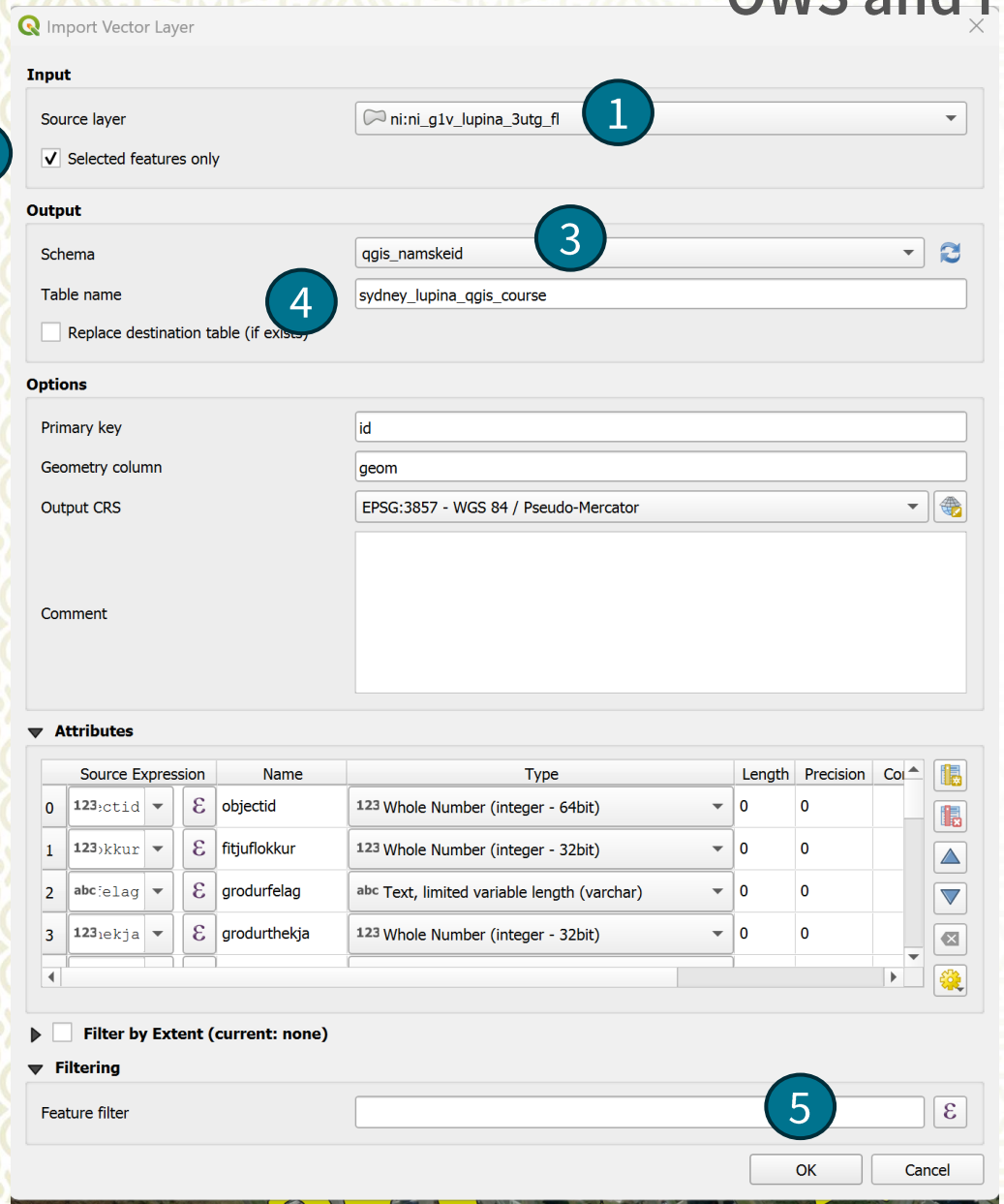


Create a copy of lupine from WFS

1. Under the PostgreSQL section in the browser, find the schema ‘qgis_namskeid’.
2. Right click on the qgis_namskeid schema and select ‘Import Vector Layer…’

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



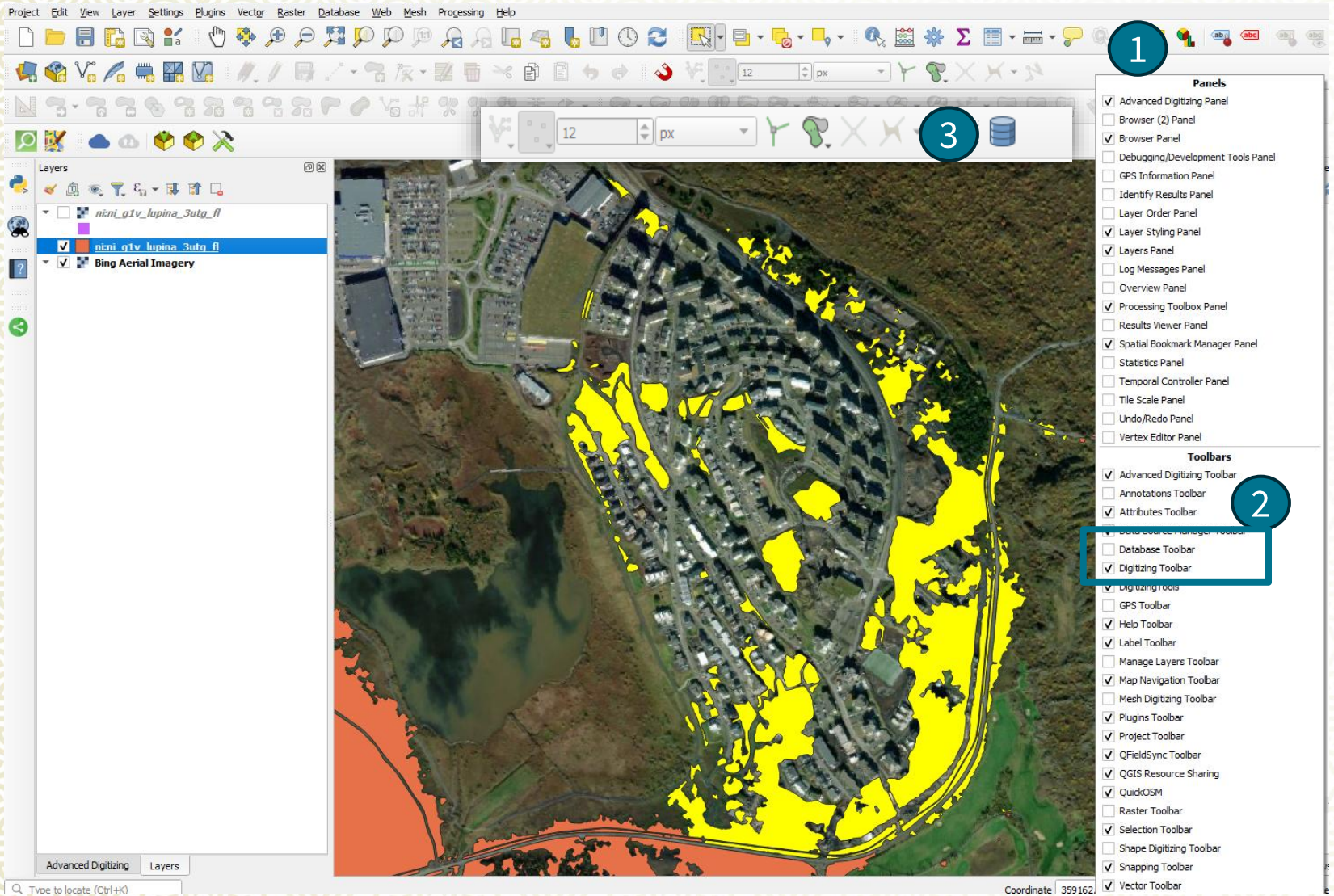
Import your Lupine file to the database

Note: this will only work if you have a newer QGIS version. If you have an older version, follow the alternative instructions on the next slides

1. Choose the lupine WFS layer from the dropdown menu
2. !!! Important: Select the checkbox that says ‘Selected Feautres Only’.
3. Be sure to save it in ‘qgis_namskeid’ schema
4. Name the table ‘your_name_lupina_qgis_course’
5. Don’t change the other settings and click ‘OK’

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



Create a copy of lupine from WFS
ALTERNATIVE WAY
If you have an older version of QGIS

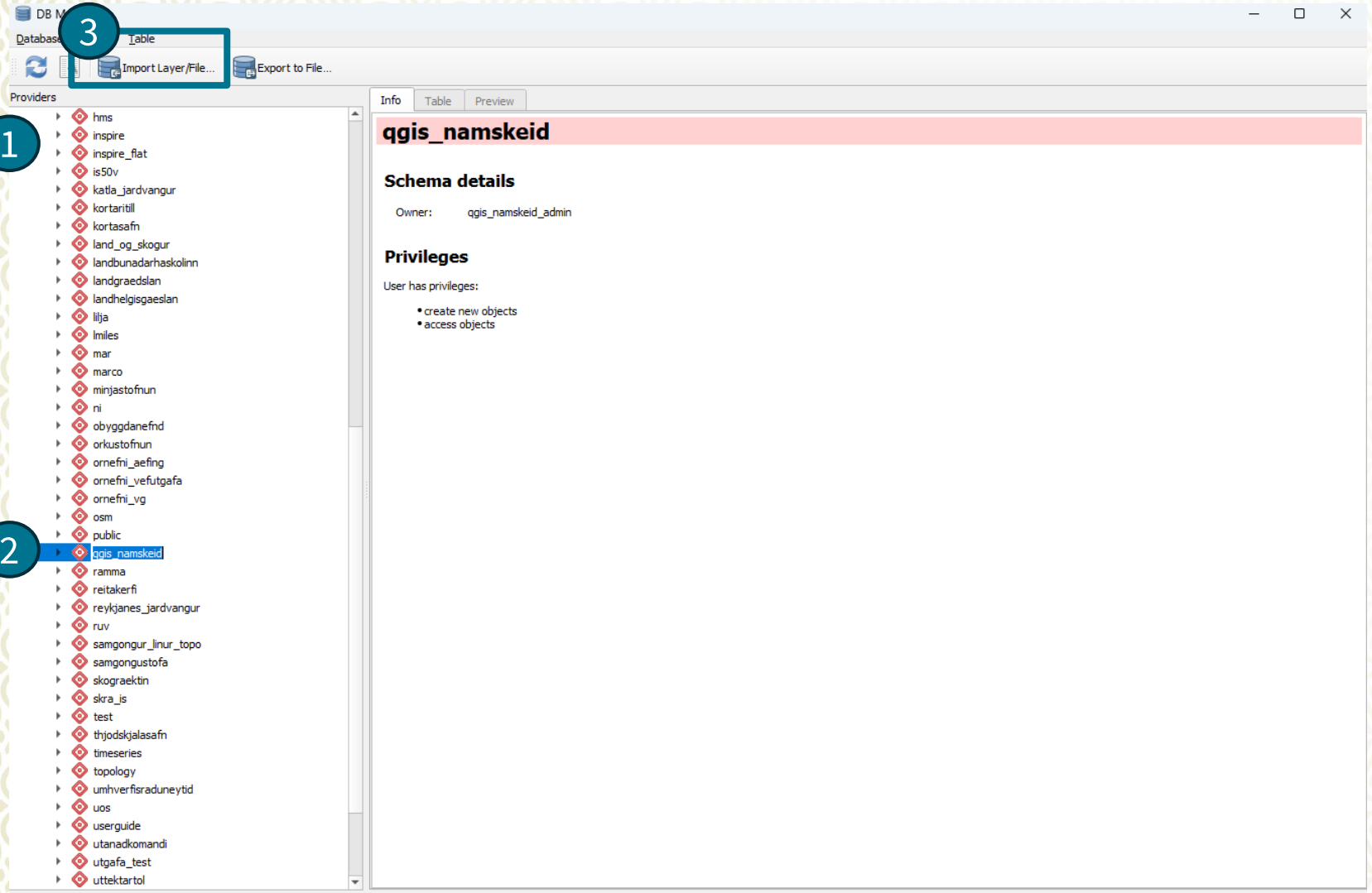
1. Right-click anywhere on an empty area of the toolbar to open the context menu

2. Click Database Toolbar to enable it, which adds the Database Manager icon to the toolbar

3. Open the Database Manager

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



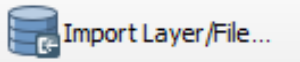
Create a copy of lupine from WFS

ALTERNATIVE WAY

If you have an older version of QGIS

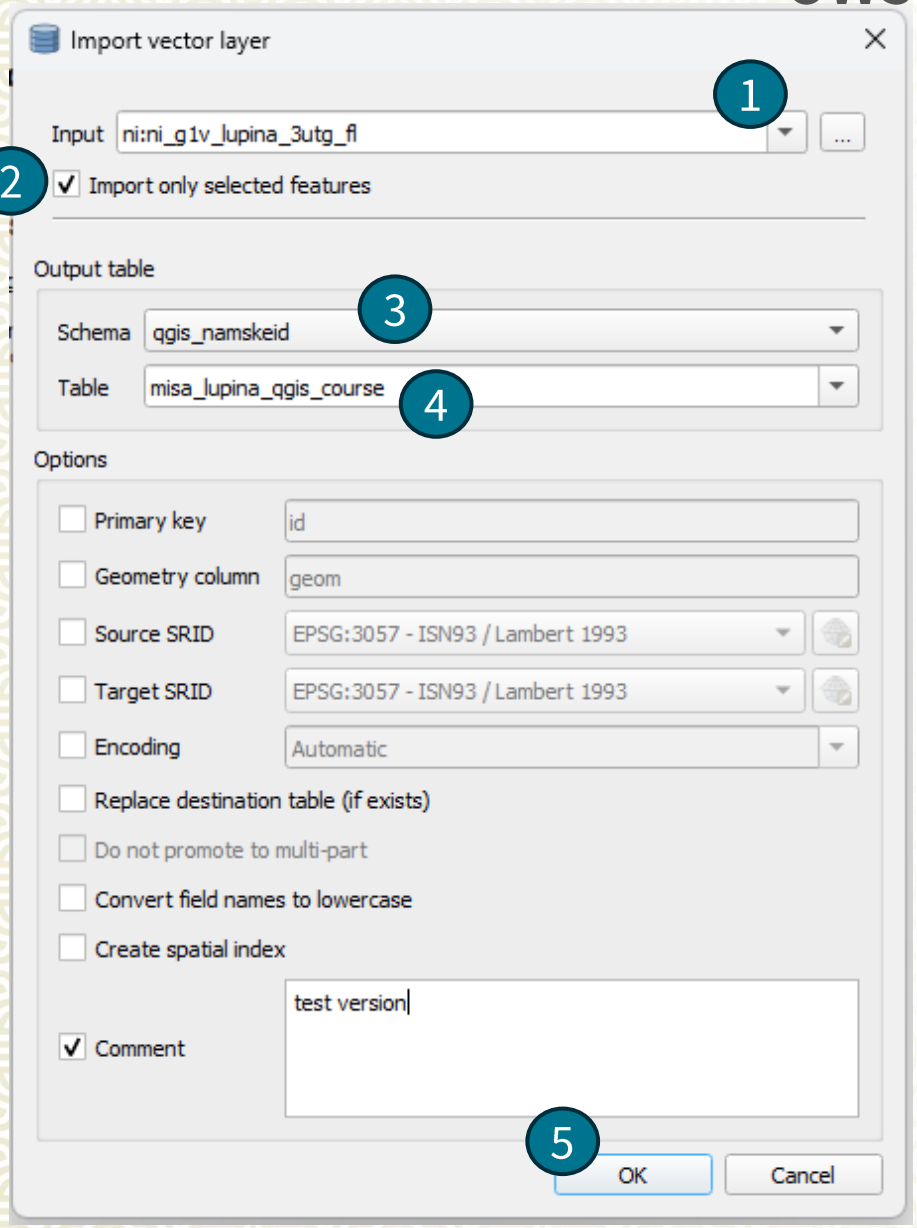
1. Under the PostGIS section in the left side, find the schema ‘qgis_namskeid’.

2. Select the qgis_namskeid schema

3. Click on ‘Import Layer/File‘ on the toolbar menu 

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



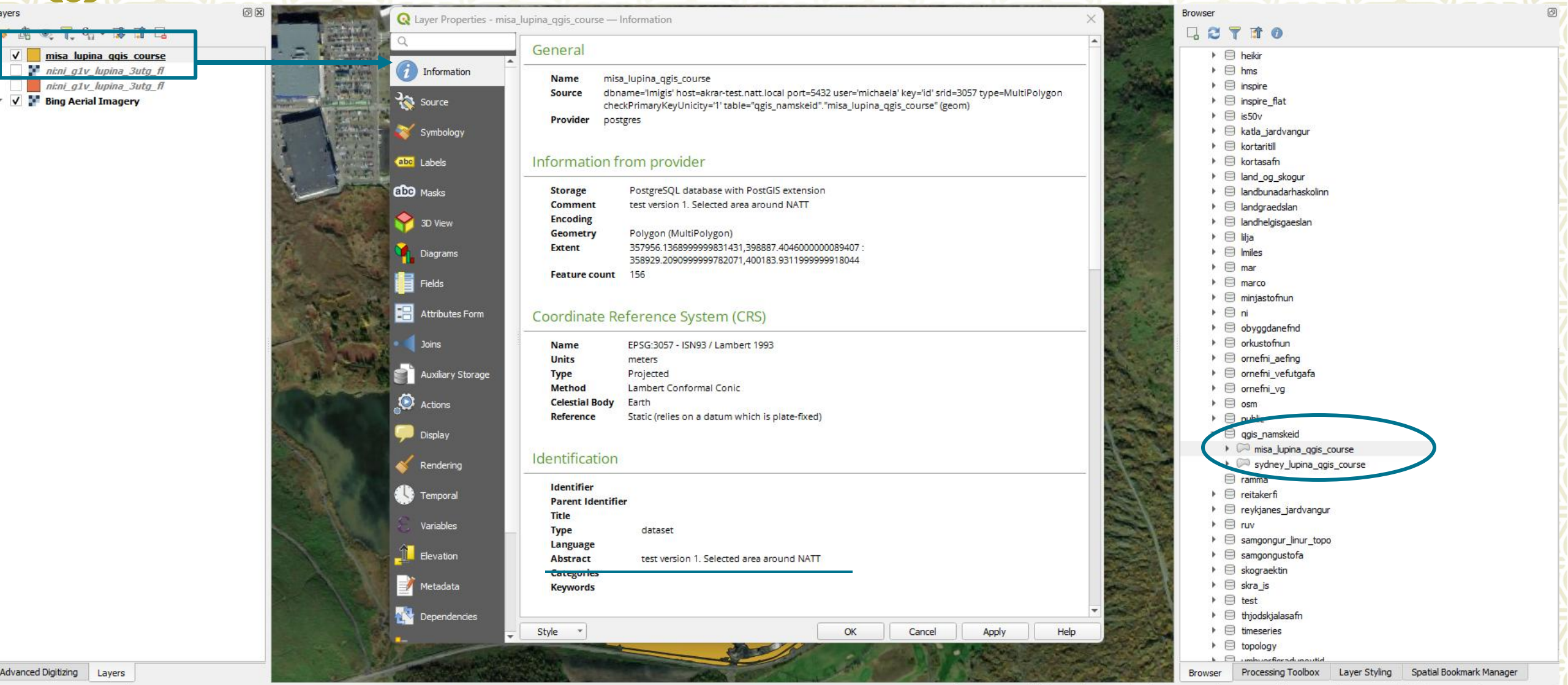
Import your Lupine file to the database
If you have an older version of QGIS

Make sure:

1. the lupine WFS layer is selected as the input
2. !!! Important: Select the checkbox that says ‘Import only selected features’.
3. to save it in ‘qgis_namskeid’ schema
4. Name the table ‘your_name_lupina_qgis_course’
5. Don’t change the other settings and click ‘OK’

Náttúrufræðistofnun

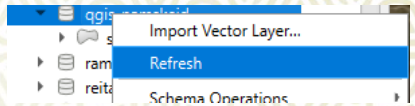
If you have an older version of QGIS

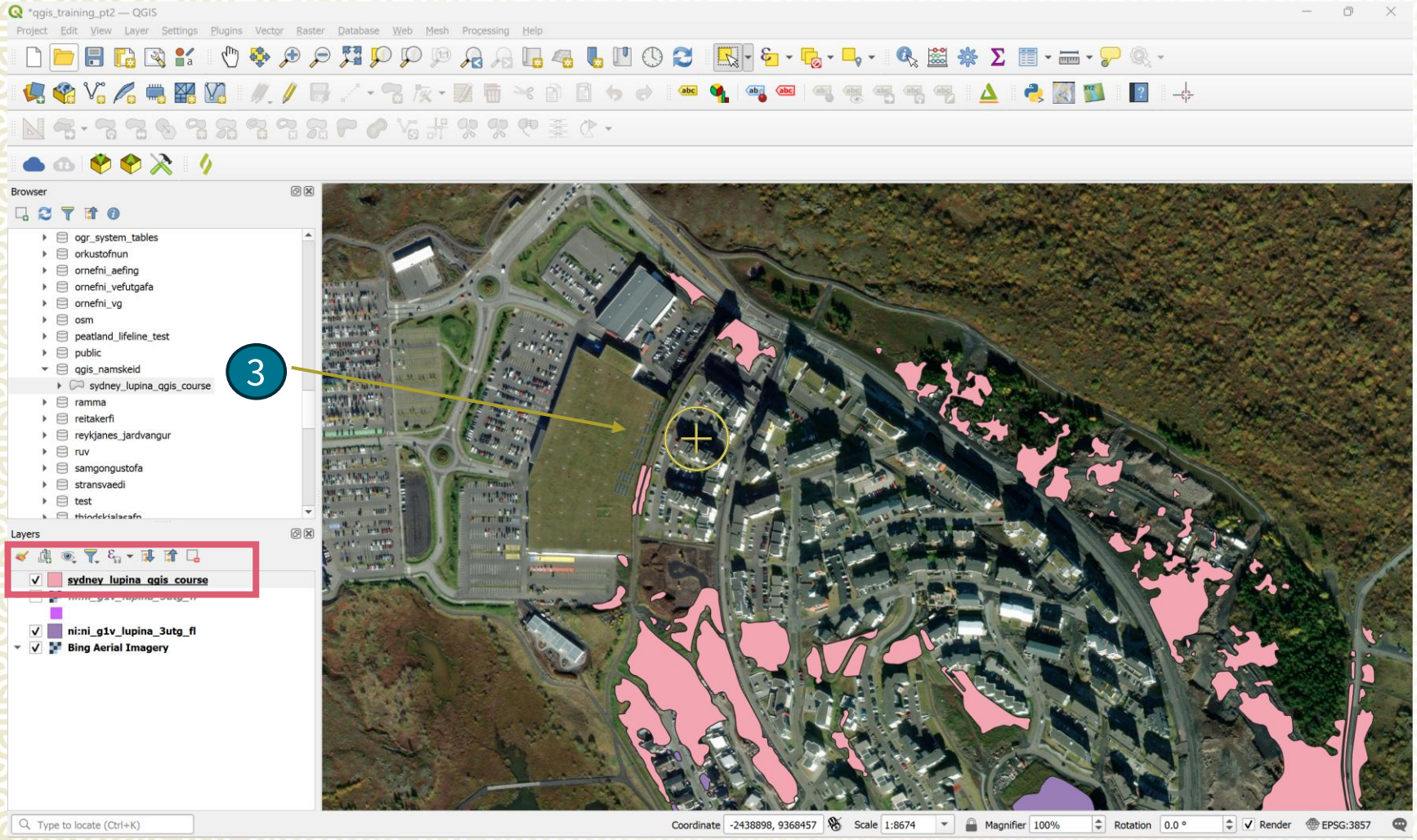


Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

Work with your lupine file from the database

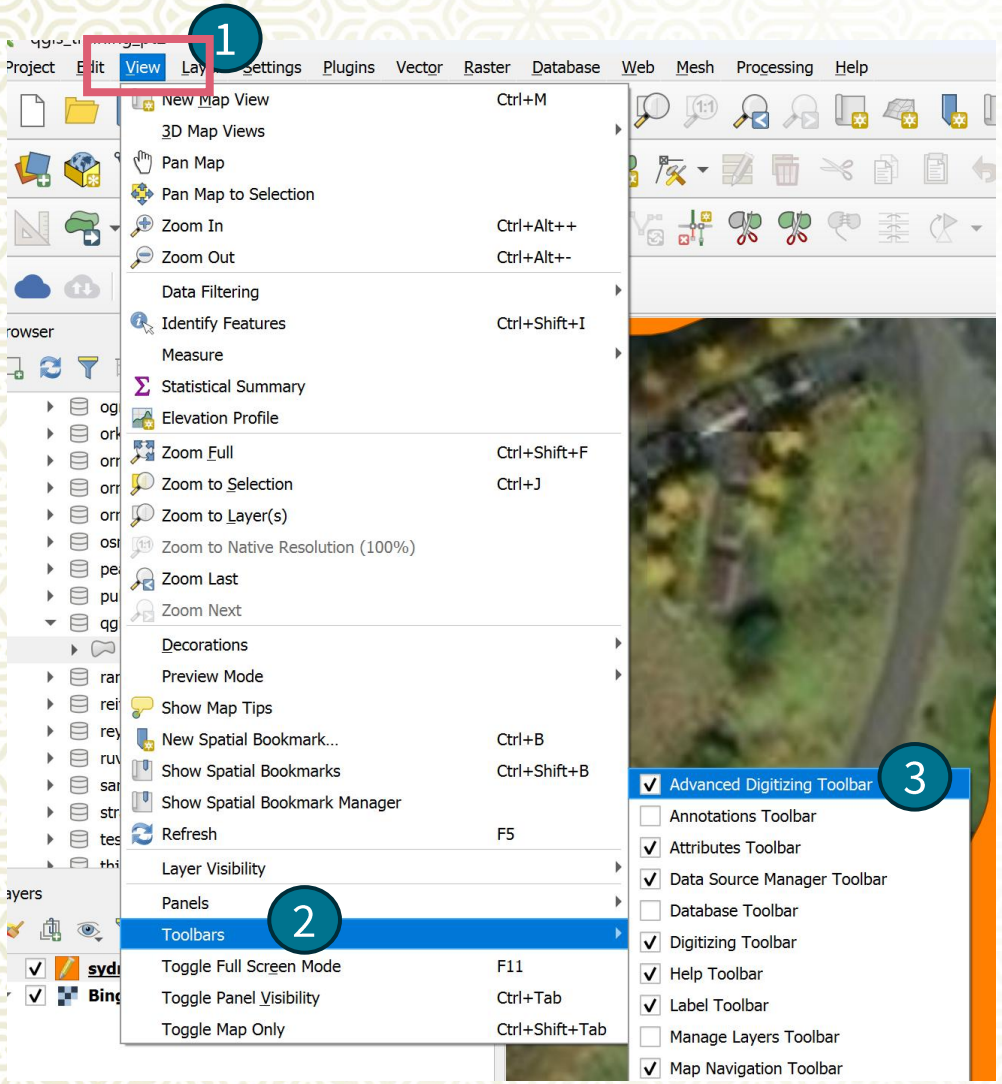




1. Right click on the schema qgis_namskeid and press refresh if needed.
2. Your newly created lupina file should appear under the ‘qgis_namskeid’ schema.
3. Click and drag it on to the map to add it
4. You are now able to directly edit your lupina layer, all changes are saved to the database. Anyone with access to this schema can see your changes.
5. If you want to you can remove the old WMS and WFS lupina layers (right click, ‘Remove Layer…’) to make the project cleaner.
6. Save your project.

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS



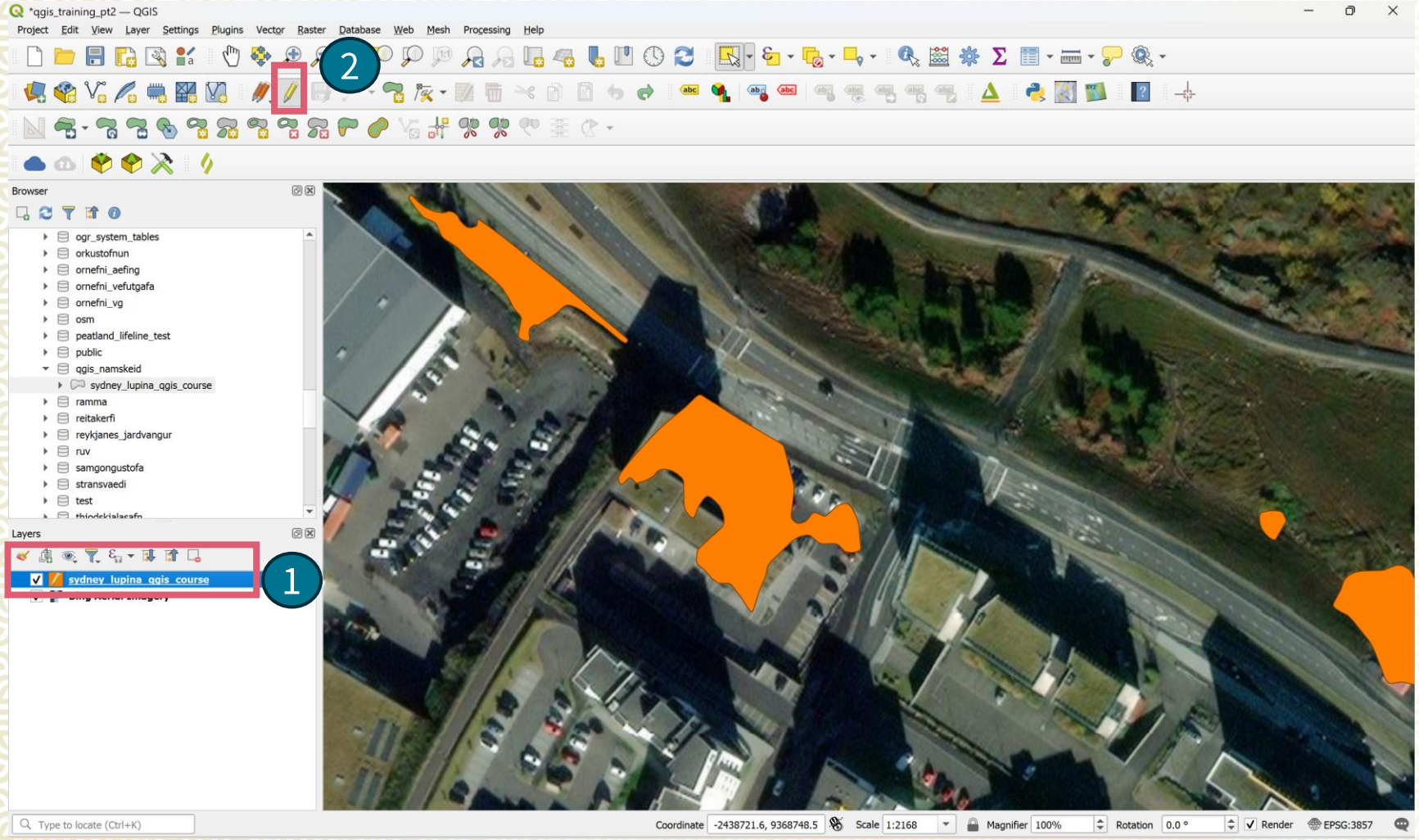
Edit/update your lupine file using satellite imagery as a reference

1. Enable the advanced digitizing toolbar. Go to ‘View’..
2. ‘Toolbars’
3. Check the button that says ‘Advanced Digitizing Toolbar’

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

Edit/update your lupine file using satellite imagery as a reference

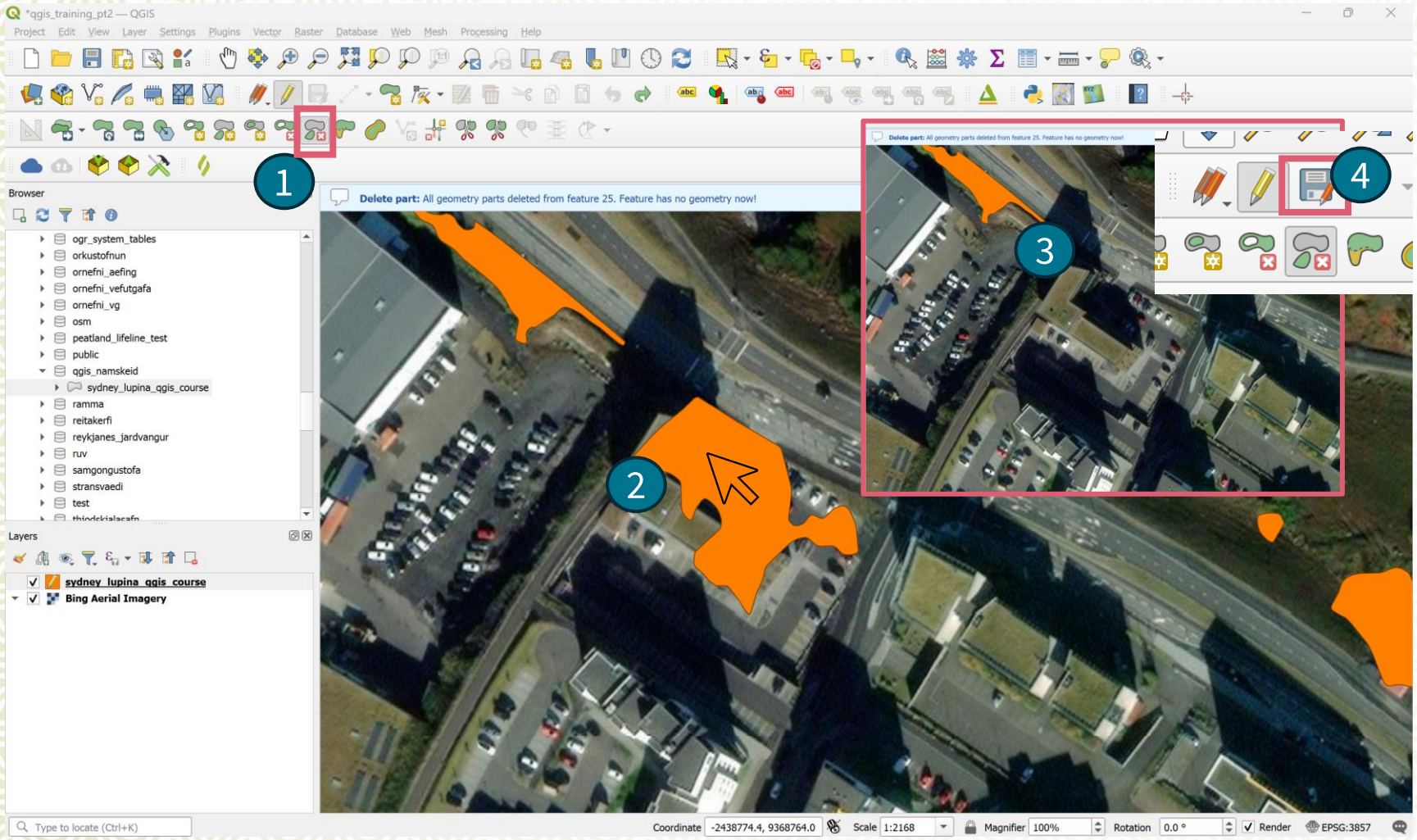


1. Single click on your lupine file in the layers window to select it
2. Click on the pencil icon at the top of the toolbar to enable editing on the layer.
3. With editor, you can reshape, delete, or add layers to your lupine file.

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

Edit/update your lupine file using satellite imagery as a reference



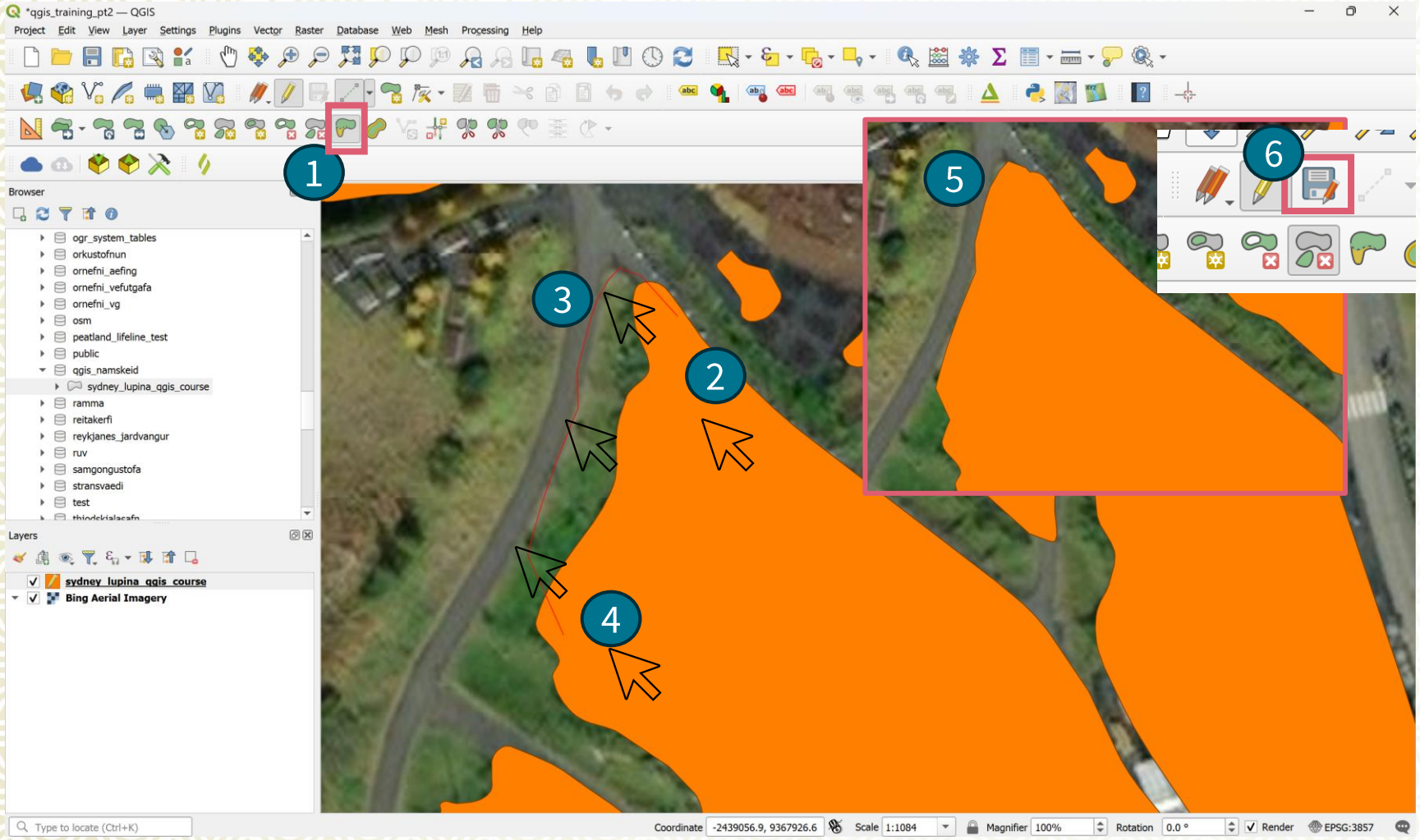
In this example, there is a building in the area that is marked Lupine. We will delete this polygon by:

1. clicking ‘Delete Feature’ and then
2. clicking on the polygon we want to delete
3. It is deleted
4. save edits by clicking the save icon at the top toolbar.

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

Edit/update your lupine file using satellite imagery as a reference



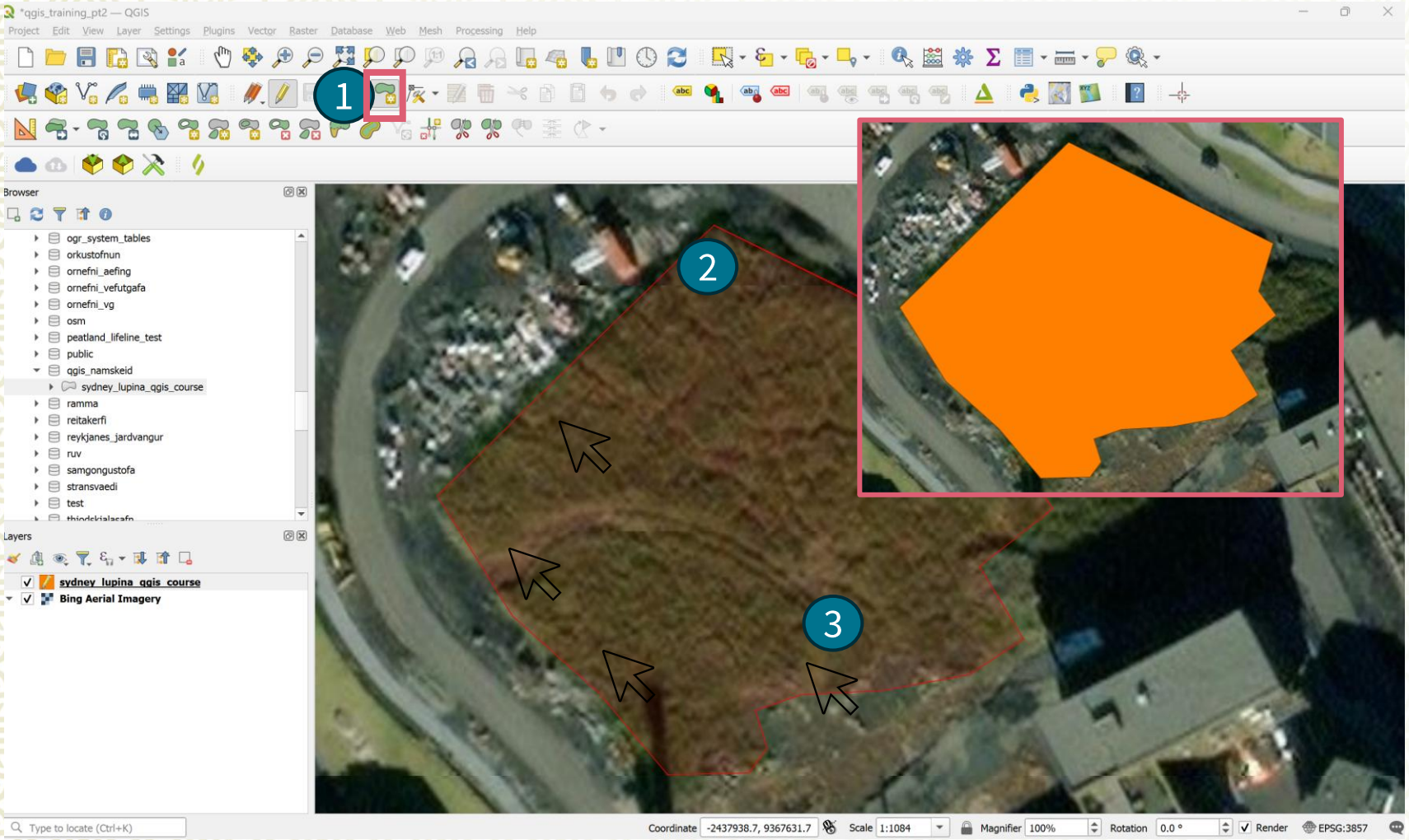
In this example, it maybe looks like the lupine coverage expanded. we want to expand the area of the polygon to cover lupine.

1. Click on ‘Reshape features’
2. Left click somewhere inside the polygon you want to expand/reshape
3. Continue clicking to create an area where you´d like to expand the polygon
4. Your last click should be inside the polygon again. Then Right click to finish the edits.
5. Now your feature should be reshaped to include the new area
6. Save edits

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

Edit/update your lupine file using satellite imagery as a reference



In this example, we will add a new polygon where the lupine was missing

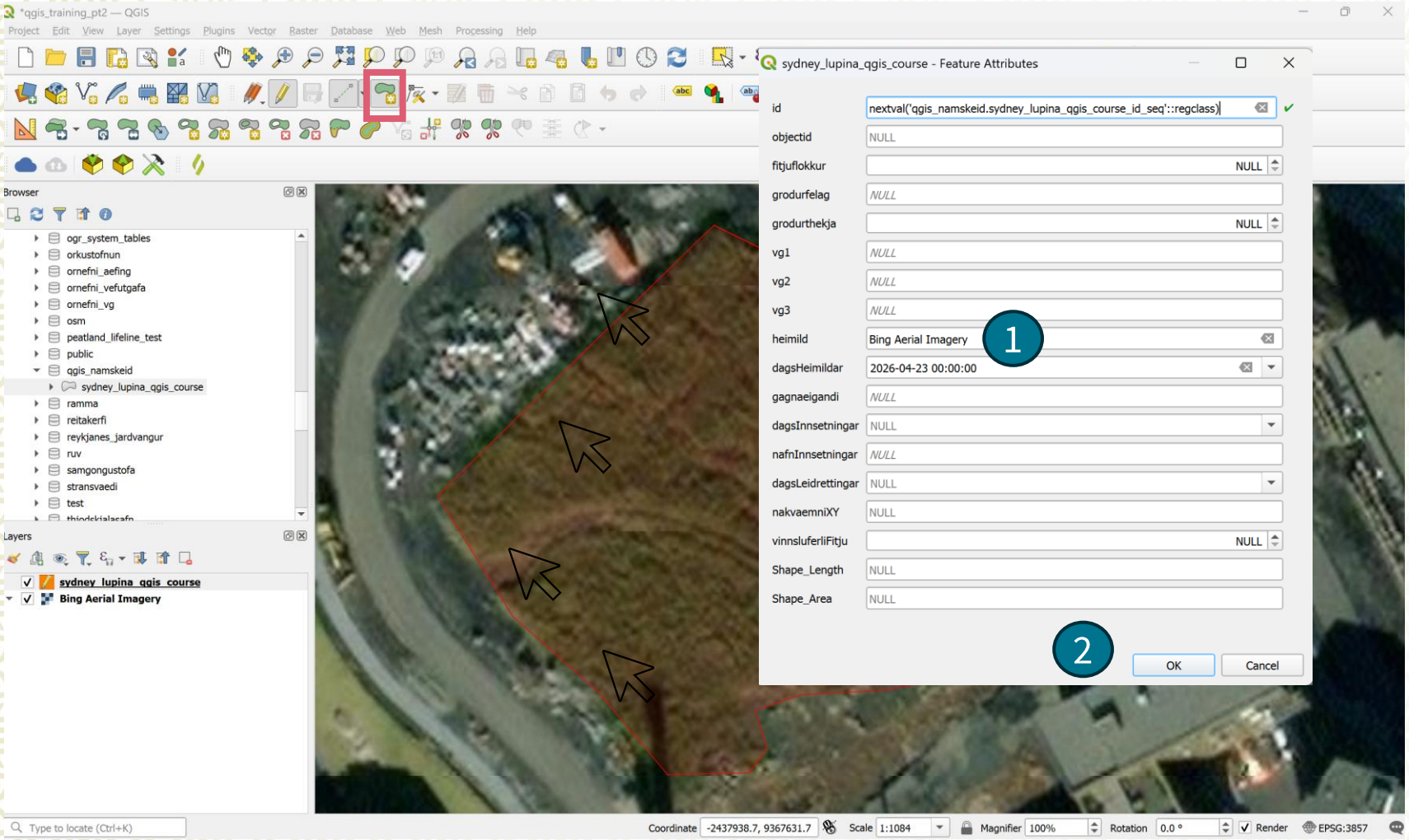
1. Click on ‘Add new feature’
2. Left around an area to define a new polygon
3. Right click to complete the polygon

… Continued on next slide

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

Edit/update your lupine file using satellite imagery as a reference



In this example, we will add a new polygon where the lupine was missing

1. Fill in the ‘heimild’ and ‘dagsHeimildar’ attributes for the feature.
2. Click ‘OK’.
3. Your feature will now be added:

Náttúrufræðistofnun

WORKSHOP:
OWS and Postgres (database) connections in QGIS

Edit/update your lupine file using satellite imagery as a reference

Finish editing your polygon(s) for your area of interest.

Save your layer edits and save your project often.

Click the pencil icon to stop editing when you are finished:

This is NOT affecting the original lupina layer from the Nátt database (this is just a test schema in our database)

Save this QGIS project somewhere safe, we will use it for the next course for QField