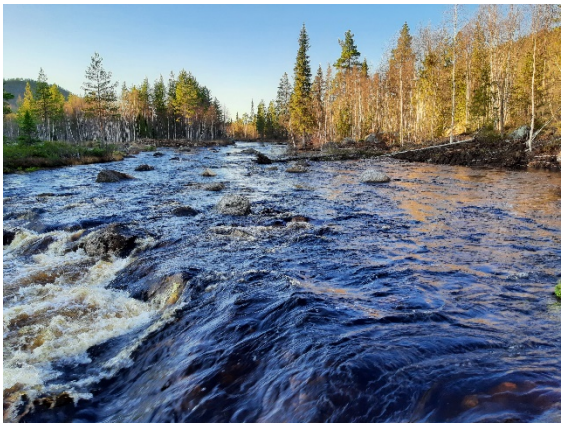
Monitoring of rewetted areas (action D5) within project ReBorN in the county of Västerbotten

(LIFE15 NAT/SE/000892)

Picture 1. Lögdån 2021 before / during restoration



Picture 2. Lögdån 2021 after restoration

Robert Ström

County Administrative Board of Västerbotten 2022

Länsstyrelsen Västerbotten

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Summary

To monitor one of the expected results, that the rewetted area will increase in restored river reach, we have used drones to take pictures before and after restoration. Polygons were created in GIS guided by dronepictures and LM Orto pictures. They then were sorted in categories of:

- Main channel (before and after restoration below or above FHC[1])
- Side channel (before and after restoration below or above FHC[1])
- Islands (before and after restoration below or above FHC[1])

In the monitored sites we have a result of 28 ha of rewetted area along a total river length of 69,43 km. Increased rewetted area is 0,403 ha/km.

Some areas are not monitored at all due to different reasons. In Karlsbäcken for example the dense tree cover made drone pictures unusable. Many tributaries were restored manually mostly by construction of spawning sites and therefore the regained rewetted area in manually restored tributaries is often quite small and in the large-scale the areas are negligible.

[1] former highest-coastline (FHC; at ~250 m above sea level)

Background

Due to the former channelizing for timber flotation use, the rivers were narrowed, and the wet areas were decreased. In many areas the rivers old shorelines are visible on land behind the wall of boulders, stones and gravel. By restoration it is possible to rewet the old floodplain and re-open side channels. The possible area to regain varies a lot mostly due to several parameters, for example the bank slope.

It is important to remember that the rewetted areas in most cases are very important areas for the ecosystem due to lots of shallow water and side channels with multiple shorelines and vegetation which provides suitable habitats for juvenile fish and invertebrates.

Method

The plan from the beginning was to measure the rewetted area with laser tools. Because of the large scale of the project this method was unpractical and too complicated to use and would not deliver a functional result.

Instead we used drones to create Orto mosaics (before and after pictures). In some areas we used Orto mosaic from LM (Lantmäteriet). Most tributaries are too small to evaluate with this method, but we tried in Strömbäcken and Mjösjöån.

For a few areas, after pictures are missing. In those areas the new areas were estimated in GIS. In 67,5 km of the restored reaches area polygons before and after was created for Lögdeälven, Lögdån, Storbäcken and Strömbäcken. In Mjösjöån 1,93 km of polygons were created.

Results

Results tables of rewetted areas.

Mjösjöån

Above the former highest coastline	Before (m²)	After (m²)	Area increase (m²)	Area increase (%)
Total area	15 591	20 392	4 801	31
Main channel	15 591	16 857	1 266	8
Side channels	0	3 535	3 535	

% Reopened side channels of new wet area	74
% Main channel of total wet area	26

Lögdeälven/Lögdån/Storbäcken/Strömbäcken

Above the former highest coastline	Before (m²)	After (m²)	Area increase (m²)	Area increase (%)
Total area	604 531	705 759	101 228	17
Main channel	572 108	663 644	91 536	16
Side channels	32 423	42 115	9 692	30

% Reopened side channels of new wet area	10
% Main channel of total wet area	90

Lögdeälven

Below the former highest coastline	Before (m²)	After (m²)	Area increase (m²)	Area increase (%)
Total area	932 117	1 106 144	174 027	19
Main channel	916 326	1 032 619	116 293	13
Side channels	15 791	73 525	57 734	366

% Reopened side channels of new wet area	33
% Main channel of new wet area	67

	m2
Total area before	1 536 648
Total area after	1 811 903
Rewetted areas %	18
Gained area m^2	275 255

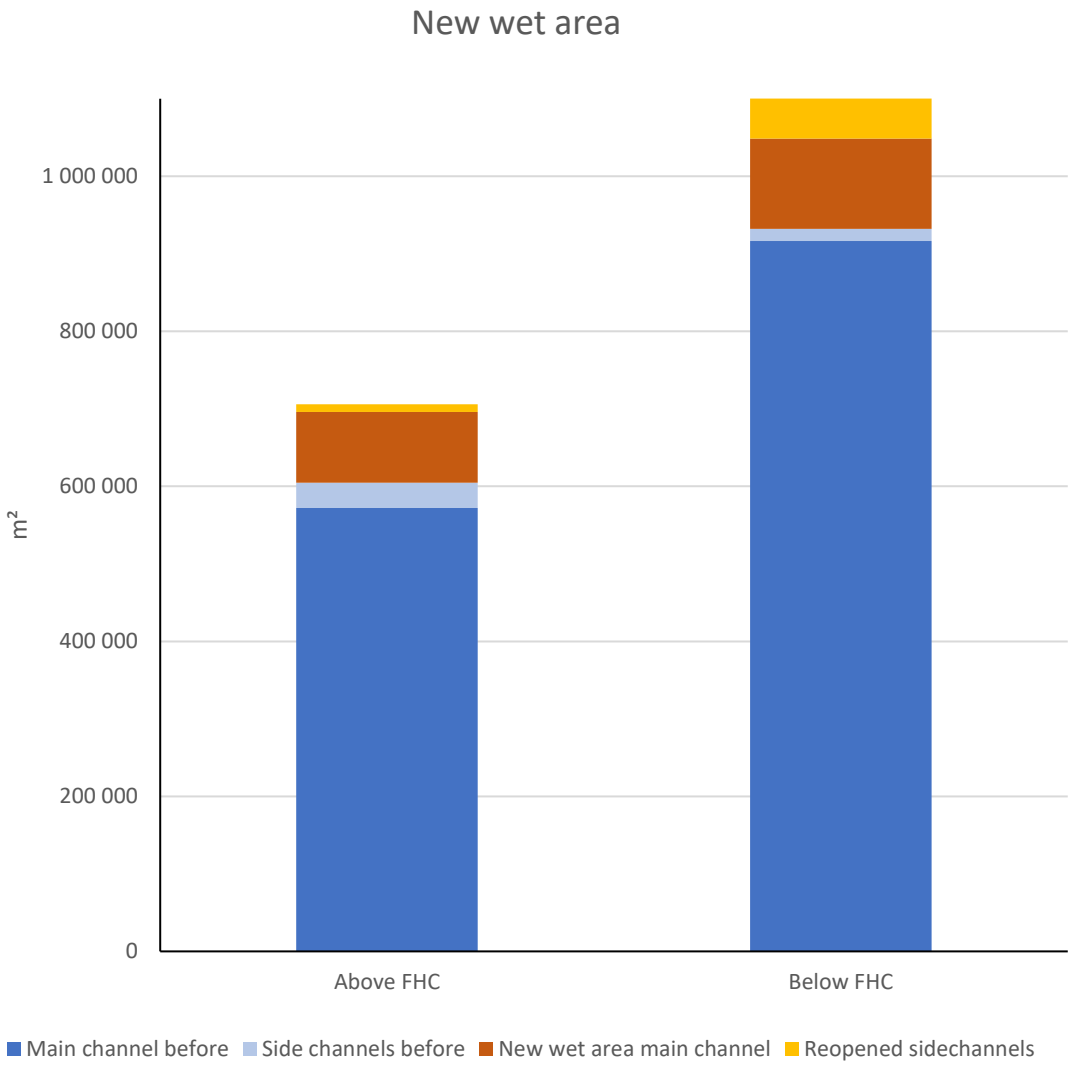

Diagram 1. Rewetted areas above and below FHC

Area	Above FHC	Below FHC
Main channel before	572 108	916 326
Side channels before	32 423	15 791
New wet area main channel	91 536	116 293
Re-opened side channels	9 692	57 734

Table 3. Rewetted areas above and below HC

In areas Lögdeälven, Lögdån, Storbäcken and Strömbäcken we gained 27,5 ha on streches that was in total 67,5km. That is **0,408 ha/km.**

In area Mjösjöån we gained 0,48 ha on stretches that was in total 1,93 km. That is **0,249 ha/km.**

Discussion

Using drones for this monitoring has been successful despite of new and complicated legislation. Monitor with drones is still very time consuming in total and is not suitable for smaller tributaries or rivers with lots of dense treetops along the shorelines.

The result of regained areas depends on many variables, such as:

- How well suited the sites are for rewetting areas, bank slop for example
- How, and what type of effort is put into the planning and understanding of the impact
- How, and what type of effort is put in the restoration work and coordination
- Constrains due to landowners and or infrastructure
- The quality of pictures and the waterflow at time

Some reaches that has been restored shows no extra gained rewetted area. However, the habitat is still very much improved in terms of variation, natural structure and function. Other reaches could show 3-4 times larger area after restoration mostly in alluvial parts with gravel/sand below FHC.

Some parts of the side channels were already "wet" but closed or partially closed off from the natural waterflow before restoration. It is important to keep in mind that the real gain of "functional" area therefore is a lot larger than the numbers shown above.

In this large-scale restoration project, it is interesting to compare for example regained side channel area above and below FHC. As the numbers above show it was more common with multiple channels below FHC then above FHC.

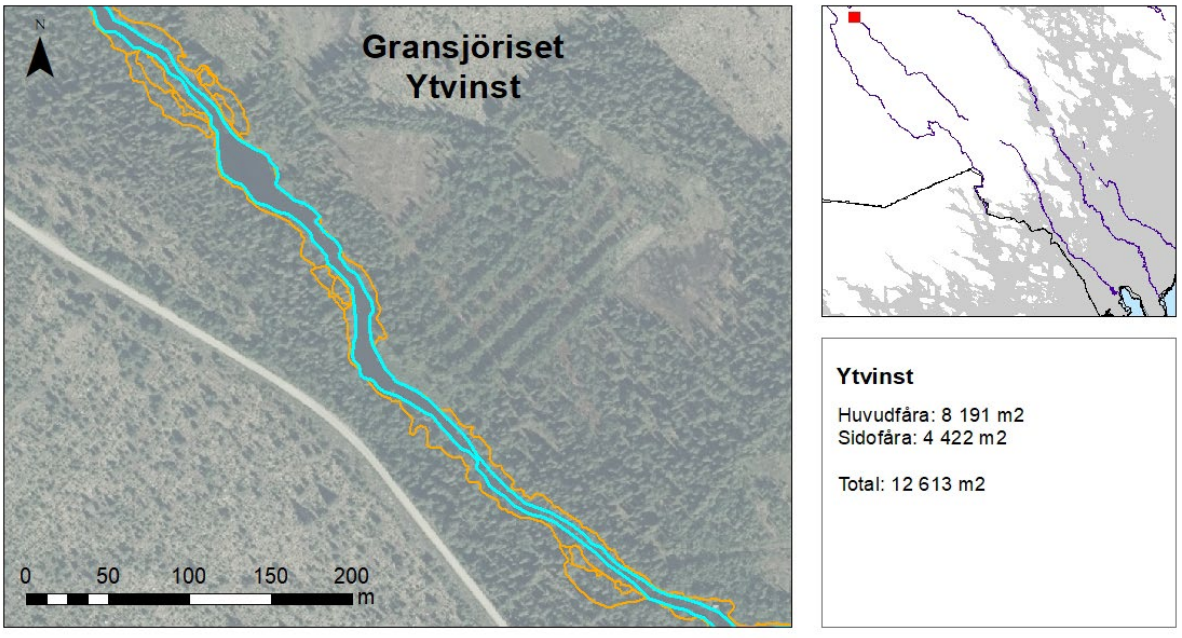

Figure 1. Rewetted area (yellow) and channelized river (cyan) in Lögdån Gransjöriset. An example of lots of regained area both widened channel and re-opened side channels.

When the former channelized river area is restored that area as well as the new regained area will serve the ecosystem much better. The total amount of improved area is therefore much larger than the rewetted area.

The connection and exchange between land and water are improved by removing constraining walls. Shallow functional shoreline in variable waterflows is much more common after restoration. The ability for the ecosystem to benefit the nutrient from falling leaves is improved due to more shorelines and “leaf gathering” structures as boulders and trees.

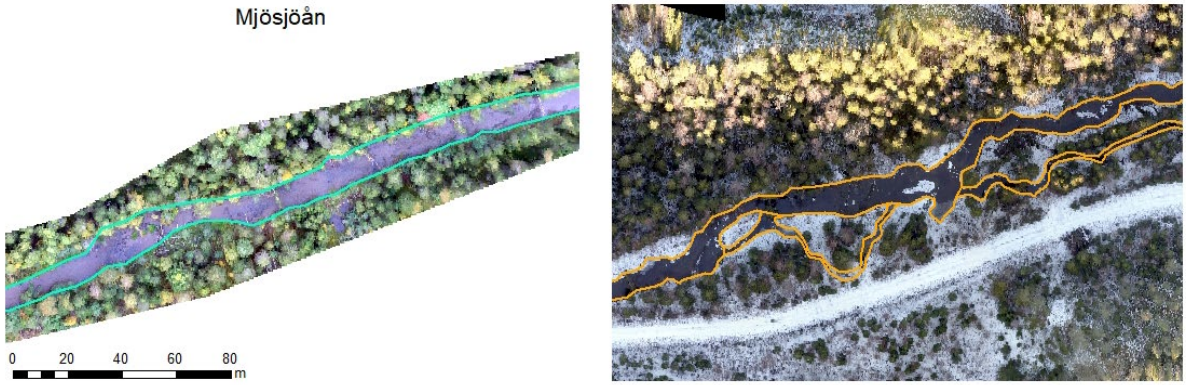

Figure 2. Example of pictures taken before and after restoration of Mjösjöån tributary to Lögdeälven. Wet area drawn as a polygon before and after. Area of new re-opened side channels can easily be sorted in the data.

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