The Noads Mire – case study: Monitoring wetland restoration in the New Forest using fixed point photography and geomorphological surveys

Overview:

Since 2010, the Higher Level Stewardship (HLS) scheme has been funding wetland restoration projects across the New Forest. To monitor the progress of these efforts, geomorphological surveys and fixed-point photography have been employed. One example project is The Noads Mire, where artificial drainage had been causing excessive erosion. The surveys demonstrated that the restoration work was successful in creating a watercourse with a more diffuse flow, reducing areas of active erosion and enabling water to spread out laterally. The hydrological and ecological benefits of this are numerous. Some, such as the formation of peat from newly established Sphagnum moss, will only become evident in the long term. However, other benefits, like the increased growth of vegetation within the channels, are already visible.

What is a geomorphological survey?

Geomorphological surveys are systematic assessments of the physical features, forms, and processes of an area, particularly focusing on the morphology and dynamics of river channels and surrounding terrain.

1. **Why do we do geomorphological surveys?**

Conducting geomorphological surveys before and after restoration projects helps monitor the success of restoration efforts, allowing for a detailed assessment of changes in stream morphology, flow dynamics, and ecological health.

The changes we would expect to see depend on where the restoration has taken place. For instance, in a headland mire which has been drained, restoration aims to restore the natural hydrology by filling in artificial drains and allowing water to spread across the surface of the land. In this instance, we would expect the channel to become much shallower and wider (often it can be hard to distinguish a clearly defined channel), and the flow to become much slower.

On the other hand, further downstream, where there is a more definitive watercourse, we might restore naturally functioning meanders to a channel that was deepened and straightened. Here we would expect an increase in the variety of flow types and physical river features, indicative of presence of natural riverine processes.

Fixed point photography (taking photos from the same position before and after restoration), also provides an effective and engaging way of demonstrating the changes achieved by restoration.

2. **What did we find?**

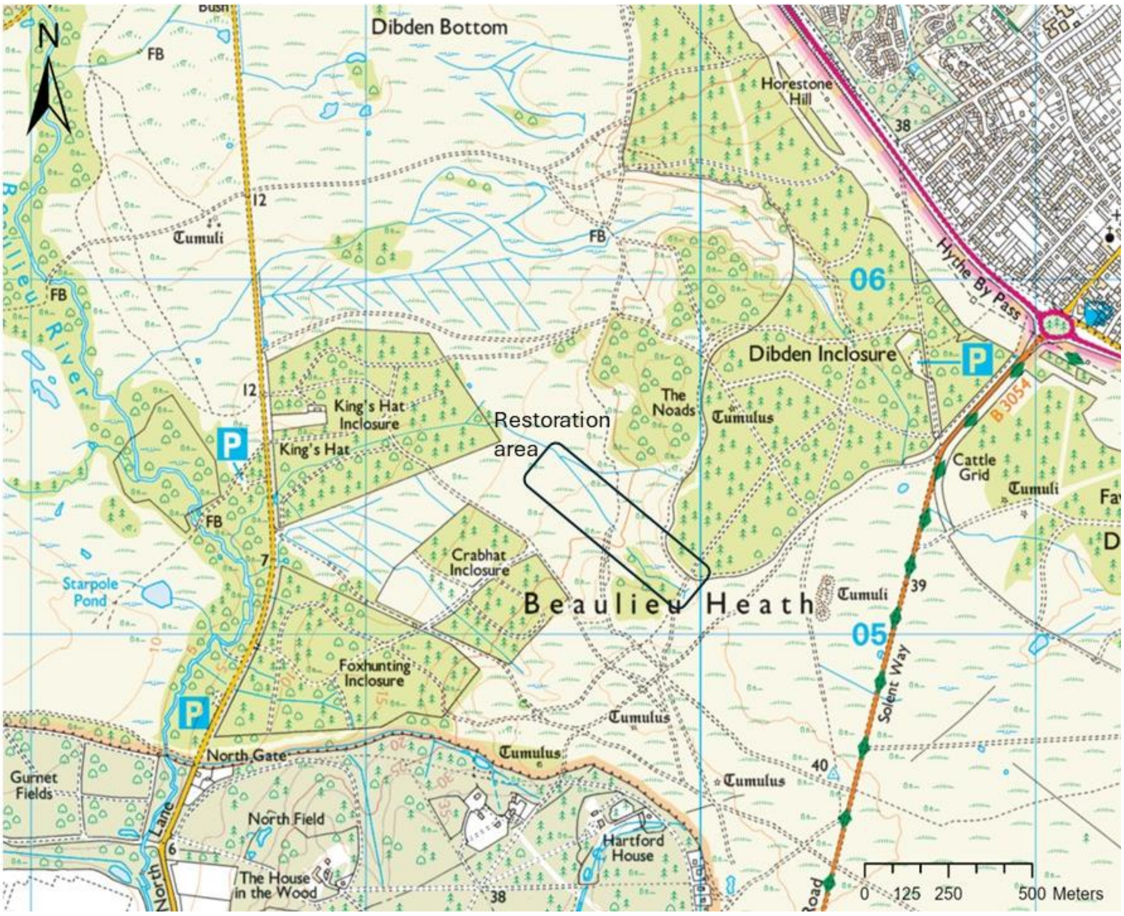
These have found restoration has positively impacted the hydrology and ecology of the area. Overall, the channel is now wider and shallower, and flow less concentrated and erosive. This has enabled an abundance of in-channel and marginal vegetation to grow, and the area is buzzing with insect life. Read on below for more detailed information on the site and results.

Site background:

The Noads mire is a small mire catchment in the New Forest between Crabhat and Dibden Inclosures, within the wider area of Beaulieu Heath. It drains westwards into the Beaulieu River via Kings Hat Inclosure.

The site was assessed as being unfavourable in 2013 by Natural England due to the artificially straightened drains running through the SSSI unit (419). Many of the New Forest streams underwent modification through drainage from as early as the 1840s with further large scale modifications in the 1950s to 1970s, to improve ground conditions for forestry and grazing. Side drains were cut into tributary valleys and streams within new Inclosures were straightened. The presence of herringbone drains (visible in the map 1) indicates extensive drainage efforts in the area around the Noads.

Map 1: Location of The Noads Mire and restoration area.



Restoration work:

Restoration work initially took place between 2017 and 2020. This involved infilling the artificial drain line running through the mire and raising the bed level, so that it grades into a shallow stream through the wooded area. This was done using heather bales and hoggin (locally dug gravels), and covering this using material from the spoil banks, which were levelled out to restore floodplain connectivity. Further restoration work took place downstream of the ford crossing, in which the watercourse was relocated back to its original route (where a remnant meanders were visible).

Thinness of the soil and scarcity of natural vegetation, coupled with heavy rainfall events shortly after restoration, meant initial recovery post restoration was slower than hoped, and areas of active erosion were clearly visible. Therefore, in 2022, repair work was done to fix areas where heather bales had decomposed and slumped, and small sections were eroding. This involved removing heather bale stakes and infilling scoured pools with hoggin and gravels.

Today, the area has visibly benefitted from the restoration work, as demonstrated by the fixed point photography and geomorphological data, collected before and after restoration.

Fixed Point Photography:

These fixed point photos show the change from an eroding channel, in which the water is being focused down a narrow gully to much shallower, wider channel in which flow is more dispersed. This has allowed much more in-channel vegetation to colonise helping support an abundance of insect life by providing an important habitat and food resource. To see the full catalogue of fixed point photos see here.

The Noads – facing downstream pre-restoration (2017)

The Noads – facing downstream post-restoration (2024)

The Noads – facing upstream pre-restoration (2017)

The Noads – facing upstream post-restoration

Geomorphological survey results:

Along the restored water course 10 geomorphological surveys were taken at regular intervals to assess its physical and biological character. These involved taking channel measurements (channel width, bank heights, water width, water depth), and documenting factors such as bank and channel vegetation types, river flow types, channel and bank face material, and river features.

The first surveys took place in 2017, prior to any restoration. Repeat surveys were done in June of this year (2024), seven years after the initial restoration.

1. **Changes to channel dimensions:**

The channel is wider and shallower.

- All surveys indicated channel width has increased across the restored area. In some areas, water is spreading out into multiple, shallow channels, where before it was confined to one distinct channel.
- With the exception of the middle part of the restored area, which is constrained by wooded banks, riverbank heights decreased across the restored area.
- See the raw data here (page 14).

These changes mean that during high flows water can spread out. There are multiple benefits to this including:

- More diffuse flow with less erosive power, reducing the erosion of peat.
- Increased soil and ground wetness, encouraging the growth of water-loving plant and moss species, such as Bog Pondweed, Marsh St. John's Wort, Lesser Spearwort and Sphagnum species. These provide an important habitat for many invertebrate species.
- An increase in the mire's ability to hold water. Without high banks funneling water downstream, and with an increase in Sphagnum species (which have a remarkable ability to hold water in specialised water storage cells), more water can be held in the area. This reduces the rate at which water is sent downstream during heavy rainfall, and ensures the area stays wet during summer droughts.

2. **Changes to vegetation:**

There is more in-channel vegetation.

- In-channel vegetation abundance increased across all the areas surveyed.
- This was especially evident in areas at the top of the mire, where in-channel vegetation went from absent to dominant.

3. **Changes to flow:**

The energy of the flow has been reduced.

- Reduced erosion, as evidenced by the loss of high energy flow types.
- The two highest flow types (free falling and chute flow) were both recorded in two separate modules in 2017, but were absent in 2024.
- The two lowest energy flow types (no perceptible flow and smooth flow) were also more dominant in 2024.