

PE1720/D

Scottish Natural Heritage submission of 2 August 2019

Scottish Natural Heritage (SNH) is a non-departmental public body funded by the Scottish Government through Grant-in-Aid. We are the Scottish Government's advisers on issues relating to nature and landscape. Our statutory purpose is to:

- secure the conservation and enhancement of nature and landscapes;
- foster understanding and facilitate their enjoyment; and,
- advise on their sustainable use and management.

Climate change and biodiversity are inextricably linked, and a nature-rich future is a part of the urgently needed solution to climate change. Natural flood management is just one of the ways in which nature can help us cope with the changes that we are experiencing in our weather and climate.

Some examples of work SNH along with partners are involved in include:

Climate Change Emergency - Climate change is happening now and one outcome of this emergency is increased flood risk. Rivers with natural patterns of erosion and intact floodplains will be best able to cope with increased flooding. Helping nature to adapt in such ways is one of our best tools for managing climate change. SNH works on this, with partners, including investigating the many benefits of river restoration, and promoting restoration schemes at a catchment scale where possible, partly through our funding and support for the [River Restoration Centre](#).

Working with Partners on Flooding issues - SEPA in its role as strategic Flood Risk Advisers and National Flood Warning Authority is developing a flood strategy, which SNH has been involved in from an early stage. This strategy will include a Natural Flood Management (NFM) element.

Benefits of natural flood management (NFM). Well planned NFM measures help in the management of floods and can have multiple benefits for both biodiversity and people. Since the publication of the Flood Risk Management (Scotland) Act 2009, SNH's role has shifted from advising on the impacts of both flooding and measures to prevent flooding on protected sites and species, to working with partners to restore natural functions of catchments that lead to improvements for nature as well as improved water management. SNH sits on the NFM Working Group alongside Scottish Government, SEPA, Scottish Forestry, National Parks and Local Authorities, National Farmers Union Scotland, James Hutton Institute and others.

Like all approaches to flood management NFM is not a panacea, but can be seen as part of a wider flood risk management approach. NFM techniques are likely to be most effective in smaller catchments (i.e. less than 100km²) however, even in larger catchments as well as slowing flows or storing floodwater NFM provides other benefits such as habitat improvement, clean drinking water, carbon sequestration, recreation, tourism. Once a flood event reaches a certain size the overall contribution of NFM is likely to decline and unlike 'hard' engineering approaches, the benefits are difficult to measure quantitatively.

In the urban setting NFM can be implemented through blue-green infrastructure – designed landscapes that as well as being attractive to people and biodiversity can help manage water in periods of excess that may otherwise result in flooding. Many of the projects supported through the Green Infrastructure Strategic Intervention,¹ which is being delivered by SNH, contain an NFM element.

Phase 1 of Dynamic Coast² – Scotland’s National Coastal Change Assessment has identified large numbers of assets such as 30,000 buildings, 1,300km of roads and 100km of railways close to potentially erodible coasts and potentially at risk from coastal flooding. A second phase of work is currently underway which includes developing adaptation and resilience plans in seven locations through developing an understanding of natural processes.

Natural Flood Management Measures – from the Natural Flood Management Handbook³

Measure group	Measure type	Main action
Woodland creation	Catchment woodlands	Runoff reduction
	Floodplain woodlands	Runoff reduction/floodplain storage
	Riparian woodlands	Runoff reduction/floodplain storage
Land management	Land and soil management practices	Runoff reduction
	Agricultural and upland drainage modifications	Runoff reduction
	Non-floodplain wetlands	Runoff reduction
	Overland sediment traps	Runoff reduction
River and floodplain restoration	River bank restoration	Sediment management
	River morphology and floodplain restoration	Floodplain storage/sediment management
	Instream structures (e.g. large woody debris)	Floodplain storage
	Washlands and offline storage ponds	Floodplain storage
Coastal NFM	Managed realignment	Estuarine surge attenuation and wave energy dissipation
	Saltmarsh and mudflat restoration	
	Sand dune restoration	
	Shingle restoration	
	Recharge (beach or intertidal)	

¹ <https://www.greeninfrastructurescotland.scot/>

² <http://www.dynamiccoast.com/>

³ <https://www.sepa.org.uk/media/163560/sepa-natural-flood-management-handbook1.pdf>

Land Management – current rural support includes funding through the Agri-Environment Climate scheme (AECs) for support for management of grassland, wetland and upland habitats which will contribute to flood management. Scotland's natural capital can provide many benefits. Therefore the inclusion of the following should be included in sustainable flood management measures: the restoration of wetland habitats and flood plains, water margin creation and management, riparian woodland management, and agro-forestry.

Peatland Action – Since 2012, Peatland Action, working in partnership with others, has set over 19,000 ha of degraded peatland on the road to recovery. The project continues to restore peatlands. One of the benefits is that healthy peatlands regulate run-off, and so reduce flooding and maintain base flows.

The Benefits of Beavers in natural flood management - These benefits will arise from their role as nature's engineers. Beavers are widely considered to be 'ecosystem engineers', which means they have a large impact on habitats and species through the alterations they make to the physical environment. Beavers can provide a range of ecosystem services. These include 'provisioning ecosystem services' such as increased ground water storage, 'regulation and maintenance ecosystem services' such as flow stabilisation and flood prevention.

The mechanisms by which beavers change environments and affect biodiversity include: creating ponds and wetlands, altering sediment transport processes, importing woody debris into aquatic environments, creating important habitat features such as standing dead wood, creating coppiced stands and unique vegetation structures, and creating successional stages such as beaver meadows. Beaver dams will impede the flow (quantity and velocity) of water in a channel. Beaver dams therefore increase the in-channel storage of water. By increasing the amount of water stored in a channel or on a floodplain the effects of prolonged periods of dry weather may be lessened. By slowing flow, and therefore reducing the speed at which intercepted precipitation passes through a catchment, beaver dams can increase the length of time taken for a flood to reach its peak and reduce the height of the peak. The dissipation of energy associated with flows slowed by beaver activity will result in increased channel stability i.e. less erosion and deposition and therefore less lateral and vertical movement of the channel. Beaver activity may therefore result in the development of natural flood defences.

Beavers have therefore a potentially significant role in flood management and SNH supports incorporating beaver presence into NFM proposals where appropriate. Working with the Scottish Beaver Forum, SNH is identifying potential areas in Tayside and Forth which could be suitable projects for wetland restoration which would include NFM.

Some useful information about the role of beavers in flood management can be found below:

- Section 3.4.3 (page 58-63) of the SNH 2015 ['Beavers in Scotland'](#) report

- [Beavers – Nature’s Water Engineers: A summary of the initial findings from the Devon beaver projects](#)
- [Sediment and nutrient storage in a beaver engineered wetland. Puttock *et al.* 2018](#)
- [Eurasian beaver activity increases water storage, attenuates flow and mitigates diffuse pollution from intensively-managed grasslands. Puttock *et al.* 2016](#)