

1 Rewilding in the English Uplands: Policy and Practice

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## 29 **Introduction**

30 Rewilding is gaining momentum as a new approach to restore and conserve biodiversity and  
31 ecosystem services, despite being imprecisely defined, controversial, and with limited  
32 explicit empirical supporting evidence (Lorimer *et al.* 2015; Svenning *et al.* 2016; Pettorelli  
33 *et al.* 2018). In a case study region (the English uplands), we discuss what rewilding means to  
34 practitioners and policy makers; the risks, opportunities and barriers to implementation  
35 rewilding is thought to present, and potential paths for policy and practice.

36 Rewilding has had strong uptake in Europe, including the UK (Svenning *et al.* 2016; Sandom  
37 & Wynne-Jones in press). A UK case study is particularly interesting for two reasons. First,  
38 many species have been lost through centuries of increasingly intensive land use and with  
39 little opportunity for natural re-colonisation species translocations are likely required for  
40 successful rewilding. Second, debate around rewilding is particularly intense with the UK's  
41 impending departure from the European Union and associated potential for considerable  
42 change of key policies, such as the Common Agricultural Policy (CAP), and the Habitats and  
43 Birds Directives. Here we highlight perceptions, concerns and possible ways forward for  
44 rewilding in post-Brexit upland England in which the 25-Year Environment Plan (25YEP;  
45 DEFRA 2018a) will frame policy. We also identify general lessons for those considering  
46 applying rewilding in other locations.

## 47 **Rewilding and England's Uplands**

48 Rewilding is increasingly prominent in policy discussions and land management practice in  
49 the UK. It was explicitly identified as a management option in the terms of reference for the  
50 UK Government's inquiry into 'the future of the natural environment after the EU  
51 referendum' (Environmental Audit Committee 2016) and has been the focus of a POSTNote

52 (Wentworth & Alison 2016). The charity Rewilding Britain has identified 13 active examples  
53 of British rewilding projects (Rewilding Britain 2017), although many others exist (Sandom  
54 & Wynne-Jones in press). Rewilding is being considered and pursued as a land management  
55 option by environmental NGOs (John Muir Trust 2015; Woodland Trust 2017) and private  
56 landowners. The environment is a devolved matter in the UK meaning the four national  
57 governments have legislative mandates to adopt their own environmental strategies. Here we  
58 focus on England and consider wider implications in our conclusions.

59 Approximately 12% of England is considered upland, which is reported to provide an  
60 estimated 70% of the country's drinking water, contain 53% (by area) of its Sites of Special  
61 Scientific Interest, 25% of woodland, 29% of its beef cows and 44% of its breeding sheep.  
62 Upland National Parks in England receive c.70 million visits annually (various sources,  
63 summarised in Upland Alliance 2016). The uplands are central to both biodiversity  
64 conservation and society as a whole, and their management has cascading impacts for the  
65 UK. To date, policy and practice in the uplands has primarily focused on food production and  
66 forestry, with secondary goals of supporting biodiversity and providing additional ecosystem  
67 services. Low soil fertility and steep slopes mean most upland farms are considered 'Severely  
68 Disadvantaged Areas' (DEFRA 2018b) and currently receive subsidy payments from the  
69 CAP (Pillar I) that makes up on average 19% (£18,104) of farm revenue in less favoured  
70 areas. A further 12% (£11,172) revenue for these farms comes from CAP agri-environment  
71 schemes (Pillar II) which seek to support conservation on farmland (Harvey & Scott 2016).  
72 The Department for Environment Food and Rural Affairs (DEFRA 2018b) reports that these  
73 uplands areas have the potential to benefit from new environmental land management  
74 schemes that could help 'encourage biodiversity, protect water quality and store carbon'.

75 Exiting the EU and the likely associated changes in subsidy regimes, combined with the UK  
76 government's stated policy of 'public money for public goods', has made discussion about  
77 the future of the uplands urgent. This is already underway with contributions from a wide  
78 range of interested parties including farmers, businesses, government bodies, NGOs and  
79 academics. In this context, rewilding presents one of many options for management of the  
80 uplands and analysis of practitioner perspectives illustrates how the concept of rewilding is  
81 interacting with rural land management in a dynamic political landscape.

## 82 **Presenting practitioner perspectives**

83 The perspectives presented here are the authors own, but also based on direct consultation  
84 with a wider group of practitioners and policy makers. The lead author contacted  
85 practitioners and policy makers, representing a range of conservation NGOs (e.g. Royal  
86 Society for the Protection of Birds, National Trust, Wildlife Trusts), protected area managers  
87 (e.g. Areas of Outstanding Natural Beauty (AONBs), National Parks (NPs)), government and  
88 professional bodies (e.g. National Farmers Union (NFU), Countryside Land and Business  
89 Association (CLA), Natural England, Forest Enterprise England, Confederation of Forest  
90 Industries), and businesses (e.g., Ecosulis, Conservation Capital, United Utilities), who  
91 attended an earlier event organised by the Upland Alliance and further stakeholders identified  
92 during the process, as well as academics active in the field. In total, the lead author contacted  
93 73 individuals and spoke directly to 22. Interviews were semi-structured and aimed at  
94 discussing 1) what rewilding means; 2) what risks and opportunities rewilding presents; and  
95 3) how rewilding could be applied or facilitated if desirable approaches are identified. This  
96 process identified seven active or possible future approaches that practitioners and policy  
97 makers associate with rewilding in England's uplands (Box 1).

98 Following the interviews, an independently-facilitated workshop on ‘Rewilding in the  
99 Uplands’ attended by 32 participants from 24 different organisations took place on May 2<sup>nd</sup>,  
100 2017. Attendees were primarily practitioners from a variety of sectors, including:  
101 Conservation NGOs (6), Business (4), Professional membership organisations (3), BES (3),  
102 Protected areas (3), Government body (1), Upland special interest group (1), Independent (1)  
103 and ten academics from a variety of disciplines (Ecology, Geography, Social science).  
104 Unfortunately, government policy makers due to attend had to withdraw because of ‘purdah’  
105 rules that prevented government employees discussing policy issues preceding the UK’s 2017  
106 snap general election.

107 The lead author assigned workshop participants into five groups. Each group was made up of  
108 a mix of academics and practitioners from different sectors, women and men (1:2.5 ratio),  
109 and a variety of career stages where possible to attain a variety of perspectives. First, each  
110 group considered the risks and opportunities presented by the seven pre-identified approaches  
111 to rewilding (Box 1). The lead author selected thirteen example risk (seven) and opportunity  
112 (six) categories on the themes of biodiversity, and productive, regulatory, and cultural  
113 ecosystem services. Of the 13, ten were paired, i.e. the opportunity and risk were opposites –  
114 for example, increased habitat diversification (opportunity) versus increased habitat  
115 homogenisation (risk; the full list is given in Fig. 1; Sandom *et al.* 2018). Each group was  
116 asked to make a rapid assessment of whether each category should be considered a High,  
117 Medium, Low, Not Applicable, or Unknown risk or opportunity for each rewilding approach.  
118 The groups did not have to reach a consensus and could give a range as a response, for  
119 example Medium-High. Figure 1 and Table 1 report and use the highest opportunity or risk  
120 recorded by each group.

121 The pre-workshop interviews with policy makers and practitioners raised numerous issues  
122 that were reported to be barriers to rewilding. These were categorised into four main groups:  
123 1) Inflexible, Out of date, Inappropriate policy, 2) Uncertainty of environmental outcomes (in  
124 terms of biodiversity and ecosystem service delivery), 3) Stakeholder resistance, and 4) Lack  
125 of clarity, media storms, and unhelpful debate. Each group was asked to discuss how these  
126 pre-identified barriers, or additional barriers identified by the group during the workshop,  
127 prevented implementation of the rewilding approach their group had been assigned, and to  
128 vote on which they thought presented the greatest challenge. Group 1 was an exception; they  
129 considered all three forms of passive rewilding because of the similarity between these  
130 approaches. Finally, the groups discussed and recorded potential solutions to the three  
131 barriers with the most votes for their rewilding approach.

132

### 133 **1. The many faces of rewilding – a blessing and a curse**

134 Based on the pre-workshop structured interviews and workshop discussion it is clear  
135 rewilding means different things to different people. The lack of a single clear definition  
136 frustrates practitioners, policy makers, and academics, and along with the strong association  
137 between rewilding and reintroduction of large carnivores, means that rewilding is perceived  
138 by some as a ‘toxic’ term. However, there is recognition that rewilding encourages  
139 innovation and provides an opportunity to reconsider established land and water management  
140 strategies.

141 In practice, a diverse spectrum of approaches ranging from low-intervention land  
142 management to large predator translocations was identified when discussing what rewilding  
143 means (Box 1). Rewilding projects were often described as projects beginning with an active

144 phase to restore ecological processes to move the ecosystem into a more functional starting  
145 condition, followed by a low-intervention/passive phase, where outcomes are uncertain. The  
146 common thread linking these descriptions is the focus on restoring ecological processes to  
147 create more self-organising and self-sustaining ecosystems. Rewilding is aimed at delivering  
148 positive outcomes for biodiversity and society in general terms, but it typically represents a  
149 move away from species- and habitat-specific targets, allowing nature to determine these  
150 outcomes instead (Sandom & Wynne-Jones in press).

151 It is important to note that there was some disagreement amongst practitioners and academics  
152 about which land management approaches should be considered rewilding. For example,  
153 some participants particularly valued rewilding's bold and ambitious agenda and so excluded  
154 practices similar to conservation management, such as process-based habitat restoration and  
155 naturalistic grazing.

156 Box 1 Starts Title: Approaches to rewilding

157 *Active Rewilding*

158 *Process-based habitat restoration*

159 Process-based habitat restoration seeks to re-instate ecological processes with the aim of  
160 restoring a specific habitat. In some cases projects are already under way to restore certain  
161 upland habitats, most notably peatlands (e.g. Moors for the Future Partnership). This has been  
162 achieved by blocking drains and gullies and re-establishing vegetation communities to restore  
163 hydrological processes. The focus on the restoration of ecological processes is consistent with  
164 rewilding thinking, but the targeted habitat-based outcome means it is an approach more  
165 associated with traditional ecological restoration.



166 *Wild/Naturalistic grazing*

167 Wild or naturalistic grazing is the restoration of large herbivore regimes that are either wild  
168 or seek to mimic wild/natural regimes respectively. It can be employed to restore  
169 grazing/browsing/dunging/trampling as processes to allow ecosystems to respond naturally or  
170 to maintain or improve the ecological condition and value of specific landscapes/habitats.  
171 The former is more consistent with rewilding thinking. As an example, Wild Ennerdale  
172 reports that they introduced herds of Galloway cattle to restore a natural disturbance process.

173 *Individual species translocations/reinforcements, removals or management to restore*  
174 *processes*

175 Several species with the potential to restore degraded ecological processes could be  
176 considered for translocation/reinforcement to the English uplands, including the Eurasian  
177 lynx, pine marten, wild cat, beaver, white-tailed eagle, and osprey. Under this approach,  
178 where and when appropriate, a specific species is introduced to restore ecological processes.  
179 Alternatively, a species might be removed or controlled to restore more natural ecological  
180 interactions. This could include the eradication of an invasive species, or control of a native  
181 one in the absence of its predator. Beaver returning to Britain is an example of a species  
182 translocation to restore process (to dam rivers and slow their flow), while the control of red  
183 deer is an example of species control in the absence of its predator.

184 *Species translocations/reinforcements or removals to restore functional communities*

185 This is the restoration of whole communities of species, particularly functionally important  
186 and severely impoverished communities such as large carnivores and herbivores. This could  
187 be implemented nationally or targeted within a landscape-scale conservation area, such as an  
188 IUCN Category II or IA National Park. This requires large areas and restoration of food-web

189 complexity, it is the most ambitious rewilding approach discussed. As far as we are aware,  
190 this is not currently under serious consideration in England's uplands, but the aspirations of  
191 Trees for Life and the Alladale Wilderness Reserve in Scotland are consistent with this  
192 approach.

### 193 *Passive Rewilding*

#### 194 *Patch-scale*

195 At the simplest end of the rewilding spectrum, landowners leave patches of their land to  
196 nature. Interviewees reported that farmers in the uplands are often aware that some of their  
197 land may be better suited to uses other than agricultural production, such as supporting  
198 wildlife or buffering wetlands.

#### 199 *Landowner-scale*

200 Landowners can also choose to re-purpose all their land and leave it to nature. Some  
201 interviewees reported that this form of rewilding is already taking place in the uplands, with  
202 slow-moving ecosystem change (including natural afforestation) occurring over recent  
203 decades.

#### 204 *Landscape-scale*

205 Landowners and managers can co-operate and agree a lower-intervention strategy over their  
206 combined land. Wild Ennerdale in the Lake District is an example where three large  
207 landowners are co-operating, with support from the state agency Natural England, to take a  
208 wilder approach.

209 Box 1 Ends

## 210 **2. Risks and opportunities – higher risk, higher reward?**

211 Surveying the views of the workshop participants indicated that both the perceived risks and  
212 opportunities of passive rewilding increase with spatial scale (Fig. 1, Table 1). In large  
213 ecosystems that are either largely intact or where the potential for natural re-colonisation is  
214 high, passive rewilding is perceived to allow natural processes to support a diverse,  
215 functional, and ‘service-rich’ ecosystem. However, in more impoverished ecosystems with  
216 low natural re-colonisation potential and currently supported by human management, passive  
217 rewilding may risk further homogenising of the system because of missing ecological  
218 processes.

219 Practitioners perceive the relationships between risk and opportunity to be more complex for  
220 active rewilding (Fig. 1, Table 1). Interestingly, opportunistic species reintroduction was  
221 perceived to be lowest risk for lowest reward, likely reflecting the opportunistic element of  
222 this approach. However, participants reported this to be a difficult approach to assess because  
223 of the breadth of options and outcomes possible. Process-based habitat restoration was  
224 perceived to offer the best risk-to-opportunity ratio, suggesting greater comfort with more  
225 controlled and targeted approaches even when seeking to work with natural processes.

226 Species translocation to restore fully functional communities was perceived to offer the  
227 greatest opportunity for the highest risk. The three approaches that include species  
228 translocations (including wild/naturalistic grazing) were all perceived to risk increased  
229 human-wildlife conflict.

230 Reviewing the literature reveals a similar story; rewilding presents often-contrary perceived  
231 risk and opportunity. For example, rewilding has been promoted as a means to restore and  
232 conserve biodiversity, mitigate flooding, improve water quality, sequester greenhouse gasses  
233 (GHGs), restore and conserve soils, increase tourism, and re-engage society with nature.

234 Conversely there have also been warnings that rewilding might threaten biodiversity  
235 (particularly rare species), reduce the economic viability of agricultural production, emit  
236 GHGs, increase flood risk, threaten cultural landscapes, and increase human-wildlife conflict  
237 (Sandom *et al.* 2016).

238

239 It is important to emphasise that participants at the workshop compared best- and worst-case  
240 scenarios when considering risks and opportunities of the different approaches to rewilding.  
241 Landowners and managers, in consultation with all stakeholders, need to decide whether a  
242 rewilding approach is likely to deliver a net benefit or cost in their specific circumstances.  
243 This should include careful consideration of implementation strategies that monitor  
244 developments so timely interventions can prevent unacceptable outcomes, if needed.

### 245 **3. Barriers to rewilding – a complex web of factors**

246 The workshop highlighted that resistance from landowners/occupiers is a major barrier to  
247 implementing rewilding. However, landowner resistance reflects a variety of cultural,  
248 economic and practical factors. Culturally, there is often a strong connection to production in  
249 the uplands. Landowners or managers typically do not want to lose the utility of the land, and  
250 want to leave a farming-based land use as a legacy to their children and grand-children. Some  
251 species reintroductions conflict with tradition, culture, and neighbour relationships in the  
252 uplands, and may represent an economic threat to game and livestock rearing. A perceived  
253 focus on large carnivores has been effective at bringing the rewilding agenda to the fore but,  
254 as a controversial form of rewilding, has also polarized opinion and drawn opposition to the  
255 term rewilding more generally.

256 Economic barriers to rewilding include subsidy policy, which is generally focused on  
257 supporting production and associated activities. For example, CAP payments support  
258 production and environmental protection only on productive land. Ponds, dense vegetation  
259 and trees - all possible outcomes of rewilding - are classified as temporary or permanent  
260 ineligible features and may make land they cover ineligible for CAP-based 'Pillar I' subsidy  
261 payments that are tied to the area of farmable land. While 'Pillar II' CAP payments are  
262 largely environmentally focused, and have scope to support actions to help alleviate flooding,  
263 improve water quality, and restore wildlife habitats (GOV.UK 2017), they maintain the *status*  
264 *quo* of a productive landscape rather than facilitating process-driven rewilding. These  
265 schemes also cover too short a time period (~5-10 years) to be applicable or effective in  
266 allowing many positive impacts of rewilding to manifest. Schemes covering 20 years or  
267 more, with on-going monitoring and review, are needed for rewilding to deliver key public  
268 goods and services, for example, woodland establishment and blanket bog recovery.

269 Other policies also create barriers to land-use change. Inheritance tax relief allows for land  
270 and property occupied for agricultural purposes to be passed to the next generation free of  
271 tax; this does not apply to buildings and land used for conservation. More indirectly, while  
272 rewilding has been associated with non-productive revenue streams, such as tourism and  
273 payments for ecosystem services (PES), these may not be attainable by all landowners or  
274 tenants. For example, tourism requires suitable local infrastructure and skill sets, and PES  
275 requires national or local schemes to be in operation.

276 Conservation policy also presents institutional barriers to rewilding, particularly the need to  
277 maintain the UK's 77 Habitats Directive Annex I Habitats in 'favourable condition' (JNCC  
278 2014). Under this directive, a habitat's range, area, specific structures and compositions, and  
279 future prospects are considered in comparison to its status in 1994, when the Habitats

280 Directive came into effect. This fixed-date baseline is ecologically arbitrary and promotes a  
281 static and preservation-focused form of conservation. This ‘compositionalist’ approach  
282 (Gillson, Ladle & Araújo 2011; Jepson & Schepers 2016) constrains rewilding’s process-led  
283 philosophy, which allows gains and losses of specific species and vegetation communities as  
284 dictated by the naturally varying interactions between plants, animals, and their environment.  
285 These issues also apply to listed species; their range, population, habitat availability, and  
286 future prospects must be favourable and so preserved according to the 1994 baseline. The  
287 Habitats and Birds Directives have done much for biodiversity conservation and discussing  
288 change is not without risk, but Brexit has begun this discussion and review and improvement  
289 of this legislation is also likely to be necessary to halt the decline in biodiversity.

290 Other practical barriers include the need for large areas to apply more ambitious forms of  
291 rewilding. Landscape-scale projects almost certainly require collaboration and long-term  
292 commitments among individual landowners. Specific examples, such as Wild Ennerdale,  
293 suggest cooperation is possible in some circumstances and for some forms of rewilding.  
294 However, while ambitious approaches might appeal to early adopters, with current barriers, it  
295 is highly likely at least some neighbouring landowners would not support rewilding on their  
296 land.

297 The collective barriers to rewilding are an interdependent set of practical, social, and  
298 institutional obstacles greater than the sum of each obstacle alone and capable of limiting  
299 innovation in conservation and land management. The complexity associated with rewilding  
300 is not a surprise. However, we emphasise the importance of viewing barriers to potential  
301 rewilding holistically and, critically, not simply attributing blame to specific stakeholder  
302 groups. We recognise a large number of interlinked barriers, and if rewilding approaches are

303 to be successful, changes will need to be effected across a number of different areas in  
304 various ways.

#### 305 **4. Potential future approaches – practical suggestions for flexibility and diversity**

306 *Innovation fund:* An innovation fund would be a mechanism to support innovative and  
307 diverse projects, including but not restricted to rewilding. Such a fund could take on a similar  
308 structure to the Nature Improvement Area fund and the current Countryside Stewardship  
309 Facilitation fund, and be part of the proposed Nature Recovery Network in the 25YEP. Both  
310 funds encourage a bottom-up, land manager-driven approach to designing and developing  
311 projects tailored to local needs and situations.

312 *Conservation property relief:* Introducing Conservation Property Relief to match Agricultural  
313 Property Relief for inheritance tax would remove a key barrier, providing opportunities to  
314 improve biodiversity conservation and the delivery of diverse ecosystem services.

315 *Results-based payments:* There is interest in moving indicators for agri-environmental  
316 payments (i.e. CAP Pillar II payments) from actions towards results (25YEP). Results-based  
317 payments are being trialled by Natural England with farmers in the Yorkshire Dales where  
318 farmers are being paid for success in producing species-rich meadows and/or good quality  
319 wetland habitat (Natural England 2017). The Dartmoor Farming Futures initiative has also  
320 reported positive results of giving farmers greater ownership when developing strategies to  
321 achieve mutually agreed agri-environment goals (Manning 2017). Although potentially  
322 riskier for landowners/managers, with less certainty of income, this approach gives  
323 landowners/managers greater autonomy to determine how to achieve mutually-agreed goals.  
324 A key point of discussion would be agreeing whether broad enough goals (i.e. positive

325 outcomes for biodiversity and the delivery of ecosystem services rather than specific habitat  
326 or species targets) could be set to allow a rewilding approach.

327 *Payments for ecosystem services:* The CAP is arguably a payment for ecosystem services  
328 scheme, but one that supports food production and farmland biodiversity. An alternative  
329 approach would be to incentivise a wider range of environmental goods and services, and  
330 may be consistent with the Government's increased focus on 'public money for public goods'  
331 (DEFRA 2018b). This could still include food production, but also flood alleviation, water  
332 purification, GHG sequestration, and environmental health and leisure resources more  
333 directly (Gawith & Hodge 2017). Any such approach would require analysis of what is  
334 valued in a particular landscape or region, and therefore what land managers should be paid  
335 to deliver, something already being considered under the Countryside Stewardship scheme.  
336 The mechanism for linking what landowners should deliver to the desired public benefits for  
337 a region is challenging. However, this could build on the work already done by the Natural  
338 Capital Committee, which proposes linking specific land uses with ecosystem service  
339 delivery (Natural Capital Committee 2014). Thus, a locally-active body (e.g. County Council,  
340 Environment Agency) could determine the value of landowners delivering grassland,  
341 woodland, or wetlands in their region and reward landowners accordingly. The regionally-  
342 targeted Landscape Character Assessments (DEFRA 2014) may provide some of the  
343 information needed to understand regional needs, as well as the cultural and natural heritage  
344 of the region that would need to be taken into account.

345 *Longer-term funding:* Long-term funding for any scheme would be needed to allow rewilding  
346 projects to develop toward the delivery of biodiversity and ecosystem service benefits. One  
347 suggestion is for 'conservation covenants' operating on at least a 20-year timescale, and  
348 preferably longer, with monitoring, payments in instalments, and appropriate break clauses.



349 *Standardised monitoring of biodiversity and ecosystem services outcomes:* Monitoring can be  
350 time-consuming and expensive, potentially making it unviable. However, to demonstrate the  
351 public is receiving goods and services for public money invested, rigorous monitoring is  
352 important. A standardised, efficient and effective protocol to monitor biodiversity and  
353 ecosystem service outcomes is needed. As discussed above, this would need to correspond to  
354 specific land-uses and their respective quality, quantity, and connectedness (Lawton *et al.*  
355 2010; Natural Capital Committee 2014). Using citizen science approaches (e.g. Manning  
356 2017) and advances in remote sensing technology, including satellite monitoring (Pettorelli *et*  
357 *al.* 2017) and drones (Barbosa, Atkinson & Dearing 2015) may help achieve this.

358 *Outdoor laboratories:* The need for experimentation and innovation is limited by multiple  
359 designations of sites. For example, National Nature Reserves (NNRs) have a mandated role  
360 as outdoor laboratories, and could be used to test the effectiveness of different approaches to  
361 conservation. However, nearly all NNRs are also SSSIs, which are mandated to maintain  
362 favourable condition of listed habitats and species limiting the scope for experimentation.  
363 NNR policy is being reviewed which could help determine how their role as outdoor  
364 laboratories could be better realised while maintaining favourable condition of key species  
365 and habitats. This could include linking clusters of NNRs to create larger conservation areas  
366 where rewilding is encouraged for interlinking land and water, or establishing new  
367 experimental rewilding zones as part of the proposed Nature Recovery Network (25YEP).

## 368 **5. Conclusions**

369 We have discussed seven rewilding approaches identified by academics, practitioners and  
370 policy makers to explore and clarify the range of rewilding-related ideas being considered in  
371 practice in England's uplands. However, we note that they are not all mutually exclusive and  
372 can be combined, they fall along a spectrum of rewilding ambition, and that these approaches

373 represent a managed withdrawal of direct human management of nature, either directly  
374 (passive) or after some remedial action (active).

375 This withdrawal is arguably the common theme that connects rewilding's otherwise varied  
376 meanings (Pettorelli *et al.* 2018) and presents the greatest barrier to implementing rewilding  
377 more widely because of how it interacts with policy and culture. Policy, such as the CAP and  
378 the Birds and Habitats Directives, is process driven and directed at supporting, encouraging,  
379 and enforcing the implementation of management to deliver specific ecosystem service,  
380 species, or habitat targets and thus creates legislative and economic barriers to rewilding  
381 approaches. Landowners' and managers' strong cultural connection to production, traditional  
382 land uses and landscapes they and their forebears have crafted also presents barriers to  
383 implementing rewilding because of resistance to reducing human influence on nature. Yet,  
384 these barriers are not universal. Land owners/managers can forego production, target their  
385 efforts on undesignated land, work with officials to get special dispensation to take a  
386 rewilding approach, and embrace a new culture where nature has a stronger role. This  
387 explains the rewilding that has taken place already. The degree and direction of change to  
388 policy, incentives and culture in the future will determine the degree to which approaches to  
389 land management associated with rewilding are embraced in England's uplands.

390 The risks, opportunities, barriers, and solutions discussed here have relevance to other  
391 regions of the world where society has largely tamed nature, has strong policy and cultural  
392 connections to productive or other traditional land uses, and has nature conservation policy  
393 focused on management of rare habitats and species that remain. The history and policy  
394 shared between England, the UK, and the EU mean this discussion is particularly relevant in  
395 Europe, albeit with some caveats. For example, in mainland Europe, agricultural land  
396 abandonment and higher natural recolonization potential, as seen with the natural expansion

397 of large predators and herbivores (Deinet *et al.* 2013), mean landscape-scale passive  
398 rewilding is likely more achievable and possibly more beneficial here compared to most  
399 British landscapes. In contrast, other isolated and particularly disturbed ecosystems, such as  
400 Australia where invasive species and severe megafauna extinction are particular issues,  
401 practitioners are likely to need to focus on more active rewilding approaches (Rewilding  
402 Australia 2018).

403 While the human cultural, policy, and economic barriers to implementing rewilding are likely  
404 to share some common themes over much of the tamed world, diverse environments,  
405 histories and specific cultures mean approaches to implementing rewilding will vary  
406 regionally, nationally, and internationally. To allow rewilding opportunities to be realised  
407 more broadly while minimising risks, policy frameworks within which rewilding operates  
408 must be sufficiently flexible and the practitioner's toolbox diverse to overcome varied and  
409 interlinked challenges.

410

#### 411 **Authors' Contributions**

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417 (United Utilities), Christopher Price (CLA), Jonathan Spencer (Forest Enterprise England),  
418 Pat Thompson (RSPB), Rob Yorke (Independent commentator) and all other anonymous

419 interviewees and participants of the Rewilding in the Uplands workshop for sharing their  
420 views.

#### 421 **Data accessibility**

422 Data available from the Dryad Digital Repository doi:10.5061/dryad.d460505

#### 423 **Biosketch**

424 **Chris Sandom** is a Lecturer at the University of Sussex and Co-Director of Wild Business  
425 Ltd with a particular interest in rewilding and predator-herbivore-vegetation interactions.

426 **Benedict Dempsey** is a PhD student at the Science Policy Research Unit at the University of  
427 Sussex, currently researching the issue of human control of nature in ecology and  
428 conservation, and with additional interests in international development and humanitarianism.

429 **David Bullock** is Head of Species & Habitat Conservation at National Trust and Chair of  
430 Vincent Wildlife Trust, with especial interests in wildlife management and reversing declines  
431 in biodiversity. **Adrian Ely** is Senior Lecturer at SPRU-Science Policy Research Unit at the

432 University of Sussex, where (amongst other things) he researches the regulation and  
433 governance of agricultural innovation. **Paul Jepson** is Course Director of Oxford

434 University's MSc/Phil in Biodiversity, Conservation and Management and Senior Research  
435 Fellow at the Smith School of Enterprise and the Environment. He has a long standing and  
436 active interest in rewilding and is a member of the supervisory board of Rewilding Europe.

437 **Stefan Jimenez Wisler** is a Land Use Policy Adviser at the CLA and interested in bringing  
438 ambitious environmental ideas into practice. **Adrian Newton** is a conservation ecologist at  
439 Bournemouth University, UK, with a particular interest in forest ecosystems. **Nathalie**

440 **Pettorelli** is a Senior Research Fellow at the Zoological Society of London, a charity

441 concerned with the worldwide conservation of animals and their habitats. **Rebecca Senior** is  
442 a PhD student at the University of Sheffield and completed a secondment with the charity

443 Rewilding Britain in 2016, investigating the potential for rewilding at different spatial  
444 scales within the UK.

445 Table 1: Total opportunity and risk scores for each approach to rewilding across six potential  
446 opportunities and seven potential risks of rewilding (as given in Fig. 1) as scored by groups  
447 of conservation and land management practitioners and academics at the Rewilding in the  
448 Uplands workshop. Scoring was across a four point scale, 0 = none to 3 = high. The groups  
449 could give a range of scores during the workshop, e.g. medium to high, totals represent  
450 summing maximum risk or opportunity scores.

451

452 Fig 1: Bar graphs of the highest perceived risks and opportunities presented by different  
453 approaches to rewilding to biodiversity and example ecosystem services according to groups  
454 of conservation and land management practitioners and academics at the Rewilding in  
455 England's Uplands workshop. 0 = none, 1 = low, 2 = medium, 3 = high, risk or opportunity.  
456 Bars are mean +/- 1 SE. n = the number of groups that responded. u = the number of groups  
457 that indicated the risk or opportunity was unknown. When n and u do not equal five it  
458 indicates some groups did not assign a score.

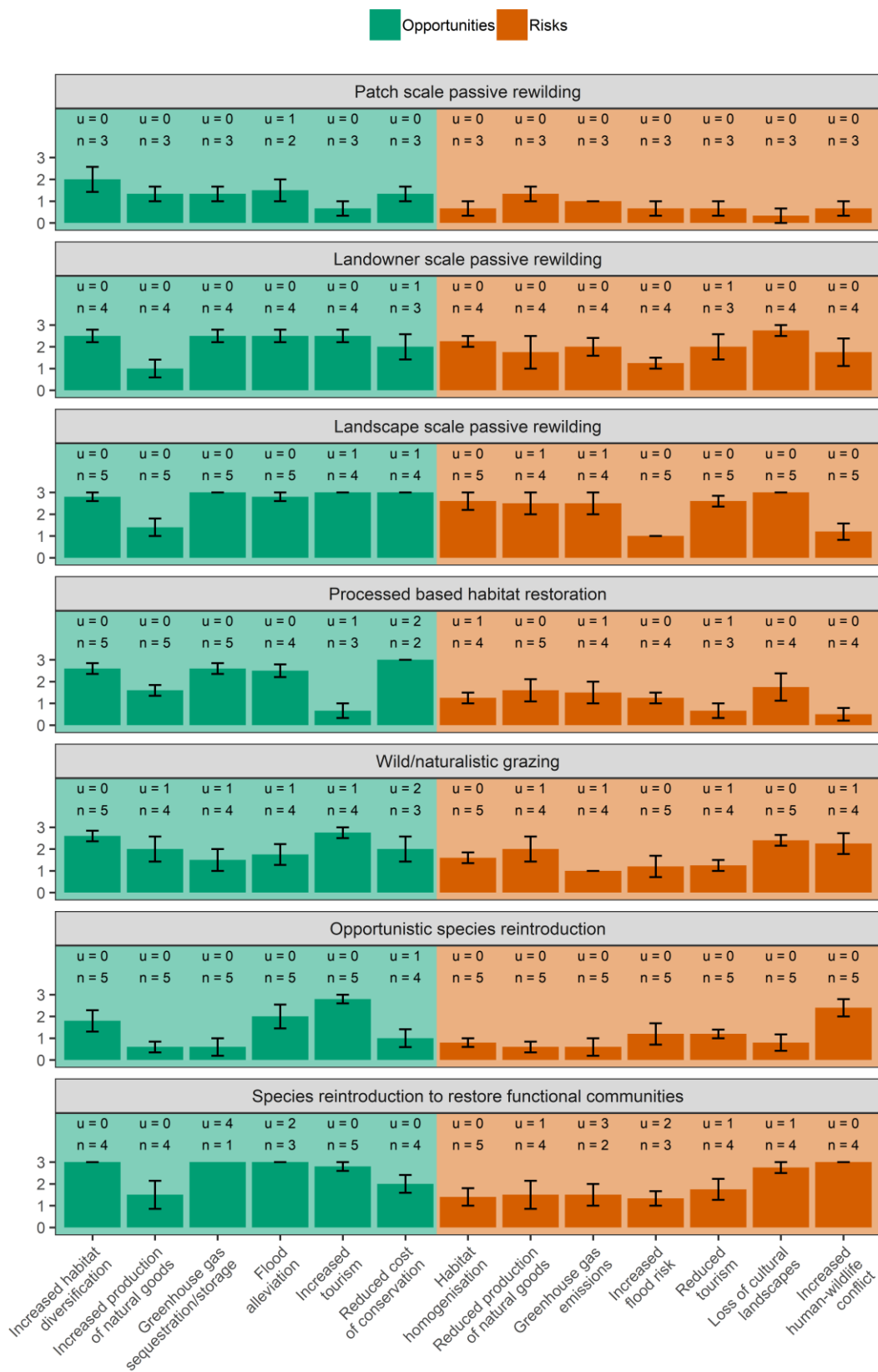
459

460

461 Table 1

<b>Rewilding Approach</b>	<b>Opportunity</b>	<b>Risk</b>
Patch scale passive rewilding	8.2	5.3
Landowner scale passive rewilding	13.0	13.8
Landscape scale passive rewilding	16.0	15.4
Processed based habitat restoration	13.0	8.5
Wild/Naturalistic Grazing	12.6	11.7
Opportunistic species reintroduction	8.8	7.6
Species reintroduction to restore functional communities	15.3	13.2

462 Figure 1





464

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