

Ecosystem service responses to rewilding: 27 years of rewilding in the Scottish Highlands

Sophus O.S.E. zu Ermgassen, Tom McKenna, Jamie Gordon & Simon Willcock

Tom McKenna

Economist, NatureScot

MSc Ecological Economics, University of Edinburgh

Presentation

- Introduction to Trees for Life, work undertaken in Scotland
- Our project
 - Above ground biomass production (Provisioning service)
 - Aesthetics (Cultural service)
 - Pollination (Regulating service)
- Results
- Implications

Background to Trees for Life

- Large Scale Nature Restoration project
- Sites across Glen Affric and Glen Moriston
- Sites protected by deer fencing



Trees for Life

Method

- Sites were between 0 and 27 years old
- Eight twinned sites between rewilded and moorland



Methodology – Pollination

- Two one hour observation on site
- Video of a false flower laced with honey to attract pollinators



Methodology – above ground biomass

- 12 random locations within each enclosure, and six within each adjacent control, equally stratifying the sample above and below the mean contour line for the site.
- 20x20m plot. In each plot, we identified each
 - ‘trees’ stem over 4cm diameter-at-breast-height to species level and recorded the DBH.
 - ‘saplings’. number and species of stems with height > 50cm and DBH < 4cm
 - ‘seedlings < 50cm tall along a randomly-selected edge of the plot
 - Number of deer pellets along this transect
- Flowering plant species richness and the percentage of different ground-cover types in a 1x1m quadrat in each of the four corners of the plot
- Above ground biomass inferred using Global Allometree database equations where possible

Methodology - Aesthetics

Photograph all sites and controls



Design survey

- Place photos onto 4x4 grid
- Ask participants to rank their 4 favourite and least favourite
- Adjective analysis



Theoretical value

- Internet-based stakeholder sampling approach



Results - Aesthetics

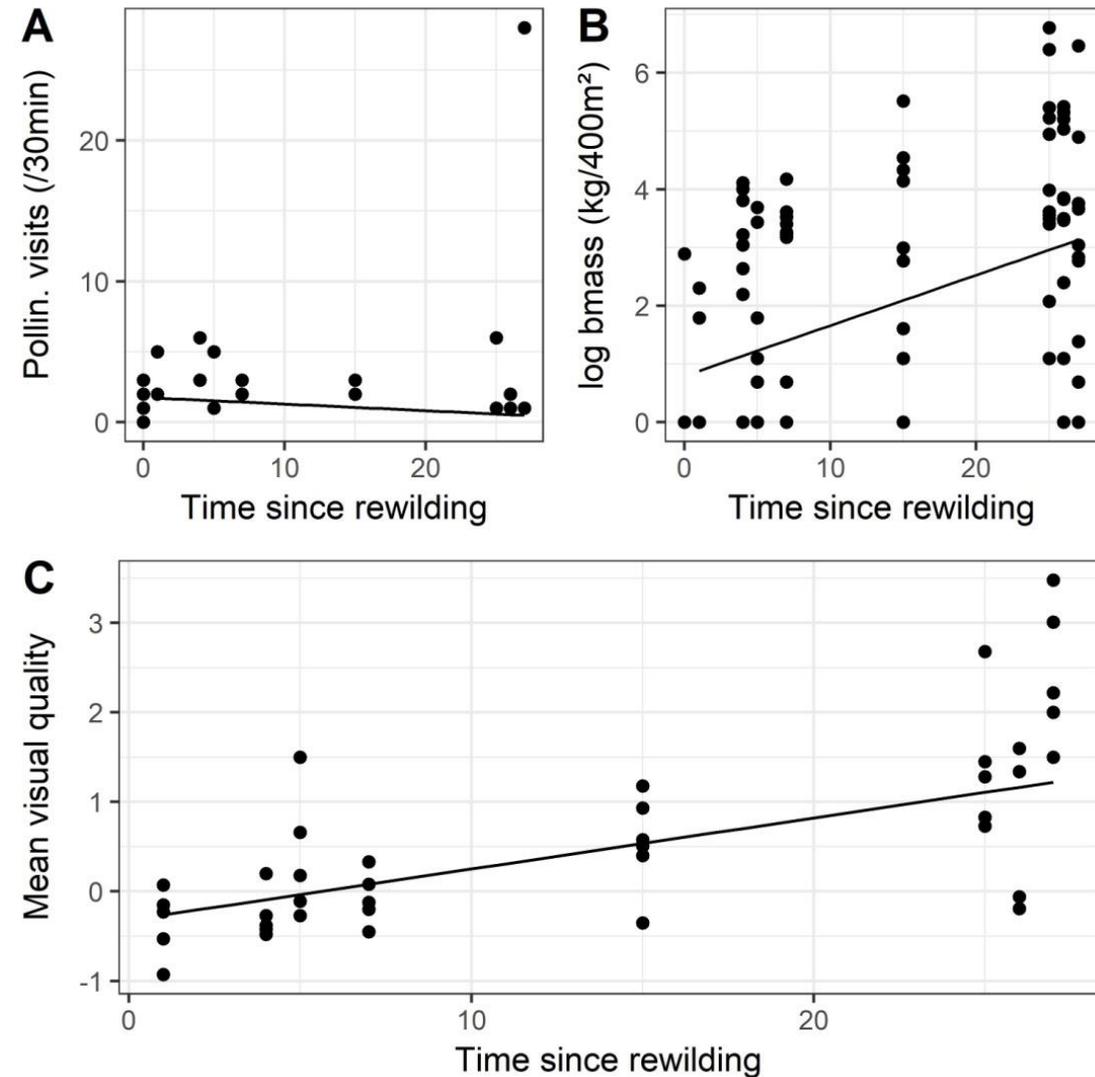
Variable	Categories	Description	Dummy variable Scoring
Water present	No water	No water body visible	0
	River	River visible within picture.	1
	Lake	Lake visible	2
Vegetation land cover	0-25%	Percentage of land covered by vegetation	0
	25-50%		1
	50-75%		2
	75-100%		3
Manmade elements	None	Presence of manmade elements.	0
	One element	One manmade element	1
	Two elements	Two manmade elements	2
Horizon	Almost flat	Also included photographs were the horizon was not obviously visible	0
	Some mountains / hilly	Presence of mountains but not main focus of photo	1
	Mountains dominate scene	Mountains are dominant and the main photo focus	2
Internal colour contrast	Low colour contrast	Colours are generally the same shades and hues	0
	High colour contrast	Colours are striking and contrasting	1
Scale present effect	No	No elements present to give viewer indication of the size of the landscape	0
	Yes	Scale effect present (e.g. houses, roads and pylons)	1
Visibility / weather	Clear	Zero or very minimal cloud cover	0
	Mixed	Clouds present but clear sky present	1
	Overcast/ raining	Thick cloud, long distance visibility impaired	2
	Misty	Some of the landscape is obstructed by low lying clouds	3

Results

Impact on pollinators (A) was unclear

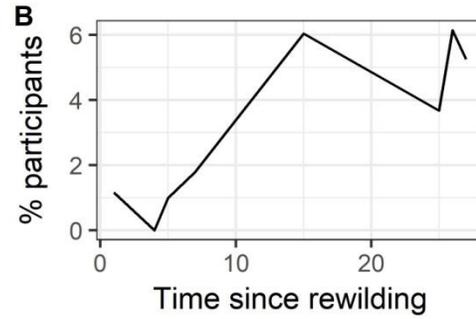
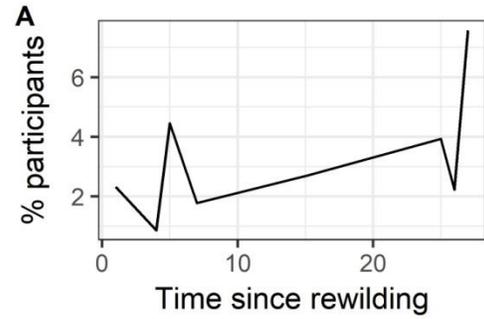
Impact on above ground biomass (B) showed a general increase. Though more data may be needed

Impact is positive on aesthetic preferences (C)

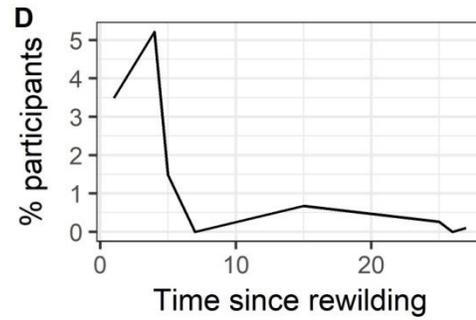
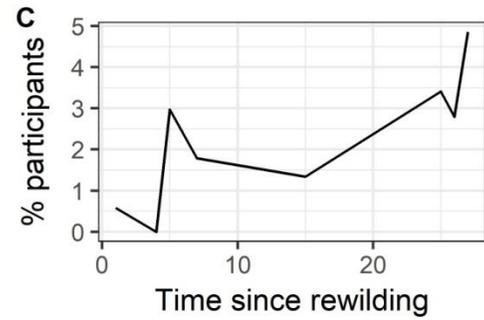


Results

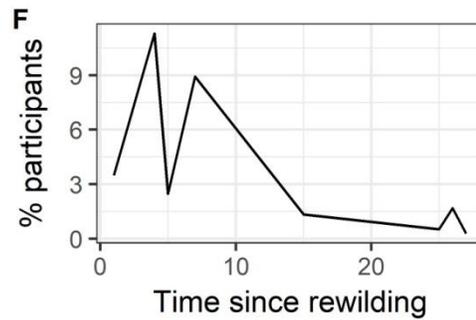
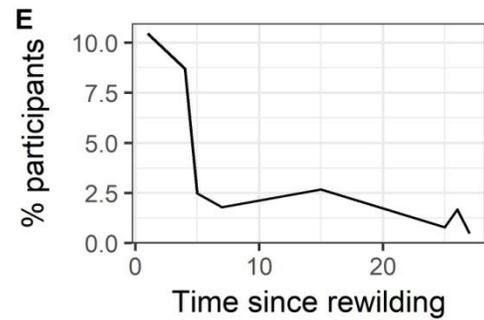
Alive



Wild



Boring



Beautiful

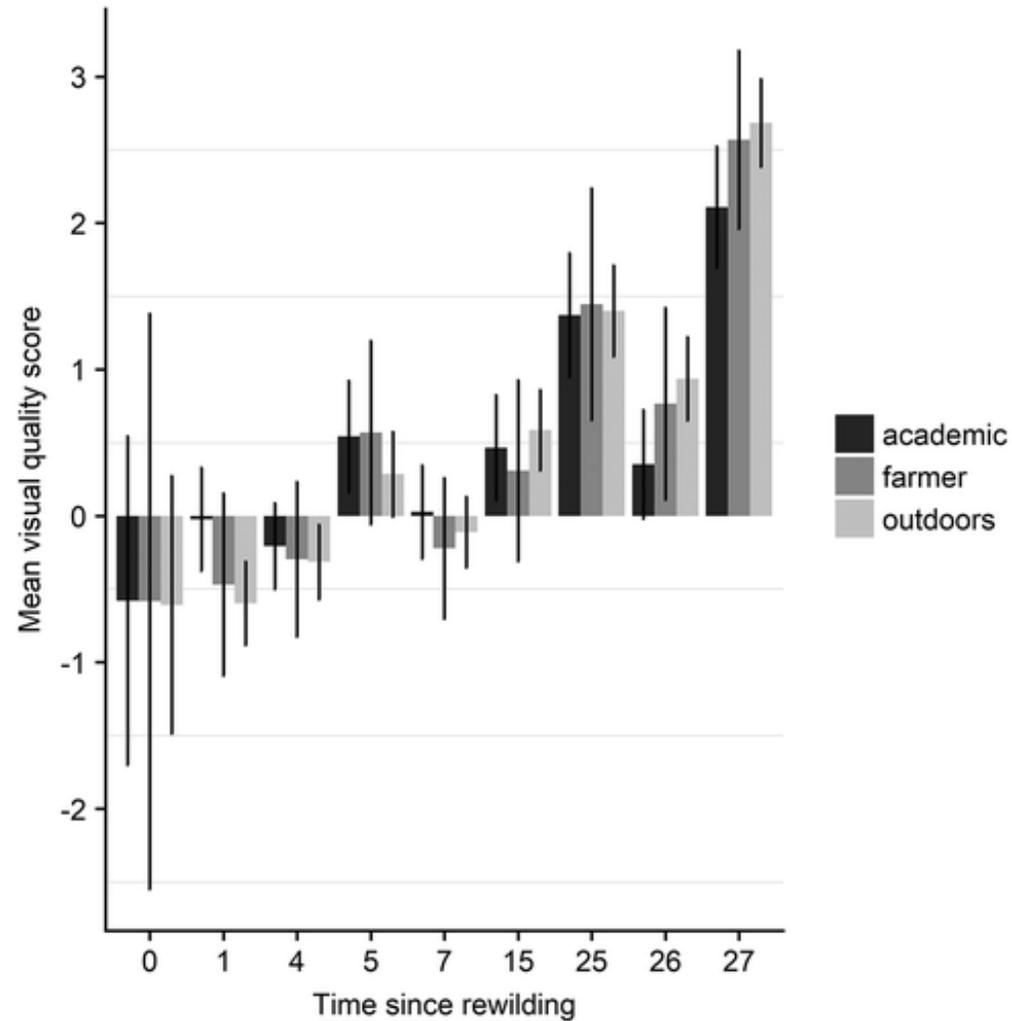


Uninspiring



Bland

Results



Regressor	Estimate	Std. error	t value	p value
(Intercept)	0.81	0.63	1.30	0.20
Time since rewilding	0.06	0.01	7.65	0.00***
Water	0.82	0.15	5.36	0.00***
Vegetation cover	-0.13	0.24	-0.54	0.59
Manmade elements	-0.21	0.33	-0.63	0.53
Horizon	0.32	0.13	2.43	0.02*
Colour contrast	0.33	0.25	1.33	0.19
Scale effect	0.09	0.17	0.52	0.60
Visibility	-0.71	0.18	-3.95	0.00***

Implications of results

If a tree functions in a forest, but no-one is there to benefit from it, does it provide an ecosystem service?

Pollinators

- The results from the pollination study weren't detailed enough to give a clear result
- Pollinators need to be near crops requiring their services to be a service

Above ground biomass

- Above ground biomass increases with time
- Impacts on long term habitat and ecosystem functionality

Implications of results

If a tree functions in a forest, but no-one is there to benefit from it, does it provide an ecosystem service?

Aesthetics

- If rewilded sites are in the “middle of nowhere”, will people benefit from better views?
- Woodland may improve views initially, but in the long run they may obscure views

Balance of ecosystem services

Habitats will never be able to deliver the maximum potential for all services, trade-offs will always be needed.

Implications of results

If a tree functions in a forest, but no-one is there to benefit from it, does it provide an ecosystem service?

General considerations

- Use of results in standardised models (Scotland's NCAI, eco-metric)
- This study looks at 3 of 28 services
- Biodiversity not included in any meaningful way
- 27 years into a 200+ year project

Other large scale nature restoration projects in Scotland

Cairngorms Connect

100 year project in CNP

Natural Capital Laboratory

Run by AECOM, testing multiple ES approaches to rewilded land on the east of Loch Ness.

Thanks for listening

Questions?

tom.mckenna@nature.scot

