

# Defining Natura 2000 habitats using point data and aerial images

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## Background

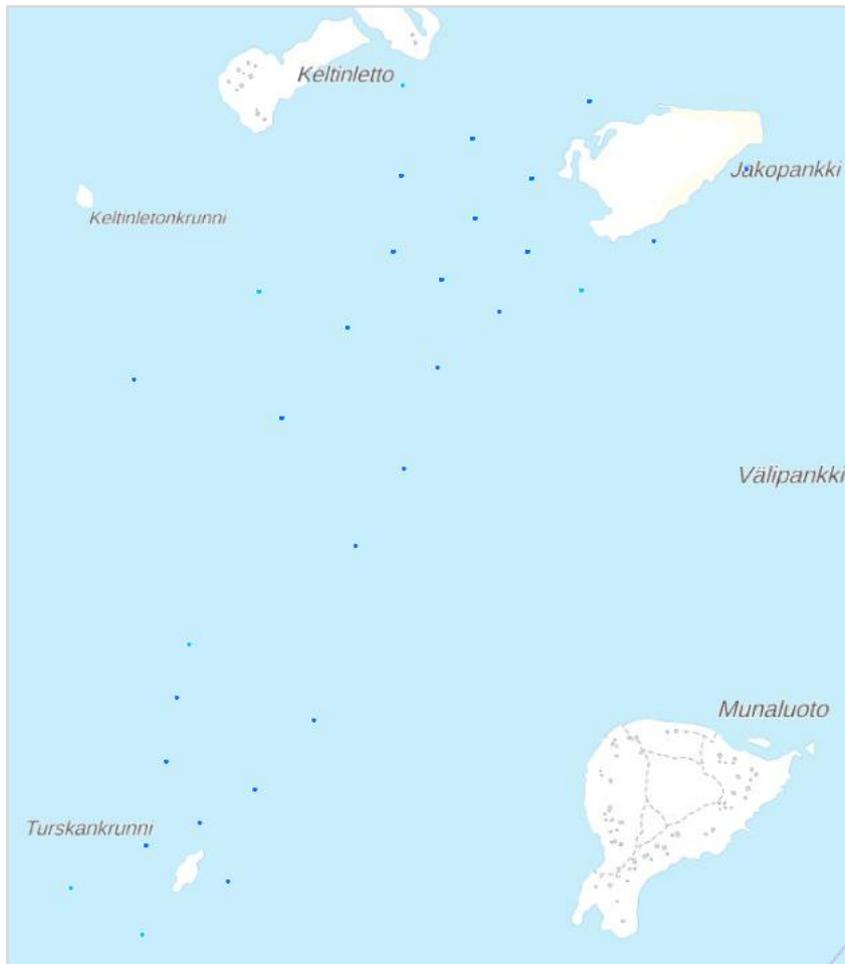
The purpose of this work was to test if Natura 2000 habitats can be identified and drawn on map using VELMU-point inventory data and aerial images taken with a drone.

Two separate inventory areas had been chosen to be test areas: Jakopankki-island in Lapland and Kahvankari-island in Oulu region. Drone was used in Lapland at Jakopankki area. VELMU-point data was put on a map in systematic grid. Field work was done in Summer 2019 by consultants and inventory data was delivered to ELY-centres in LajiGIS-Excel sheets (Picture 1.). In Excel, the data collected from the field (species, bottom substrate, depth and other relevant factors) is saved in a systematic way.

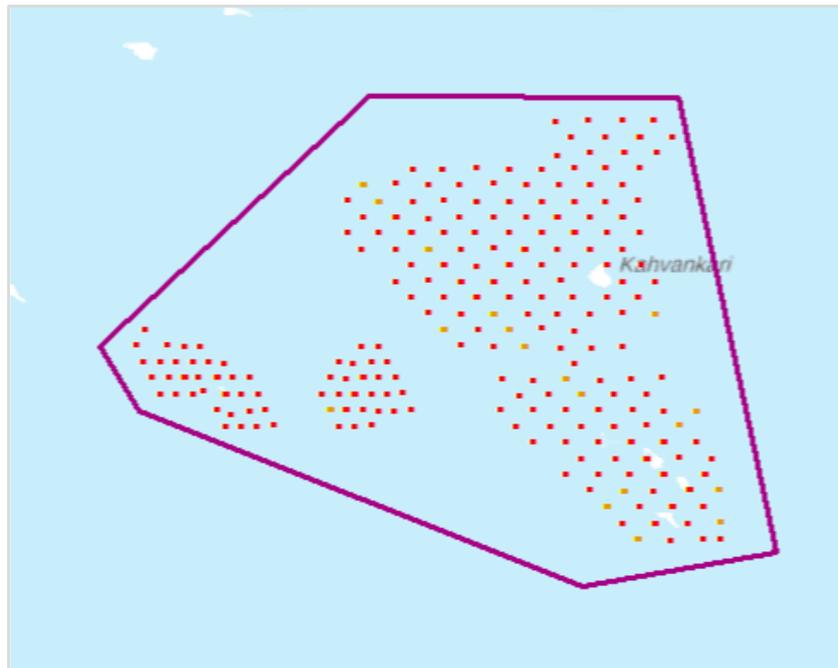
Kahluupisteiltä kerättävät tiedot											
Videopisteiltä kerättävät tiedot											
							vesikiikari 23 tai pistesukellus 25		snorklaus 13		Natura-luontotyyppi kirjataan tähän
							voi käyttää				5
							42 11 HD		aina 3		Natura-luontotyyppi kirjataan tähän
											5
Kartoituskohteen tiedot											
Kohteen nro* (käyttäjän antama, hierarkian luomiseen)	Kohteen taso*	Kartoituksen tarkoitus* (Kohdetyppi)	Kohteen nimi*	Arviointirudun N- koordinaatti (aste,desim aali)	Arviointirudun E- koordinaatti (aste,desim aali)	Pisteen ID (Point ID)	Kartoitus menetelmä	Kartoitus menetelmän tarkennus	Runsasarviointimenetelmä	Kohteen huomautukset ja lisätiedot	Otantamenetelmä
1	63	20	Jakopankki	65,75179	24,37601	91	42	11	3		5
2	63	20	Jakopankki	65,75266	24,37258	96	42	11	3		5
3	63	20	Jakopankki	65,75751	24,37766	82	42	11	3		5
4	63	20	Jakopankki	65,76445	24,38023	108	42	11	3		5
5	63	20	Jakopankki	65,76445	24,38023	108	42	11	3		5
6	63	20	Jakopankki	65,76445	24,38023	108	42	11	3		5
7	63	20	Jakopankki	65,76859	24,38656	101	42	11	3		5
8	63	20	Jakopankki	65,76474	24,39541	95	42	11	3		5
9	63	20	Jakopankki	65,76474	24,39541	95	42	11	3		5
10	63	20	Jakopankki	65,76474	24,39541	95	42	11	3		5

Picture 1. Example of a LajiGIS-Excel sheet where VELMU-point data is saved.

Inventories were carried out by two consulting companies, Latvasilmu OSK and Alleco Oy. They provided good quality inventory data. A large amount of data was collected from the SEAMBOTH-area using VELMU marine inventory methods. Jakopankki area was 148 hectares and there were 30 points (Picture 2.). Kahvankari area was 860 hectares and there were 207 points (Picture 3.).



Picture 2. Jakobankki-island study area with collected VELMU-points (blue dots).



Picture 3. Kahvankari-island study area with collected VELMU-points (red dots).

## Data processing

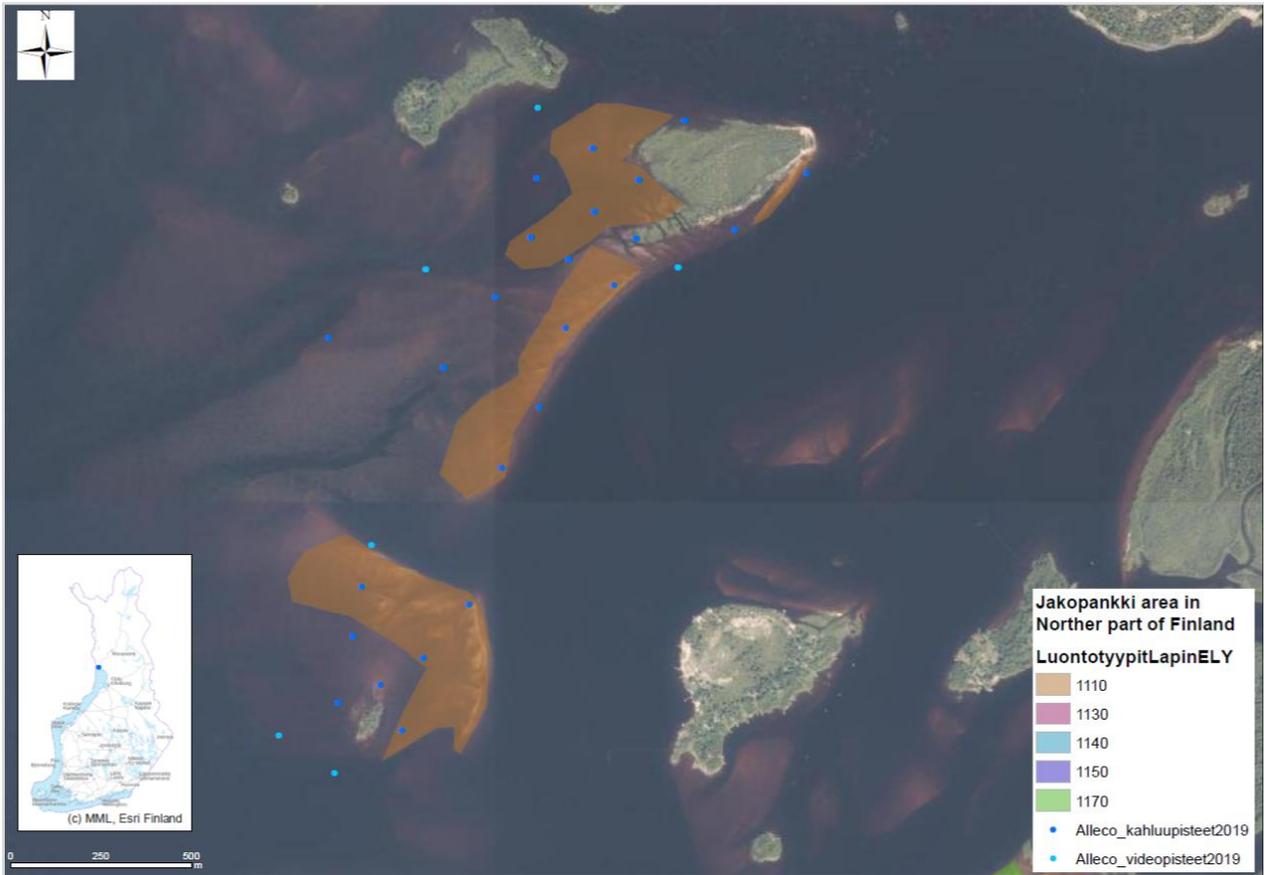
At the beginning, the obtained data was modified to the older version of Excel (97-2003) to make it as simple as possible (Picture 4.). This was done because the inventory data was saved in the LajiGIS-Excel sheet using macros which cannot be used in ArcMap. Also, the data needs to be in a simple form, because in the ArcMap attribute table the column heading should be very short (up to 10 letters), with no Scandinavian letters such as å, ä, and ö. Also, the special characters are not allowed.

A	B	C	D	E	F	G	H	I	J	K
nro	taso	tyyppi	nimi	N	E	ID	menetelmä	tarkennus	Runs_men	Otanta
1	63	20	Jakopankki	65,7517905	24,3760103	91	42	11	3	5
2	63	20	Jakopankki	65,7526565	24,3725802	96	42	11	3	5
3	63	20	Jakopankki	65,7575145	24,3776562	82	42	11	3	5
4	63	20	Jakopankki	65,7644545	24,3802270	108	42	11	3	5
5	63	20	Jakopankki	65,7644545	24,3802270	108	42	11	3	5
6	63	20	Jakopankki	65,7644545	24,3802270	108	42	11	3	5
7	63	20	Jakopankki	65,7685894	24,3865645	101	42	11	3	5
8	63	20	Jakopankki	65,7647378	24,3954107	95	42	11	3	5
9	63	20	Jakopankki	65,7647378	24,3954107	95	42	11	3	5
10	63	20	Jakopankki	65,7647378	24,3954107	95	42	11	3	5

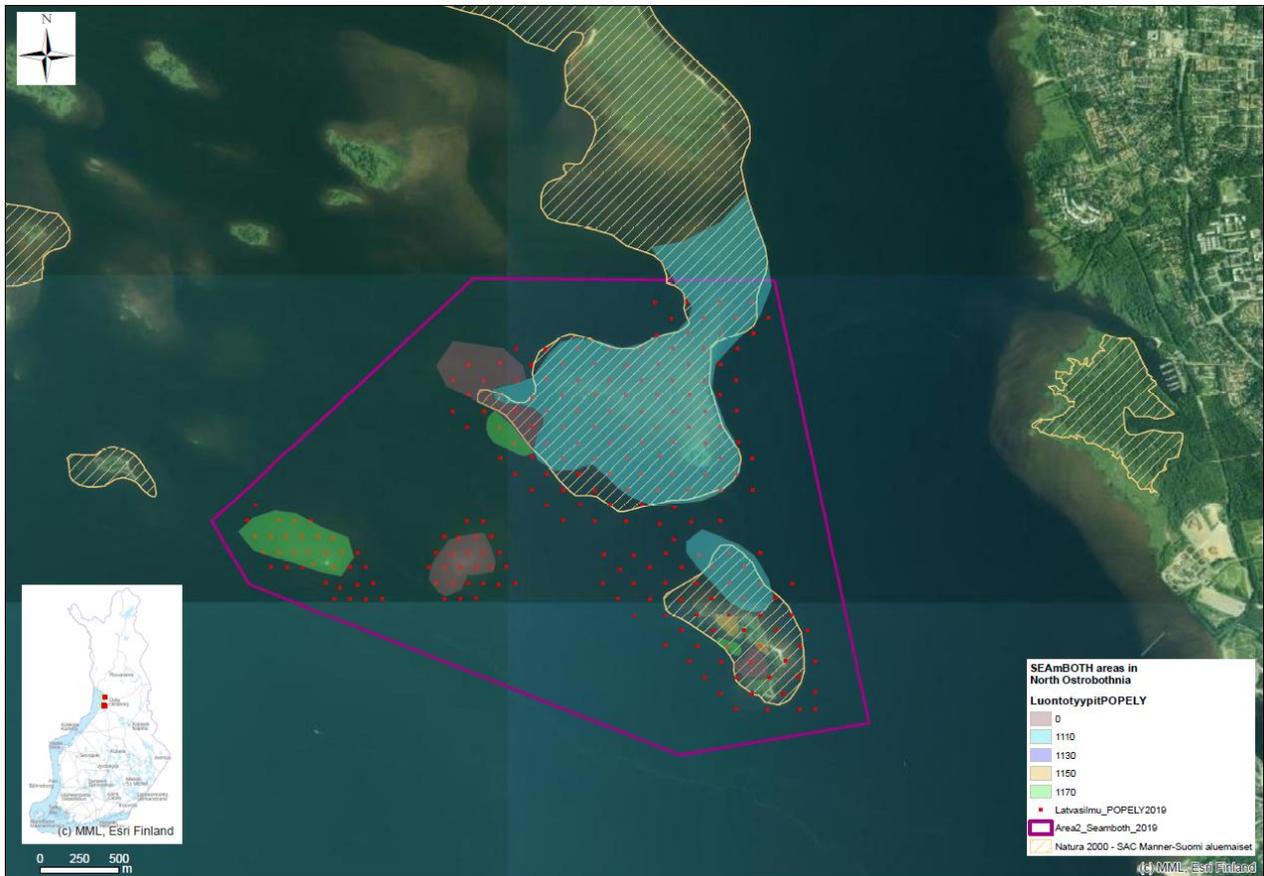
Picture 4. Modified, more simple form of an Excel sheet.

Total quantity of data was 390 observation points with multiple data. The basic data used was that collected in 2019 inventories, but since there was also inventory data available from 2018 inventories, it was utilized too. The exercise was started by copying and pasting the data from one Excel file to another Excel file. From the finished Excel file, the data was transferred to ArcMap as a layer.

The next step was processing the data. Aerial photos were used as a base, and VELMU-point data was used to determine the vegetation, bottom substrate and habitats found in the inventoried areas. Finnish Natura areas, habitat codes, characteristics of inventoried areas, species found in the areas and seabed values were considered. This made it easier to define the borders for the habitat types and to digitize areas from the aerial view. Picture 5 shows an example of digitized habitats from the island of Jakopankki, northwest from Kemi. Picture 6 shows an example of digitized habitats from the island of Kahvankari in front of Oulu. Colorful dots indicate collected data points in the area. Unlike the Jakopankki-island test area, there are several Natura habitats in the Kahvankari-island test area.



Picture 5. The Jakopankki-island study area. The brown area was digitized as sandbanks. The blue dots are collected VELMU-points.



Picture 6. Kahvankari-island in front of Oulu. Habitats identified include sandbanks, reefs and lagoons.

### Most important observations

In most cases, digitizing habitats using VELMU data and aerial imagery was simple. The aim of the work was to test if this point data-aerial photograph -method can give a good overview of the habitats, their locations and surface areas. The method was proven to work well. However, it was noticed that when the inventories were made by using straight lines to circular areas such as the coastal lagoon (1130), the data collected, such as depth, seabed quality, and species coverage, did not provide a detailed picture of the area and its features. The grid point network used in the test may work best in defining the boundaries of straight areas. Locating the points following the shape of the inventory area could give even better result with the same sampling effort. The quality of the inventory and the analysis of the inventory data would also be improved if comprehensive in-depth information was available from the regions already in the inventory planning.

Aerial images by NLS (National Land Survey of Finland) were precise enough for this work, but images taken with a drone might bring more detailed information from specific areas. Especially from small reefs and sandbanks far out at the sea more detailed images than what NLS is providing might be needed for defining habitats, and in very shallow areas even vegetation can be identified from drone images in some cases, and this information is often valuable for drawing habitats on a map. Alleco Oy used drone surveys in their inventory work in 2019 in Jakopankki-island area and their comments on the functionality of drone surveys from the mapping of underwater habitats can be found in Finnish in the report "Jakopankin vedenalaisen luonnon inventointi liittyen SEAmBOTH-hankkeeseen 2019".

### Data management after the project

The digitized Natura 2000 habitats have been exported to the SAKTI-database. Species data has been saved in LajiGIS-database. Both SAKTI and LajiGIS are databases of environmental administration (managed by Metsähallitus). VELMU-points done have been saved in public VELMU-database managed by SYKE.