BOUNDARY BOOST

Project Overview

The potential to develop alternative green finance as income for environmental provision, explored on Dartmoor farms.

The project was developed and run by Dartmoor Hill Farm Project (DHFP), part of Dartmoor National Park Authority.

Made possible by Defra's Natural Environment Investment Readiness Fund (NEIRF), administered by the Environment Agency.

Dartmoor National Park

Dartmoor Hill Farm Project

Natural Environment Investment Readiness Fund

Department for Environment Food & Rural Affairs

Environment Agency

Natural England

Project Objectives

Explore potential funding

Changing Agricultural Policy places emphasis on financial support for environmental goods and services, not production. This transition presents threats and opportunities for farm businesses to adapt by applying alternative approaches and making informed choices to utilise resources available to them.

Coupled with this, available funding is under pressure with Government encouraging the Private Sector to also recognise its reliance on natural resources, integrate greater sustainability measures into operations and proactively support initiatives to meet economic, social and governance goals.

Understand provision

Based on a cohort of working farms on Dartmoor in southwest England, a pilot was developed with farmers and trialled to inform the potential for a new scheme.

Designed to be accessible, relevant and of value to the majority of farmers - Boundary Boost focussed on the extensive network of hedges, banks and walls found across this pastoral and culturally rich landscape.

By identifying and seeking to quantify key environmental provision, the project gathered evidence to determine realistic and pragmatic options for farmers and potential financial support

The proposal

‘Devon hedges’, banks and walls combine a complex mix of elements originally built for function; eg. to manage livestock or clear areas for crops, to define ownership or geographical areas. Virtually every farm has extensive boundaries which perform these roles yet require regular maintenance incurring costs that are not fully met by support schemes.

These features also provide multiple environmental services which are not directly rewarded, such as habitat for flora and fauna, a refuge and highway connecting species, intercepting and slowing surface run off to reduce flooding, trapping soil from erosion, improving infiltration into soils, sequestering and storing carbon within an earth core or woody top, containing historical or cultural significance...

Could these boundaries be better recognised and rewarded for all that they deliver - providing an income stream for farmers whilst a functional part of the farm, and an option for funders to support practical initiatives with multiple and tangible benefits?

Devon is reported to have ~53,000 kms of hedges, illustrating the current potential and opportunity to upscale across the region or country.

Environmental provision

The proposal seeks to better recognise and reward provision from ‘Devon hedges’ which tend to represent more complex features than a single planted hedgerow and require more maintenance as a result.

Feature	Biodiversity (Flora & fauna, refuge, food, connectivity, seedbank etc)	Water quality (via infiltration & percolation)	Water resource (intercepting surface flow, slowing and storing inc. NFM)	Soil protection (reducing soil erosion, trapping mobilised sediment)	Carbon (sequestration and storage in earth core, woody growth or vegetation)	Climate mitigation (resilience re; soil, water, carbon, nutrient cycles and weather impacts)	Air quality (absorbing & cleansing pollutants via vegetation)	Farming (livestock management & welfare, shade, forage, shelterbelts)
‘Devon hedge’ or bank	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓✓
Traditional ’English hedgerow’	✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓
Dry stone wall	✓	✓	✓✓	✓✓		✓	*	✓✓

A broad overview; variation in boundary features will represent a range of values e.g. size, extent of vegetation / tree cover, condition or management.
Site vs site; Devon hedges or banks may have less tree cover but greater earth content for carbon storage than a comparative hedgerow etc.
* Minimal vegetation on stone walls but often extensive Lichens; sensitivity to pollution makes them good air quality indicators.

Focus*

Biodiversity connectivity

- Hedges support biodiversity through provision of extensive and diverse habitat; flora across a range of trophic layers from lichen to standard trees, also providing sheltered and generally undisturbed coverage within the banks and margins where plants can mature, seed and spread, bolstering plant communities.

- These in turn support invertebrates (inc. pollinators), small mammals and birds creating refuge and underpinning food webs.

- Traditional small field systems are common in the southwest, the density of these further increase biodiversity value due to their high connectivity for species and populations as natural highways.

Managing Water; Natural Flood Management (NFM)

- As solid and permanent structures, hedges intercept surface water flow in a landscape - meaning less soil or sediment is mobilised and reaching streams

- This helps to slow and store run off on the land during weather events, reducing flash flooding affecting roads, houses or businesses further downstream

- Holding water for slower infiltration retains water in drier seasons and levels out base river flows, with less drought / flood extremes

**Two main elements were explored in detail from the multiple environmental services that hedges provide*

- **Research**

An Environmental Economist and Social Scientist were contracted to undertake research, evaluating trends, markets and opinions from buyers and sellers to inform potential routes.

- **Government schemes**

The ambition was to develop a supplementary offer that could work in parallel to Defra Agri-Environment schemes - a ‘premium’ that recognised high-value and multi-faceted hedges and incentivised long term management to maintain these.

- **Evidence**

Building an evidence base would provide support and confidence for a potential market, aiming to quantify and qualify provision. This would underpin offers and inform any future scheme, as well as understand potential scale and scope.

Project Approach

Boundary Boost sought to combine market research, economic and environmental assessment with data collection on working farms to understand opportunities for green finance, and test the practicalities or viability of the proposal.

Farming input

Farmers were key to being included in the consultation throughout, to ensure clarity and that the remit was practical as well as feasible.

10 case study farms across Dartmoor were involved in Boundary Boost, providing a cross section of farm enterprises, each of which undertook monitoring to inform the baseline. Two of the sites were piloted to provide further in-depth data evaluation to understand the cost / benefit of different modelling from providers.

Most of the farmers also attended the quarterly Steering Group, along with members from external bodies which enabled farm visits to compare and contrast hedge management and which led to a more cohesive group and broad ranging discussions.

Actions and outcomes

Hedge Survey App

To understand potential extent or condition of hedges, requires knowledge of a current baseline. Often this does not exist or is incomplete. Existing hedge survey tools do not fully reflect the more complex nature of a 'Devon hedge' and its features. If these are not recorded, they cannot represent evidence.

Working with an App developer; a beta version tool was generated with a series of drop down questions that recognised all boundary types, recording information to reflect current extent and condition linked geo-spatially. Importantly, this aligns with evidence required by Defra Agri-environment schemes plus allows for optional data eg. photographs, species lists etc.

The case study farmers trialled the App in the field (enabled via off-line maps) and fed back with adjustments, while DHFP retain admin access to overview data.

The base data utilised hedge management layers made available in collaboration with the RPA who were supportive of the approach and it's potential.

Biophone deployment

An opportunity to trial biophone devices from local company Wild Connect, enabled Boundary Boost to record audio data directly and discreetly within hedge lines across all 10 case study farms.

These units were deployed to record 24/7 through the months of May, July and September to evidence bird and bat species presence.

Trialling helped to inform practical approaches of cost-effective surveys which would not have otherwise been possible, and importance of human experience through a combination of digital and manual assessment to eliminate false positives .

Besides the valuable data which created a precedent individually and collectively across all sides of the moor, the unexpected results were important to relay positive feedback to farmers and led to some friendly competition.

WILD CONNECT

Total results for 3 months:

74

Bird species

3

Bat species

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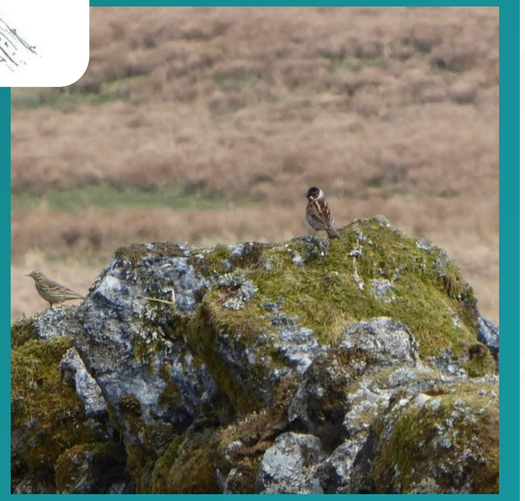
40-60 Bird species per farm*

456,845 vocalisations collected & verified

Bat ecolocation calls at 9 out of 10 farms

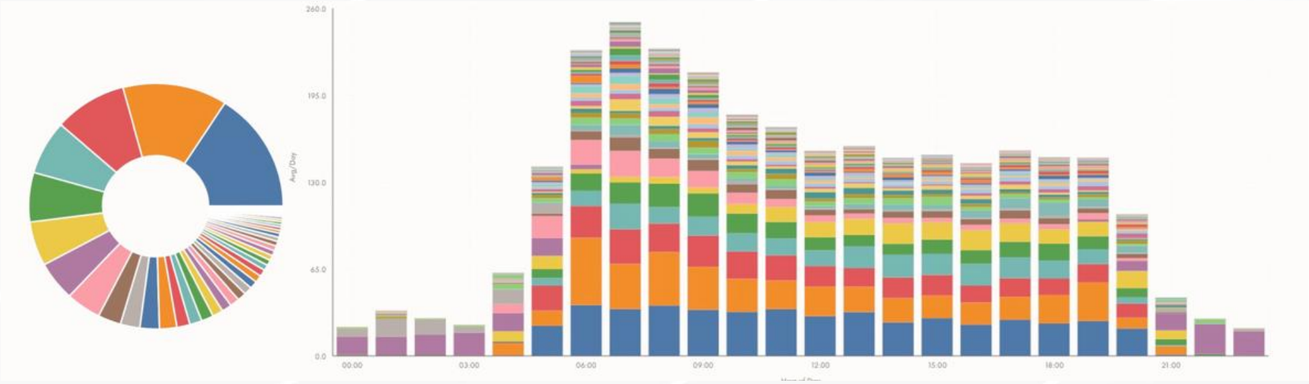


*Bird detections were categorised as resident / local / distant or flyover

Biophone results

With no prior data to indicate potential results, the data was a very successful outcome as an indication of biodiversity levels on case study farms.

Furthermore, the breakdown of species revealed differences in bird activity (eg. breeding or territorial) between seasons and the top 12 species accounted for over 77% of all calls.



In terms of conservation status the results revealed

- 14 species of Least Concern (5.49%)*
- 31 species of Green status (75.24%)
- 17 species of Amber status (14.78%)
- 15 species of Red status (4.49%)

(*% of recorded detections)

Density & Connectivity

One of the key aspects that Boundary Boost seeks to highlight is the value of connectivity from the extensive network of hedges and boundaries within a landscape, due to traditional small field systems in the southwest. These present greater ability to connect fragmented habitat and enable stronger, more genetic diversity among species as a result; which in the long term influences wider ecosystem populations and communities.

Estimates of density were calculated using a number of available datasets for the 10 case study farms, using existing guidance as one example benchmark towards achieving Favourable Conservation Status (FCS) at 10 kms of hedge per km2. Results indicated a range of estimates which exceeded this figure at up to 14 kms / km2 but at low confidence. Realistically figures as a minimum align with regional averages of approx. 8 kms / km2 and reinforce the case for more accurate records, which are of value to demonstrate good practice and flow of benefits.

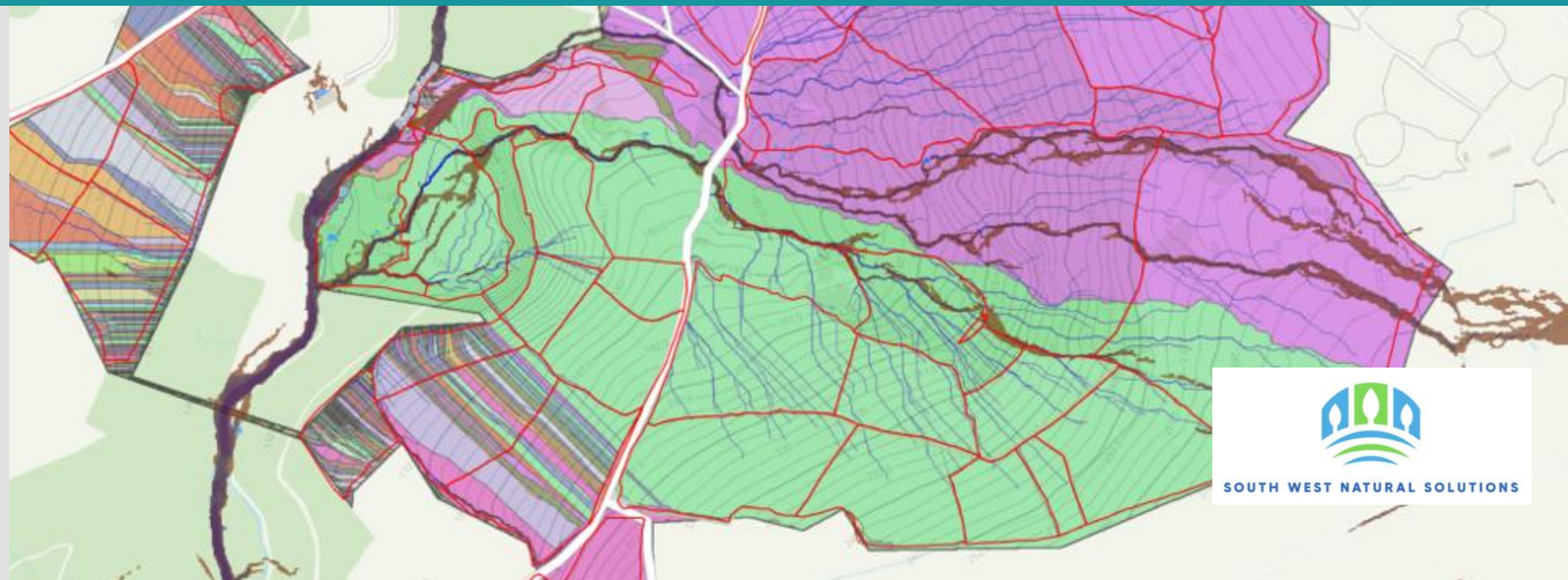
Natural Flood Management (NFM)

Hedges influence the movement or storage of water from rainfall by intercepting and slowing run off, historically some may have been built for this purpose and to utilise supply. At a landcape or catchment scale, this capability contributes to resilience from changing climate and weather events, reducing flood risk further downstream, recharging and filtering supplies or providing wetland habitat.

The ability to accurately quantify current NFM provision across case study farms specifically from hedges was not possible, but modelling scenarios* led to potential Nature-based Solutions (NbS) which worked with existing boundaries to enhance their role. Dartmoor records a high annual rainfall in the region of 2000 mm / yr therefore potential storage on a sub / catchment scale represent a significant contribution to reducing localised flood risk to communities, business and infrastructure.

*Using Scalgo model (Scalgo.com)

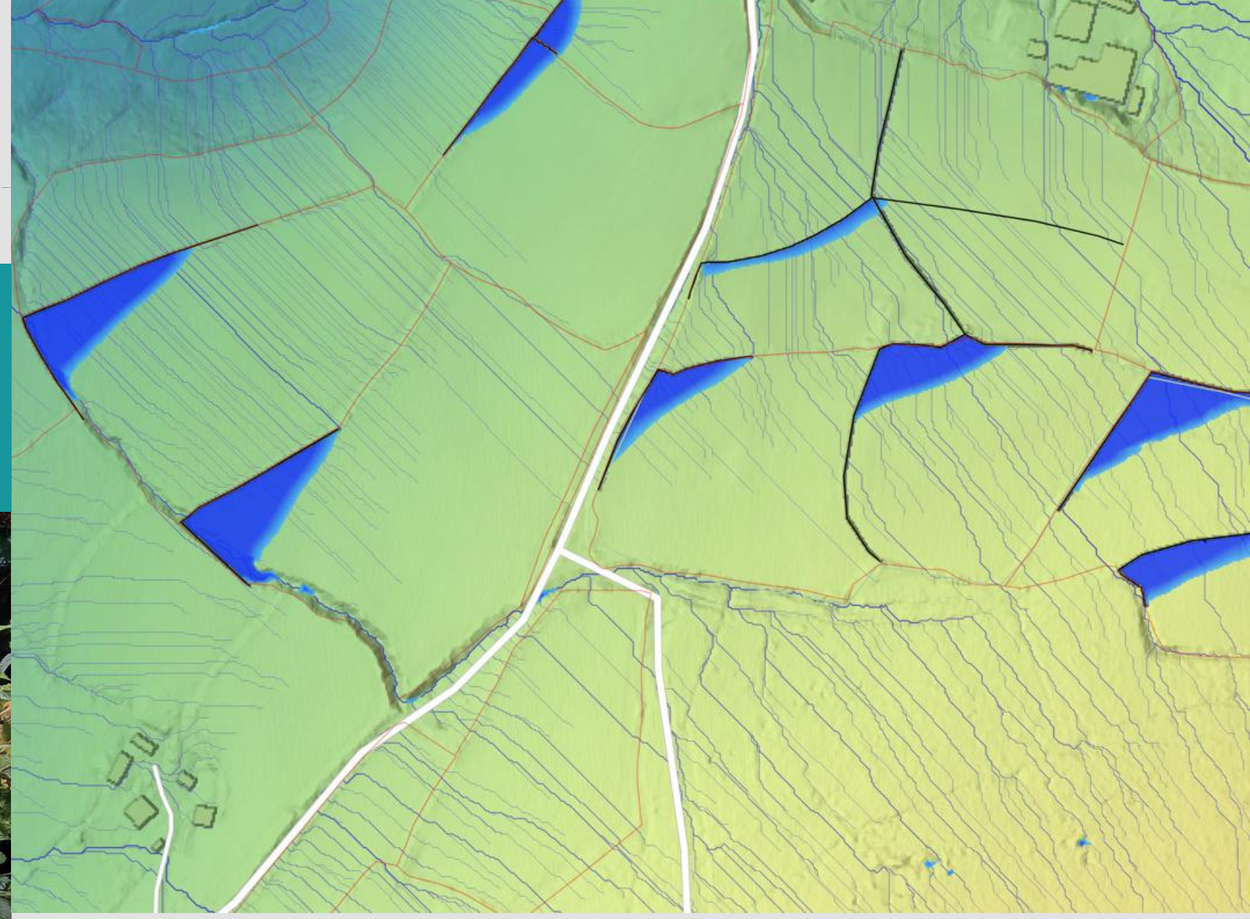
Farms were initially evaluated to identify individual surface flow routes as illustrated (right), where each colour represents a different flow path.



SOUTH WEST NATURAL SOLUTIONS

Modelling applied a single rainfall event of 100 mm and no infiltration, with interventions including restoration of boundaries to optimise water storage (example shown right).

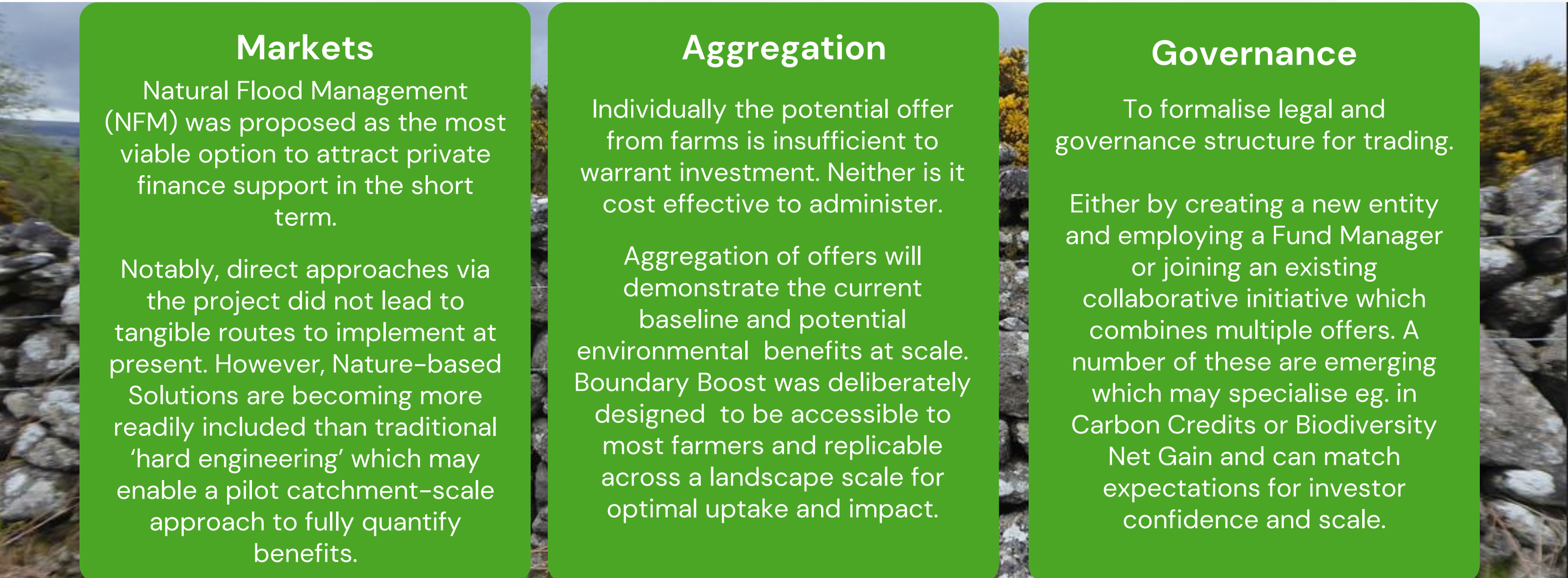
In total all ten farms & one rainfall event modelled potential increased storage and reduced run off combined to a volume of approx. 100,000 m3 (roughly 40 Olympic swimming pools).



Public highways include many unregistered roads and lanes. Originally run off was managed by a combination of offtakes such as ‘buddle holes’ into fields or ‘lengthsmen’ employed by local parishes. These tend to no longer exist but the opportunity to manage run off would reduce accident risk, localised flooding and repair costs from recurring potholes (proposed to Devon County Council).

Consultancy review: Environmental Economist & Social Scientist

From market research, surveys, interviews and analysis, key recommendations were suggested for consideration to enable Boundary Boost to be taken forward as a viable approach, including:



Markets

Natural Flood Management (NFM) was proposed as the most viable option to attract private finance support in the short term.

Notably, direct approaches via the project did not lead to tangible routes to implement at present. However, Nature-based Solutions are becoming more readily included than traditional 'hard engineering' which may enable a pilot catchment-scale approach to fully quantify benefits.

Aggregation

Individually the potential offer from farms is insufficient to warrant investment. Neither is it cost effective to administer.

Aggregation of offers will demonstrate the current baseline and potential environmental benefits at scale. Boundary Boost was deliberately designed to be accessible to most farmers and replicable across a landscape scale for optimal uptake and impact.

Governance

To formalise legal and governance structure for trading.

Either by creating a new entity and employing a Fund Manager or joining an existing collaborative initiative which combines multiple offers. A number of these are emerging which may specialise eg. in Carbon Credits or Biodiversity Net Gain and can match expectations for investor confidence and scale.

Conclusion

Current approach

Research & findings support the proposal that Dartmoor's hedges and boundaries offer environmental benefits but greater detail is required to quantify current and future capacity.

In the short term Boundary Boost has been added to the project pipeline for potential funding via the National Parks Partnerships (NPP). This creates and manages sector-leading partnerships between the UK National Parks family and commercial partners.

NPP works closely with the National Park teams to understand their priorities, utilising the National Park brand to attract private finance to drive nature restoration at scale and support local communities. 'Boundary Boost' is included on NPP's project pipeline for inclusion in proposals to potential partners. More information can be found on the NPP website.

National Parks Partnerships

Long term

The aim to stack a privately funded offer as a premium with a Government scheme remains the long term goal, which could be realised via adapting existing systems to identify and incentivise where multiple actions may be combined for optimal benefit; combining both boundaries and field margins.

Boundary Boost would encourage private finance as the 'top up' revenue over core Government funding, reducing risk, blending across sectors to ensure efficient use and market confidence.

With flexibility to adapt, over time the offer would seek to develop, reflecting wider benefits eg. Carbon sequestration, to increase the 'value' and market uptake.

Legacy outcomes

The project has developed knowledge and connections through a number of exploratory actions and practical trials – these have led to potential future collaborations which are being followed up.

Biophone data

To replicate the Biophone deployment to better understand species presence across a longer time frame.

Hedge Survey App

Working with data providers for the continued development and refinement of the App to improve user experience and data collection.

Defra family

Dialogue to identify how to develop aligned and stacked offers, combined with tools to evidence activity and management.

Contractors

Collaboration to ensure practical management of boundaries includes consultation and input from contractors.

National Parks Partnership

Develop and build on initial offer, raising awareness, communications and evidence, linked to the landscape character.

New Policy

Capitalising on opportunities aligned to the Land Use Framework, LNRS, Farmer Collaboration and local priorities

Upscaling

Boundary Boost was devised due to its widespread relevance to farmers across Dartmoor. Across the Westcountry, similar hedges are a fundamental and practical element of most farms whilst reflecting localised styles and incorporating heritage features.

The ability to bolster this fantastic resource and extensive network would represent a significant contribution towards addressing habitat loss, nature crisis, carbon capture, landscape resilience mitigating impacts of climate change and weather extremes - while supporting farming in a sustainable approach.

The core project approach is also adaptable; the potential exists to expand this regionally and nationally, reflecting different boundary types, their component parts or landscapes.

The Boundary Boost proposal was outlined in a short film by Ecosystems Knowledge Network available via the QR code.

ACKNOWLEDGEMENTS

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Developed and run by Dartmoor Hill Farm Project as part of Dartmoor National Park Authority, the project would not have been possible without the input, time and contribution of the farmers and Steering Group. We also acknowledge the contribution from contractors and partners including:

- Stantec UK
- Natural Apptitude / Coreo
- Wild Connect
- South West Natural Solutions
- National Association of Agricultural Contractors
- Rural Payments Agency
- National Parks Partnerships
- South West Water
- Devon Hedge Group
- UKCEH