SEFARI Gateway Funded Programme - Fellowship

Connecting research and management needs for the Cairngorms National Park

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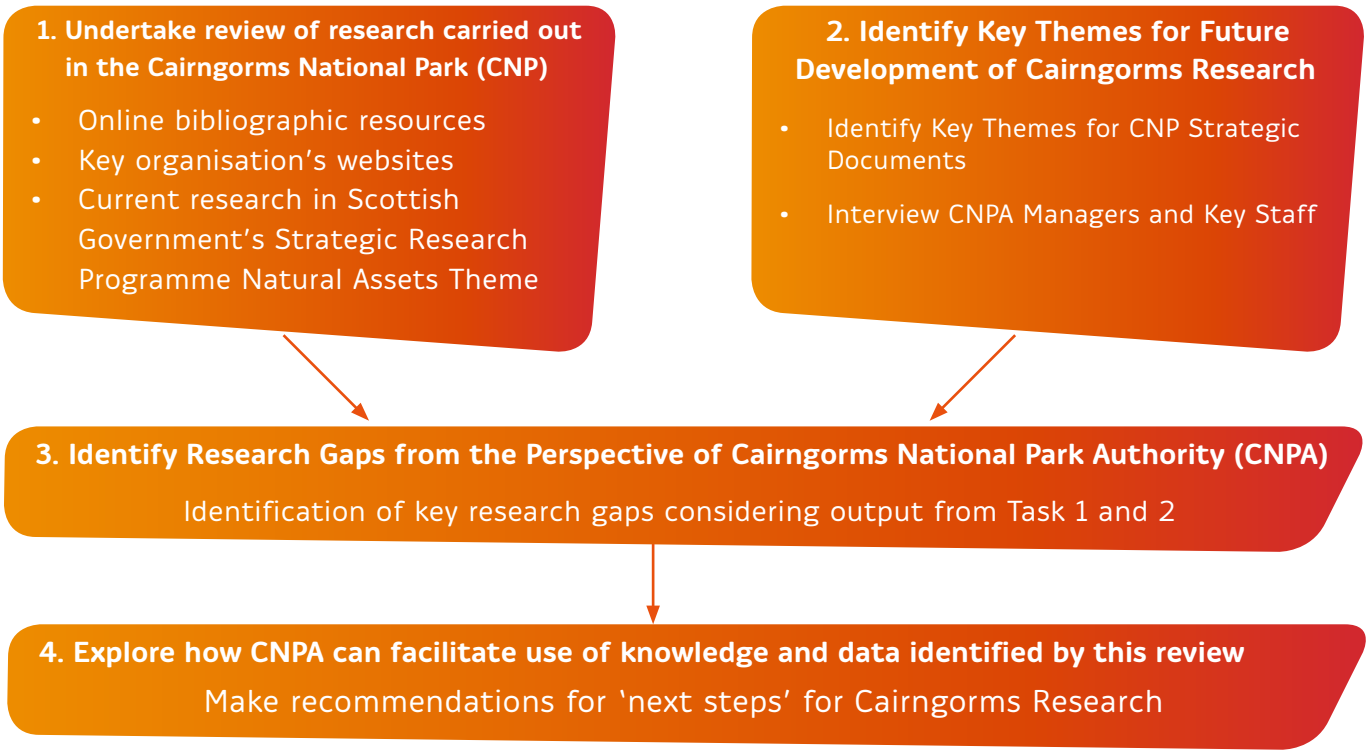
Summary

SEFARI, the Scottish Environment, Food and Agriculture Research Institutes, is responsible, with Higher Education Institute partners, for delivering the Scottish Government funded Strategic Research Portfolio on environment, food, agriculture, land and communities. The Portfolio includes the Strategic Research Programme 2016-2021 (SRP), policy-facing Centres of Expertise and underpinning capacity for strategically important projects. SEFARI Gateway exists to improve the flow of research, knowledge and expertise to and from the Portfolio to policy, business and public audiences – and to improve the impacts of those activities.

SEFARI Gateway worked with "Cairngorms Research" (the short-hand name for the Cairngorms Long-Term Socio-Ecological Research Platform (LTSER)) to develop a specific Fellowship opportunity to undertake a review of published research carried out in the area of the Cairngorms National Park, identify themes for future development of a Cairngorms Research database, identify major research gaps from the perspective of CNPA, and explore how to improve the use of knowledge and data created. The Cairngorms LTSER platform is connected to the international LTSER research community via the network of long-term ecological research sites of the UK Environmental Change Network (ECN), giving excellent pathways for wider collaboration and research information sharing. Cairngorms Research promotes research, often across disciplines, that addresses management needs in the Park, with the following three primary aims: (1) encourage connections between researchers and those working to manage land and/or resources within the Park; (2) inform research priorities and share the results of research; and (3) make the most of the opportunities presented by the Park to contribute to wider research agendas.

Note – the abbreviations CNP/the Park and CNPA have been used throughout the report for brevity, meaning Cairngorms National Park and Cairngorms National Park Authority, respectively.

The SEFARI Fellowship was awarded to Alison Hester, covering 19 days of her time during spring 2019. In addition, SRUC funded 5 days of Marcus Craigie's time to contribute to this work with Alison's guidance as detailed below. The work was divided into four main tasks, as illustrated below:



1.1 Approach taken for each task and key points to note

Task 1: Undertake a review of published research carried out in the CNP.

This included both peer-reviewed publications and other literature published online arising from research carried out in the CNP. It involved keyword searches of: (a) online bibliographic resources; and: (b) key organisations' websites. Full details of search methodology and organisational websites searched are given in Appendices 1.a, and 1.c, respectively. By detailing a step-by-step protocol for both the online bibliographic search and the key organisation website search, the same searches can be repeated by anyone else in future, e.g. at regular intervals (as suits CNPA requirements) to update the publications database. All references found are listed in Appendices 1.b and 1.d, respectively, and are also held in reference databases. Marcus Craigie (SRUC) took the task of searching key organisational websites for relevant online (i.e. available to download online) reports and other 'grey literature' relating to work done in the CNP, using a similar methodology to that which I used for the published papers, and creating a reference database of online 'grey literature'.

The keyword searches specifically focused on research carried out in the CNP - the resulting reference lists from the two searches give a useful flavour of CNP-located research published to date and help to identify areas that to date seem to have been less studied than others within the CNP. This can be used to help direct students for future projects, along with the assessment of research priorities for CNPA (see below). But it is important to note that successful inclusion of any published work from keyword searches like this is completely dependent on: (a) authors having used the search terms in title, abstract or keywords; and: (b) the search efficiency of Web of Science and Scopus, and/or the individual organisational website search engine capabilities. So inevitably there will be papers and reports that have not been picked up and could not be without a much more time-intensive, exhaustive search than can be done within a short Fellowship such as this.

Task 2. Identify key themes for future development of a Cairngorms Research database.

This was addressed through two complementary approaches. The first was to identify key themes of importance to CNPA from primary CNP strategic documents (listed in Appendix 2). The second complementary approach was to request and undertake individual interviews with all CNPA managers plus additional staff in key roles, as selected by Grant Moir (CEO) and Pete Mayhew (Director of Conservation and Visitor Experience). I asked each person the same questions (listed in Appendix 3) and their answers were used to augment or refine the list of themes of importance put together from the CNP strategic documents. Staff were also asked directly about how they would value/use a CNPA research database, to inform my recommendations relating to future research database requirements.

Task 3. Identification of research gaps from the perspective of CNPA.

Identification of key research gaps utilised the information drawn from the individual interviews with CNPA staff, contextualised through the strategic priorities and targets extracted from the various CNP strategic documents. This represents an important pointer for future work as per the needs of the Park, in particular for identifying major barriers to progress and ways to address them; as well as identifying specific topics that would benefit from focused-reviews where a strong need has been identified for a better understanding of the best research knowledge to support and inform specific actions within the Park.

Task 4. Explore how CNPA can facilitate use of knowledge and data identified by this review.

All of the above were used to explore how CNPA can facilitate use of knowledge and data, and to make recommendations for a way forward.

1.2 Keyword search of relevant research in the Scottish Government's Strategic Research Programme 2016-21

In addition to the four main tasks of the Fellowship outlined above, I added this additional task: to carry out a key-word search of ongoing research in the Scottish Government's Strategic Research Programme (SRP) 2016-2021 Natural Assets Theme. This provides useful information for CNPA staff about relevant research that is ongoing but not yet published, thereby increasing the connectivity between the CNPA and the SRP, in support of a key ethos of the SEFARI Gateway. This also supports the 4th bulleted aim on page 80 of the CNP Partnership Plan 2017-22: "supporting delivery of the Scottish Government's Strategic Research Programme".

The keyword search used the words "Cairngorm*" and "CNP*" to pick up all work referring to this location and/or the CNPA (sometimes they were listed as members of a steering group for work that otherwise did not mention the Cairngorms, so this has been included as we assume the work is of relevance if the CNPA were asked to be represented). The search results were then edited heavily to produce a short summary table outlining relevant research in this Theme and associated key contacts (Appendix 4). If this information collation is of value to CNPA, a similar search of ongoing research in the other two Themes (Productive and Sustainable Land Management and Rural Economies; Food, Health and Wellbeing) could be requested via the RESAS research management office.

2. Identifying key themes for future development of a Cairngorms Research database

Identification of key themes of relevance to a potential Cairngorms Research database could simply follow the official priority themes identified in the different CNP Corporate Plan and other strategy documents relating to the Park, but to me it is of equal importance to consider in-tandem the translation of these priorities into the work of individuals within the CNPA. The first section summarises key themes of importance to CNPA from primary CNP strategic documents, as detailed in Appendix 2. The second section summarises the main themes identified during the one-to-one interviews that I held with all CNPA managers plus additional staff in key roles, as selected by Grant Moir and Pete Mayhew. Each were asked the same questions (listed below and in Appendix 3) and their answers were used to augment the formal list of themes of importance put together from the CNP strategic documents. Staff were also asked directly about how they would value/use a CNPA research database, to inform my recommendations relating to future research database requirements – this is summarised in the third section.

2.1 Key themes identified from CNP strategic documents

> The over-riding aim for Scotland's National Parks is "to conserve and enhance the natural and cultural heritage of the area" and this takes precedent over all other aims.
>
> [CNP Partnership Plan 2017-22 page 10]

This section summarises the primary priority themes described in the main strategic documents for the CNP, full details of which are given in Appendix 2. The Corporate Plan 2018-22 sets the high-level strategic context for the CNP, summarising in short form its main ambitions and priorities, and the delivery of the Cairngorms National Park Partnership Plan. The CNP Partnership Plan 2017-2022 sets out the vision and overarching strategy for managing the Cairngorms National Park. Cross-referencing from this to other documents is clear and well signposted. Within the Partnership Plan, nine priorities have been identified, with an Agenda for Action and clearly-defined policies providing a framework for delivering the priorities and actions. Additional documents address the specific needs of each priority area listed in this Plan (e.g. capercaillie framework, flood risk management strategies, etc).

Priority 1 is 'supporting landscape-scale collaboration', and this spirit of collaboration within and across the Park flows through all the documents that were checked, stressing, for example, the importance of working together; community empowerment; sustainable economic growth; integrated land use planning accommodating different needs from the land; reversing the loss of biodiversity; exemplifying the connections between nature and economy (stressing the importance of natural capital underpinning tourism and land-based businesses); and connecting research with management needs. Climate change mitigation and adaptation feature prominently in descriptions of what several of the priorities are aiming to address.

Priorities 2 and 3, deer and moorland management, focus in on specific land use activities and they sit in a group with other key topics not listed in the nine priorities but given high importance elsewhere in this and other strategic documents, namely woodland management/expansion and peatland restoration. Woodland management/expansion within the Park has its own CNP Forest Strategy 2018 which provides strategic direction on future forest management and the restoration of woodlands in the Park, in line with the Partnership Plan aims. The Plan explicitly seeks to integrate plans for both natural and productive forests and woodlands, thus enhancing nature as well as supporting community involvement, employment and economic returns. All peatland restoration work in the Park is funded by "Peatland Action", a peatland restoration programme led by SNH with a remit to restore this damaged habitat across Scotland.

At individual species level, targeted action plans reflect Scotland's Biodiversity Strategy priorities (as detailed in the Plan), tailored to address specific issues of particular importance for the Park. The importance of GIS and spatial data support for these and other priorities within the Park is clear and critical.

Priorities 4 to 9 are focused primarily on people and bring together the needs for visitor management ("parks for all"); "Active Cairngorms" (encouraging individuals to get out and about and enjoy the natural environment of the Park and all the health and wellbeing benefits that it can bring); using the Park as a base for learning and inclusion; addressing housing needs; community capacity and empowerment; and economic development, linking back to the landscape scale approach embodied in Priority 1. Many of these priorities are supported by their own strategy documents.

Cairngorms Nature, with its strategic document Cairngorms Nature Action Plan 2019-2024, sets out the Conservation Priorities for the Park, sitting alongside several other plans that subdivide the overall aims of the partnership Plan (see page 15 of the Partnership Plan). The strategic context is the Scottish Biodiversity Strategy (SBS) route map to 2020's Six Big Steps for Nature, with Cairngorms Nature aiming to make a significant contribution towards five of the big six Big Steps for Nature (the sixth is 'Sustainable management of marine and coastal ecosystems')." These five encompass ecosystem restoration; investment in natural capital; quality greenspace for health and education benefits; conserving wildlife and sustainable management of land and freshwater.

Specific Priorities are identified as in the Partnership Plan, each with specific Targets for Action and lists of Partners that have been tasked with delivery. There is a strong emphasis on creating good environments for partnerships to evolve and so foster a strong sense of collective effort (again as in the Partnership Plan). The importance of robust scientific evidence is also highlighted as the foundation for conservation action in the Park. Key target areas that are brought out perhaps more strongly in this document than in the Partnership Plan include ecological connectivity (particularly in relation to woodlands); more natural, dynamic rivers connected to functioning wetlands and floodplains; more habitat suitable for breeding waders as part of agricultural systems, and wildlife-rich grassland and woodland on productive, profitable farms.

Individual species action focuses on improving the conservation status of threatened or declining

species, with the primary objective of "getting species back on a sustainable footing, where they are no longer reliant on targeted action, but have been recovered within a robust and resilient network of habitats".

Sitting alongside species and landscape conservation priorities is the aim of "engaging, inspiring and encouraging local communities and communities of interest to value and care for nature, be proud of the conservation work in the Cairngorms and want to do something to protect and enhance their natural heritage", with a strong emphasis on demonstrating the benefits that conservation can bring for people as well as wildlife.

Delivery mechanisms: In addition to the specific organisations listed under different targets, there are various broader partnerships and delivery groups. This includes two landscape-scale partnerships that have developed over recent years, providing a focus for ecosystem restoration (Cairngorms Connect) and moorland management (East Cairngorms Moorland Partnership). Several Catchment Partnerships: Dee, Spey, South Esk are well established. The Cairngorms Nature Strategy Group (CNSG) coordinates, allocates resources and maintains an overview of processes in place to deliver actions and meet targets, and the newly-formed Cairngorms Upland Advisory Group (CUAG) aims to promote better understanding between all organisations with an interest in upland management in the Park, advise on key issues, share examples of good practise and latest relevant research.

In addition to the specific references to connections between research and management, page 80 of the Partnership Plan states that: "The CNP Partnership Plan 2012-17 prompted development of a National Park Research Strategy (CNP Research Strategy 2012-2017) which led to increasing collaboration through a network of researchers working in the Cairngorms." Key issues identified in the Research Strategy to 2017 were: connecting researchers with land managers, businesses, communities and policy makers; developing an information hub for research in the Cairngorms; and supporting delivery of the Scottish Government's Strategic Research programme. The next steps for the CNPA in defining their strategic priorities for research should usefully be able to draw from the findings of this Fellowship.

2.2 Priorities and gaps identified by CNPA staff

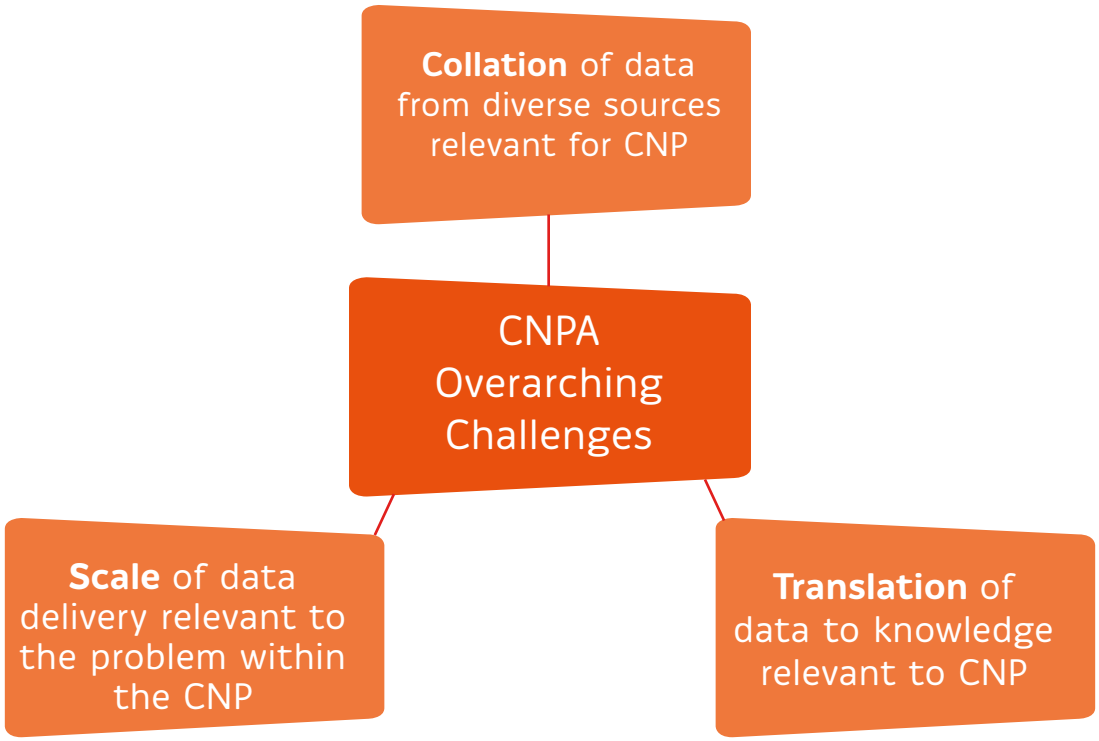
Analysis of the priorities and targets within the different strategic documents for the CNP (previous section) gives a good basis for identifying research priorities. Cross-checking this against the gaps identified through the interviews with Park staff reveals those areas considered to be the biggest barriers to progress with the various aims of the CNPA. The key question of relevance to this section that I asked each CNPA staff member that I interviewed was:

Q3. What are the biggest challenge topics in your work; and for each one:

- Which ones do you think suffer from a lack of supporting (research) information? (e.g. peatland restoration – which methods work best? / best approaches for local buy-in? etc)
- Which have good supporting information (but may have other challenges...)?

The information shared with me by the staff that I interviewed was immensely informative and helpful and I thank them all for this. For this report, I have extracted all challenge topics specifically mentioned by individuals and collated them into a list below, loosely arranged under three main heading. But, as will be clear when reading the list, many of the challenge topics identified connect across more than just the heading they are listed under.

As an overview, one of the most striking points coming from the interviews was that, by and large, the biggest challenges in people's work were more likely to relate to big, overarching issues, as opposed to specific gaps in research knowledge relating to their key targets and actions – this is illustrated in the diagram below. xamples of these overarching issues are: (a) the lack of data availability at whole-Park level (this could be economic or planning data, or data on species populations and trends over time); (b) data availability at resolutions required for action on the ground; (c) how to reconcile contradictory research findings and polarised views on desirable land uses; (d) influencing-factors outwith the 'control' of the CNPA that have knock-on effects on the work that they do; (e) a need for climate change and scenario work to assess likely future outcomes of actions taken.



'Biggest challenge topics' identified in relation to the work of the CNPA staff interviewed

Socio-economic data and assessments for the Park (e.g. people and the Park).

- Several staff talked about the need for more socio-economic data and assessments at Park level (as opposed to Local Authority boundaries). Examples included:
- An economic baseline for the Park which staff could use to establish targets and assess progress.
    1. An overall assessment of the socio-economic effects of creating the Park – this would be really useful and informative, not only for the CNP but for any future Governmental decision-making about additional National Parks. Methodologically this is really challenging - key issues include:
    2. data resolution: there is much data on housing, populations etc at Park level but socio-economic data is harder to collate as it is usually collected at other scales than the Park (e.g. Local Authority level; regionally, nationally);
    3. delivery: is the Park delivering what people want and engaging them well? What is the balance of top down v bottom up engagement? (This links to the important wider question of socio-economic effects of protected areas in general);
    4. connecting impacts within and outside the Park: e.g. windfarms are all around the Park but not in it – is this because it is a Park or some other reason(s)?.
- Agri-environment scheme funding impacts on the ground – information is needed to demonstrate whether and how public scheme (and which scheme(s)) money is actually delivering public benefits within the Park.
- Visitor behaviour and communication with visitors and residents were discussed at some length, particularly in relation to challenges such as:
    1. Responsible access and how to initiate behaviour change where needed?
    2. Natural health service – how to communicate this effectively with the 'inactive' or 'less-active'?

A major cross-cutting issue identified by many staff relates to the challenges of **balancing economic, social and environmental perceptions and impacts of different land uses** (e.g. moorland v woodland; rewilding v 'traditional' land uses).

This includes the need to translate research knowledge (e.g. on benefits and trade-offs) into something that resonates with landowners and land managers. A major challenge is how to reduce / reconcile polarisation of views, e.g. trees v open ground. This links to identifying and tackling constraints to planting new woodlands - actual v perceived, and how to influence opinions, e.g. perceived conflicts between trees and wading birds etc, but is there really such conflict (e.g. if one looks at where wading birds thrive in other countries like Scandinavia)?

Housing and other developments within the Park

There was much discussion about housing and other developments in the Park. Listed below are the main areas raised as important data/research needs:

- Impacts of different policies on rural housing standards and uses, for example:
    1. Do current policies encourage or deter owners from offering low-cost affordable housing as opposed to costly holiday lets?
    2. What are the socio-economic impacts of second homes in scenic areas like this?

- **Collation of survey information from planning applications** - data from planning applications are not easily available, yet there is so much potential for such data to be more widely useful if they were easily accessible. Collation of such information into a database accessible to CNPA staff would allow greater use and give significant added value from the original work.

- There is a need to better understand the **environmental impacts of different types of development across the CNP** – this relates primarily to a lack of analysis of actual impacts post-development, rather than a lack of pre-development impact assessment (although pre-development environmental impact assessments can be rather narrow and of limited value in terms of wider environmental impacts, i.e. in the context of the whole Park).

- **Corporate performance reporting** – there are key gaps in the knowledge-base required to do this well. It would be helpful also to establish how best to measure the 'success' of local development priorities, etc.

Environment and landscape

As with the challenges identified in the sections above, discussions ranged widely - and a lack of Park-level data (e.g. on individual species population status), was again identified as a gap. Many of the examples below are closely linked:

- **Valuation of the 'natural capital' of the Park (e.g. Natural Capital Asset Index at Park level?)** Trends are probably more important than absolute values, to be able to assess success or otherwise. But as far as CNPA staff are aware, data / data collations do not exist. This would also facilitate assessment (currently lacking) of:

    1. impacts of different land uses on the natural capital/other values of the Park

    2. development of Ecosystem health indicators and other indicators.

- A major requirement for many of the issues raised by staff is **robust underpinning GIS mapping data** (e.g. for different habitats, species, flood risk, peat depth...) and **definitive information on land cover and land cover change within the Park** – there were many different examples given that all require spatial data, so I have amalgamated examples into the following list of main 'needs' that were mentioned:

    1. Holistic assessments of the 'state of nature' across the Park (as opposed to individual studies of specific issues/areas – see other examples below). This includes demonstrations of trends over time. A subset example of this that was identified as a specific need is a holistic map of Natura Habitats to allow whole-Park decision-making, i.e. where could expansion of one Natura habitat be allowed at the expense of another?

    2. Species locational data of sufficient resolution to connect to habitat data, management units, etc - this is a big problem in that the resolution of much species data (e.g. breeding bird atlas data) is not good enough to aid management decisions within the Park. One type of resource mentioned as 'highly desirable' for on-the-ground management decision-making would be species 'heatmaps' searchable by polygons.

    3. Lack of consistently-recorded biological data is also a problem, making it very difficult, for example, to compare one finding against another (either from a different location or from a different date) and use this to inform management. Collation of what is published/ available e.g. through SEWeb, NBN, Scottish Government's Strategic Research Programme, Atlases would greatly help CNPA staff, with, importantly, some sort of synthesis (and standardisation where possible) to facilitate understanding and application.

    4. The following examples were also given to me of notable spatial data/ research already being used from the Scottish Government's Strategic Research Programme - Macaulay Institute (now Hutton) Native Woodland model (Alison Hester and colleagues at Hutton); peatland restoration (SNH/Rebekka Artz at Hutton); woodland expansion planning, opportunities and constraints (Alessandro Gimona and colleagues at Hutton); natural flood management mapping (Susan Cooksley at Hutton; Alessandro Gimona and colleagues at Hutton). [Looking at this list as I write the report, I wonder whether the preponderance of Hutton examples given to me might be because I was doing the interviewing? But it is great to hear about the value and benefits of existing active links between researchers and Park staff addressing some of the major challenges for the management of the Park.]

- **Landscape qualities assessment** was identified as a gap in terms of both data and knowledge about how best to do this type of assessment for the Park.

- **Wildfire and management-burning** – e.g. fire risk v habitat type; climate change risk management, etc. As with some of the other challenges identified above, this is again an area with a combination of data and knowledge gaps but also synthesis gaps.

- **Natural flood management** – this is another important, cross-cutting area where gaps in knowledge were identified (and being addressed – see above) as challenges to decision-making, for example which habitat types 'do it best' and where?

- **Natural medicines** were also mentioned by a couple of staff as a total gap in knowledge, with the possibility of giving added benefits to some land use decisions if benefits are found (e.g. willows as worming control for livestock?).

2.3 How would CNPA staff value and use a CNPA research database?

During early discussions about the Fellowship, it was anticipated that identifying key components of a research database would be a priority for the Park. Given this, I asked staff two questions of relevance to this:

Q4. Your priority key themes for a CNPA research database?

Q5. Database format, updating, etc – most important 'needs' to facilitate easy access and use?

During our interviews we rolled these two questions together and discussed this in broader terms, considering key needs, both individually and collectively, and considering how those needs might best be served by different 'models', together with the pros and cons of creating something in-house versus exploring options to use an existing external facility of some sort.

After speaking with the staff that I interviewed, it was clear to me that the combination of 'needs' and resources within CNPA would be best served by creating a facility that was part of an existing large data repository (such as SEWeb or NBN), as opposed to something internal and administered by CNPA staff / contractors. The biggest issues mitigating against creating something in-house are that: (a) resourcing something in-house would be a huge challenge (probably requiring a potentially costly external service agreement); (b) CNPA do not actually hold much data themselves; (c) replicating something already available elsewhere would be a waste of valuable resources; (d) wider accessibility to an in-house system could be difficult; (e) the potential benefits of something hosted on one of the large 'platforms' were numerous, not least that they are already well-known repositories for much data of relevance to the Park. It was suggested in a Cairngorms research workshop a few years ago that a dedicated Cairngorms National Park' section of the NBN might be a good way forward (NBN gave a presentation at this workshop and offered this possibility for consideration) – from all our discussions, this type of structure should give the best outcome for the Park, whether NBN, SEWeb or other repository. A useful next step would be to formally assess the pros and cons of different options (e.g. using the key requirements as listed below). One notable caution that mentioned, however, was to consider carefully the cost-benefits (and content) of a subscription-based 'platform' because it is getting easier and easier to access much relevant information online. The need to have a strong evidence-base but also making it more accessible was stressed by several people, with the aim of helping to promote a management culture within the Park that respects data and evidence. Involving the public in both collecting evidence and policy development should also help foster such a culture. National Parks are great places to pilot approaches such as this.

Key requirements for an external CNP 'research and data platform' mentioned by staff include:

- Accessibility (of data AND of publications) - for Park staff, plus wider scientists, practitioners and general public (examples were given of difficulty in accessing business-critical data from some existing sources – if a centralised data repository solved this problem it would be immensely valuable)
- Wide awareness of its existence and sufficient incentive (through recognition / exposure and use of data etc) for scientists and others to upload relevant information
- Easily searchable e.g. through keywords
- Availability of data relevant to Park boundaries
- State of Nature information (akin to Atlas of Living Scotland) specifically relating to the Park
- Species 'heat-maps' searchable by polygons, etc
- Translation of complex research findings into short synthesis-summaries which are of practical use on the ground
- Facility to receive regular electronic updates on 'what is new' etc
- Facility to carry out satellite interpretations to monitor gross (and some fine-scale, as per focal question and image-analysis capabilities) changes within the Park and those of wider relevance to the Park.

3. How can the CNPA facilitate use of knowledge and data identified by this review?

Several key points emerged during my work on this Fellowship, drawing ideas from all the information gathered and the valuable discussions with CNPA staff. The CNPA are currently looking at their strategic research priorities over the next 5 years, with a view to refreshing the CNP Research Strategy later in the year - and the findings of this Fellowship are informing this process. Keeping close to the primary remit of the Fellowship, these are my proposals for how the CNPA might take this area forward.

3.1 Identifying priority research needs within the Park

This was one of the primary drivers for the Fellowship and I would propose the following actions for CNPA at regular intervals (e.g. every 5 years) to underpin and inform the development of their next research strategy document:

1. Commission a keyword search update of research carried out in the Park similar to that carried out as part of this Fellowship. The search protocols were specifically written to facilitate repeat searches by anyone; they are on the CNPA website as well as in the Appendices of this report. The resources needed to do this are not large (the Fellowship was 19 days and the literature search was only a small part of the work carried out)
2. Carry out one-to-one interviews with CNPA staff to elucidate their pressing research needs within the Park - I found these to be one of the most informative and enlightening parts of the Fellowship. I would suggest that this also becomes a formalised component of underpinning information collection prior to preparation of each new Research Strategy.

3.2 Identifying priority, topic-focused research / synthesis needs to underpin and inform specific Park priorities and targets for action

Collating best available evidence to support specific CNP priorities and targets for action is clearly of paramount importance. There was discussion about what syntheses are already being used (e.g. the peatland restoration decision-support tool (SNH) that is based on expert

synthesis of a diversity of spatial and non-spatial research data on Scotland's soils, peatland restoration techniques, impacts on GHG and different components of the system, etc), and more generally how one might store research synthesis data and tools of relevance to the Park. As per the discussion on storage of and access to scientific data of relevance to the Park, it would be helpful to explore, e.g. with NBN, SEWeb and other potential data repositories, what the options would be for creating a research synthesis page as well as data repository searchable for CNP-relevant data. As per the priority needs for research carried out within the Park, I recommend that regular updates of priority topic research and synthesis needs of individual staff are made, either through the same kind of one-to-one interview process as that carried out within this Fellowship, or some other formal method that is not too time-intensive.

3.3 Sharing information with academic institutions looking for research project ideas within the Park

This is a natural follow-on from the process of identifying priority research and synthesis needs for the CNP. Student projects can be an excellent, low cost way of gathering information of benefit to both the Park and the student / academic institution. I recommend that CNPA are proactive in this respect and share the research outputs lists (Appendices 1.a, b & c) with key academic institutions. Obvious priorities are the Scottish Universities, but it could also be shared much more widely (with obvious increased time implications, so starting small might be the best approach, along with making sure the website makes it very easy for external people to find the research page and see the keyword search information on what research has already been done. It might be useful to 'flag' this page at key times of year when students are typically looking for projects – initial consultation with the University of the Highlands and Islands (UHI) as an example academic institution that already has close relations with the CNPA would be very useful in this respect).

3.4 Closer alignment between the Scottish Government's research funding and the policy priorities of the CNP (and other organisations)

As outlined in this report and highlighted in the key CNP documents, the importance of close alignment with RESAS research is paramount for small public bodies such as the CNPA with no in-house research teams. I recommend that the CNPA work closely with the Scottish Government in advance of the next RESAS programme of funding to maximise synergies and value of the research in the next programme by addressing some of the key research priorities of the CNP (and the LLTNP) as high profile, iconic Scottish National Parks.

There is already formal input by agencies and other bodies to the Scottish Government's research funding planning process for each 5-year programme and I recommend that CNPA are proactive within this process - many of the CNPA's research priorities are also shared by other public bodies such as SNH and SEPA so there are much wider benefits to be had in bringing all organisations more closely together to input and discuss their research needs. In addition to the SRP research programme, there are options for targeted pieces of call-down work administered through the Centres of Expertise and I also recommend proactivity here for CNPA (during this Fellowship we identified this potential route for a time-critical research need for the Park, with the successful outcome of funding for a call-down project to address this need – a good illustration of the potential for realising greater synergies with these Centres of Expertise).

3.5 Teaming up with Loch Lomond National Park to pool resources where there is commonality of purpose

This has great potential, not just in terms of pooling resources to collate available research information on key topics, but also more widely to consider other needs of the Parks that might require approaches to Government – an obvious example here is the current problem highlighted by several CNPA staff of a lack of data availability (planning, economic, etc) that matches the boundaries of the Park, as opposed to local planning authority regions, for example. Data availability at Park level is a fundamental requirement for any National Park to function efficiently - both of Scotland's National Parks would benefit from data collation at Park level and can more powerfully work together to try to address this with relevant Government and other bodies.

APPENDIX 1.a

Search methodology for published papers on research carried out within the CNP

The search protocol used is detailed below, to allow easy updating of the reference list in future, following the same methodology. Additional comments are included below in square brackets and italics, to distinguish them from the method steps.

The main purpose of this database is to identify what published research (listed in the two literature search websites Web of Science and Scopus) has been carried out in the CNP to date (up to April 2019).

[NB the purpose was not to identify published research on key topics of interest for the CNP that were not carried out within the CNP – obviously there will be many more papers referring to specific topics of relevance to the CNP but where the research has been carried out in other places].

Step 1.

Online literature search, using Web of Science (WoS) – and check Scopus too if possible – it finds some extra references.

WoS example:

'Advanced search'

[After testing various combinations of keywords, the following search string was used – "Cairngorm*" picked up by far the greatest number of records but the other key words added some further useful references, without also picking up too much non-CNP work:]

Search words used:

Cairngorm* OR Speyside OR Deeside OR Aviemore

Restrict language to English; all document types; timespan 'All years' (1945-2019).

Step 2.

All references exported into a Reference database – exported as 'full record', which included abstracts where available.

Step 3.

Initial title and abstract sift to delete those papers obviously not relating to research in the CNP.

Step 4.

Reference database facility used to search and attach pdfs into the database for any free-access papers.

Step 5.

Reference pdfs scanned and any remaining non-CNP references removed.

Step 6.

Initial check and correction of major typing (etc) errors in the downloads where they would cause major confusion [there were many – still some remaining but hopefully they are more 'cosmetic' than confusing.]

DOI / URL information checked and added (where not initially present) into each publication record where available.

End product = Reference database for the CNP website listing published papers on research carried out in the CNP that include one or more of the key words listed above.

APPENDIX 1.b

List of published papers found from keyword search for research carried out within the CNP for the period 1945 (=Web of Science earliest date) - April 2019.

Abrahams, P. W., Tranter, M. & Davies, T. D. (1988). The trace element composition of stream- and melt-waters at times of the spring-thaw in the Scottish Highlands. Environmental Geochemistry and Health 10, 84.

Abrahams, P. W., et al. (1989). Geochemical studies in a remote scottish upland catchment II. Streamwater chemistry during snow-melt. Water, Air, and Soil Pollution 43, 231-248.

Abrahams, P. W., et al. (1988). Trace-element studies in a remote scottish upland catchment - 1. Chemical Composition of Snow and Meltwaters. Water, Air, and Soil Pollution 37, 255-271.

Addy, S., Soulsby, C. & Hartley, A. J. (2014). Controls on the distribution of channel reach morphology in selectively glaciated catchments. Geomorphology 211, 121-133.

Addy, S., et al. (2011). Characterisation of channel reach morphology and associated controls in deglaciated montane catchments in the Cairngorms, Scotland. Geomorphology 132, 176-186.

Aitken, B. (1990). National Parks for Scotland? The next chapter. ECOS: a Review of Conservation 11, 62-66.

Alexander, K. & Green, T. (2018). Wood pasture and cattle in the cairngorms National Park? British Wildlife 30, 77.

Ali, G., et al. (2014). A comparison of wetness indices for the prediction of observed connected saturated areas under contrasting conditions. Earth Surface Processes and Landforms 39, 399-413.

Ali, G., et al. (2012). Topographic, pedologic and climatic interactions influencing streamflow generation at multiple catchment scales. Hydrological Processes 26, 3858-3874.

Allen, J. R. M. & Huntley, B. (1999). Estimating past floristic diversity in montane regions from macrofossil assemblages. Journal of Biogeography 26, 55-73.

Allott, T. E. H., et al. (1995). The impact of nitrogen deposition on upland surface waters in Great Britain: A regional assessment of nitrate leaching. Water, Air, & Soil Pollution 85, 297-302.

Anderson, I. C., Campbell, C. D. & Prosser, J. I. (2003). Diversity of fungi in organic soils under a moorland - Scots pine (Pinus sylvestris L.) gradient. Environmental Microbiology 5, 1121-1132.

Andrews, C. f., Ives, S. & Dick, J. (2016). Long-term observations of increasing snow cover in the western Cairngorms. Weather 71, 178-181.

Ashmole, N. P., et al. (1983). Insects and spiders on snowfields in the Cairngorms, Scotland. Journal of Natural History 17, 599-613.

Aspinall, R. (1992). An inductive modeling procedure based on Bayes Theorem for analysis of pattern in spatial data. International Journal of Geographical Information Systems 6, 105-121.

Aspinall, R. J., Hill, M. J. & Ieee (1997). Land cover change: A method for assessing the reliability of land cover changes measured from remotely-sensed data. Igarss '97 - 1997 International Geoscience and Remote Sensing Symposium, Proceedings Vols I-Iv: Remote Sensing - a Scientific Vision for Sustainable Development, New York, I E E E.

Aspinall, R. J., Miller, D. R. & Birnie, R. V. (1993). Geographical information systems for rural land use planning. Applied Geography 13, 54-66.

Bachell, A. (1993). The Cairngorms - management in partnership. Planner 79, 25-27.

Baggaley, N. J., et al. (2009). Long-term trends in hydro-climatology of a major Scottish mountain river. Science of the Total Environment 407, 4633-4641.

Bailey, J. J., Boyd, D. S. & Field, R. (2018). Models of upland species' distributions are improved by accounting for geodiversity. Landscape Ecology 33, 2071-2087.

Bain, D. C., et al. (1993). Variations in weathering processes and rates with time in a chronosequence of soils from Glen Feshie, Scotland. Geoderma 57, 275-293.

Baines, D., Sage, R. B. & Baines, M. M. (1994). The implications of red deer grazing to ground vegetation and invertebrate communities of Scottish native pinewoods. Journal of Applied Ecology 31, 776-783.

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Ballantyne, C. K. (2010). Extent and deglacial chronology of the last British-Irish Ice Sheet: implications of exposure dating using cosmogenic isotopes. Journal of Quaternary Science 25, 515-534.

Ballantyne, C. K. & Kirkbride, M. P. (1986). The characteristics and significance of some lateglacial protalus ramparts in upland Britain. Earth Surface Processes and Landforms 11, 659-671.

Ballantyne, C. K., Schnabel, C. & Xu, S. (2009). Exposure dating and reinterpretation of coarse debris accumulations ('rock glaciers') in the Cairngorm Mountains, Scotland. Journal of Quaternary Science 24, 19-31.

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Bayfield, N. G. (1980). Replacement of vegetation on disrurbed ground near ski lifts in the Cairngorm mountains, Scotland. Journal of Biogeography 7, 249-260.

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Bayfield, N. G. & Nolan, A. J. (1998). Vegetation and soils of the Allt a'Mharcaidh catchment, Cairngorm mountains. Scottish Geographical Magazine 114, 18-21.

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APPENDIX 1.c

Search methodology for online 'grey literature' on key organisations' websites relating to research carried out within the CNP.

Step 1.

A list of potential organisation's websites to search was collected as a basis for research.

Below are key organisations and their website in brackets (Note: Additional guidance related to the Forestry Commission search is available under "Additional Notes").

- Scottish Environment Protection Agency (SEPA
- Scottish Natural Heritage (SNH)
- Royal Society for the Protection of Birds (RSPB)
- Scottish Environment LINK
- Forestry Commission (FC)
- Ramblers
- Forestry and Land Scotland (FLS)
- Scottish Forestry (SF)
- Forest Research (FR)
- Joint Nature Conservation Committee (JNCC)
- Ecosystem Services Community (EScom)
- Scotland's Rural College (SRUC)

A range of key search terminology was used due to the variability of organisation search functions, in brackets there is feedback about the terminology:

- Cairngorm
- Cairngorms (Often Cairngorm gave the full list of results, however, some sources required "s" to appear in the search)
- Cairngorms National Park (Many returns related to national parks and national research rather than specifically relating to the Cairngorms National Park)
- CNP (Rarely returned any new results after the above terminology had been used).

Due to the robustness of some organisation search tools a Google search of the organisation's name followed by "Cairngorms" was required to gain as many references as possible.

Step 2.

Google search engine was first used 1.) To potentially source other websites to search further, 2.) To find individual pieces of grey literature that may be relevant to download but not on the key organisation's website, 3.) To ensure as many sources as possible were gathered to minimise the risk of organisation's search tools not being fully comprehensive.

Step 3.

Each key organisation's website search tab was used with the key search terminology as listed above.

Step 4.

Returned results titles scanned and a control F search for the key words (Cairngorm & Cairngorms) conducted, a decision was then made whether the source was relevant or not. If potentially relevant, the web link, title and the search platform used were imported into Excel.

Step 5.

A further scan of each potentially relevant source was conducted, this was completed by a skim read. Following a skim read, only relevant sources that contained some form of original work in the CNP were downloaded.

Step 7.

Relevant sources were then imported to Mendeley, including details such as the author(s), title, dates and sources website.

Step 8.

References checked for errors and any discrepancies noted below.

End product - A list of relevant references which mention one of more of the key terminology listed above.

Additional Notes

Forestry Commission Scotland (FCS) has been devolved and FCS website no longer has a search function, instead an alternative search was made, listed under key organisations.

Some references are difficult to find on the source's website and are easier to find through Google, such as "Modelling flooding at Mar Lodge, Cairngorm National Park, Scotland". Which is easier to find by googling the title or by searching for the author on the source's website rather than searching for the title on the source's website.

The general search tab on some organisation's website does not give the same result as when a filtered search is conducted. An examples of this is at the FR website, different results are given when using the "all publication and research" tab compared to the general search tab on the website.

Some titles of references are not the name of the file, so are difficult to find using the search function

for example: "Identifying river restoration sites to deliver multiple benefits in the River Dee" is

named "dee-non-technical-summary" on the SEPA website. This is the same for

"NFI provisional estimates for woodland in the Cairngorms National Park" which is called "Cairngorms National Park woodland" on the FR website.

End product = Reference database for the CNP website listing published papers on research carried out in the CNP that include one or more of the key words listed above.

APPENDIX 1.d

List of online 'grey literature' found on key organisations' websites (i.e. available online at time of search: May 2019) relating to research carried out within the CNP.

(Search carried out by Marcus Craigie. All links to these documents online are provided at the end of each reference).

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Atterton, J. and Skerratt, S. (2011) Walking to a Healthier Scotland. Available at: https://www.sruc.ac.uk/downloads/file/34/walking_to_a_healthier_scotland

Britton, A, Hester, A & Perex-Barberia, J. (no date) The Only Constant Is Change. Available at: http://archive.jncc.gov.uk/PDF/Iheath_2006sem_AndreaBritton.pdf

Brooker et al. (2017) Feasibility study: translocation of species for the establishment or protection of populations in northerly and/or montane environments Scottish Natural Heritage Commissioned Report No. 913. Available at: www.nature.scot/sites/default/files/Publication 2017 - SNH Commissioned Report 913 - Feasibility study - translocation of species for the establishment or protection of populations in northerly and or montane environments.pdf

Brown, C. (2013) Track Changes Tracks constructed under Permitted Development Rights : the need for planning control. Available at: http://www.scotlink.org/wp/files/documents/TrackChanges-LINK-HillTracksReport.pdf

Brown, K. et al. (2016) Benefits from woodland derived by communities from case study areas and the main trade-offs. Available at: https://www.hutton.ac.uk/sites/default/files/files/research/srp2016-21/RESAS_srp143_Output_143c-D2_Final.pdf

Bruneau, P. M. C., Gordon, J. E. and Rees, S. (2011) Ecosystem sensitivity and responses to change: understanding the links between geodiversity and biodiversity at the landscape scale. Available at: http://archive.jncc.gov.uk/PDF/jncc450_FINALweb.pdf

Burt, T, P, Thompson, D, B, A, Warburton, J. (2002) The British Uplands: Dynamics of Change. Available at: http://archive.jncc.gov.uk/PDF/jncc319_web.pdf

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Cairngorms Business Partnership (2015) Cairngorms National Park Economic Strategy 2015-2018. Available at: https://cairngorms.co.uk/wp-content/uploads/2015/10/151001CNPEconomicStrategyV1.pdf

Cairngorms National Park Authority (2008) The Forests of the Cairngorms. Available at: https://cairngorms.co.uk/resource/docs/publications/08042008/CNPA.Paper.613.Forests of the Cairngorms.pdf

Cairngorms National Park Authority (2018) Draft Cairngorms National Park Forest Strategy 2018. Available at: https://cairngorms.co.uk/wp-content/

Cairngorms National Park Authority (no date a) Cairngorms National Park Local Development Plan 2020 Main Issues Report - Strategic Flood Risk Assessment. Available at: https://cairngorms.co.uk/wp-content/uploads/2017/11/SFRAwebV1.1.pdf

Cairngorms National Park Authority (no date b) Cairngorms National Park Local Development Plan Action Programme June 2018. Available at: https://cairngorms.co.uk/wp-content/uploads/2018/07/Action-Programme-2018-Final.pdf

Christie, M., Greene, D. and Trench, H. (2012) Challenges of implementing an ecocystems approach in the Cairngorms National Park. Available at: https://www.sruc.ac.uk/download/downloads/id/1409/99-104_trench

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APPENDIX 2

CNP strategic documents scrutinised to identify key themes of importance to CNPA

The over-riding aim for Scotland's National Parks is "to conserve and enhance the natural and cultural heritage of the area" and this takes precedent over all others.

CNP Partnership Plan 2017-22

The National Park Partnership Plan:

- sets out the vision and overarching strategy for managing the Park;
- guides the work of all public bodies and other partners to deliver the aims of the Park;
- provides the strategic context for the Local Development Plan;
- sets out the regional land use framework for the Park;
- provides the strategic context for managing the Park as a sustainable tourism destination2;
- shows how the Park will contribute to the Scottish Government's core purpose and national outcomes.

Nine priorities have been identified, each with an Agenda for Action and clearly-defined policies providing a framework for delivering the priorities and actions (Table 1 page 18 gives good information on how the priorities sit within the public interest context and national policy contexts):

- Priority 1: Supporting landscape scale collaboration
- Priority 2: Deer management
- Priority 3: Moorland management
- Priority 4: Visitor management ("parks for all")
- Priority 5. Active Cairngorms
- Priority 6: Learning and inclusion
- Priority 7: Housing
- Priority 8: Community capacity and empowerment
- Priority 9: Economic development.

Other key topics extracted from the text (I have put in brackets what they are aiming to address) are:

- Woodland expansion and peatland restoration (climate change mitigation)

- Reversing the loss of biodiversity through large scale restoration and priority species action (addressing Scotland's Biod Strategy)
- Natural capital – exemplifying the connections between nature and economy (i.e. importance of natural capital underpinning tourism and land-based businesses)
- Community empowerment
- Sustainable economic growth.

Page 23 gives detail on the main specific conservation challenges over next 5 years, followed by details on the aims of each of the 9 Priority areas above. There are also lists of key documents for each priority area listed in this Plan (e.g:. capercaillie framework, flood risk management strategies, etc).

CNP Research Strategy: To quote from Page 80 of the Partnership Plan: "The CNP Partnership Plan 2012-17 prompted development of a National Park Research Strategy, which led to increasing collaboration through a network of researchers working in the Cairngorms. We will be updating the research strategy to reflect the research priorities for the next five year period."

"The strategy will continue to focus on connecting research and the management needs of the Park through:

- Connecting researchers with land managers, businesses, communities and policy makers
- Developing an information hub for research in the Cairngorms
- Supporting delivery of the Scottish Government's Strategic Research programme."

Cairngorms Nature Action Plan 2019-24

This document sets out the CNP Conservation Priorities, sitting alongside several other plans that subdivide the overall aims of the partnership Plan (see page 15 of the P Plan). The strategic context is the SBS route map to 2020 Six Big Steps for Nature – "Cairngorms Nature will make a significant contribution towards five of the big six Big Steps for Nature (the sixth is 'Sustainable management of marine and coastal ecosystems')." These five are:

1. Ecosystem restoration – to meet the Aichi target of restoring 15% of degraded ecosystems
2. Investment in natural capital – to ensure the benefits nature provides are better understood and appreciated
3. Quality greenspace for health and education benefits – to ensure the majority of people derive increased benefits from contact with nature
4. Conserving wildlife in Scotland – to secure the future of priority habitats and species
5. Sustainable management of land and freshwater – to ensure that environmental, social and economic elements are well balanced.

The three aims listed (see below) are the same as the three big conservation challenges listed in the Partnership Plan, and each of those three aims are divided into specific Priorities), each with specific Targets for Action (each with Partners listed who are tasked with delivery). There is a strong emphasis on creating good environments for partnerships to evolve and so foster a strong sense of collective effort. The importance of robust scientific evidence is also highlighted as the foundation for conservation action in the Park.

Under each Aim are also various objectives (p 17 onwards) which are different from the lists of Priorities, so the connections here are a little hard to follow. The Aims and objectives listed are:

Aim 1: Support landscape scale conservation and collaboration to deliver ecosystem restoration and sustainable land management, balancing environmental, social and economic factors.

Main objectives – natural heritage

- Bigger, more natural woodlands, expanding up to a natural treeline, providing connections across catchments and around the central core of the mountains.
- More natural, dynamic rivers connected to functioning wetlands and floodplains.
- Restored peatlands stopping the loss of carbon, improving water quality and helping alleviate flooding.
- Main objectives – cultural landscapes
- More sustainably managed moorlands with more structural and species diversity and pockets and strips of trees and shrubs on moorland edges, steep slopes, in gullies and around woodland remnants.
- More habitat suitable for breeding waders as part of agricultural systems.
- Wildlife-rich grassland and woodland on productive, profitable farms.

Priorities:

- woodland expansion & enhancement (this has priorities listed in the CNP Forest Strategy document)
- nature friendly farming
- freshwater restoration
- moorland & peatland.

Aim 2: Deliver focused action to improve the conservation status of threatened or declining species

Main objective:

Getting species back on a sustainable footing, where they are no longer reliant on targeted action, but have been recovered within a robust and resilient network of habitats.

Priorities:

- Scottish wildcat
- mountain hare
- beaver
- capercaillie
- curlew
- golden eagle
- peregrine falcon

- aspen
- plants, fungi & lichen.

Aim 3: Engaging, inspiring and encouraging local communities and communities of interest to value and care for nature, be proud of the conservation work in the Cairngorms and want to do something to protect and enhance their natural heritage.

Main objectives

- Raising awareness and understanding of land management and clearly demonstrating the benefits that conservation brings for people as well as wildlife.
- More engagement with nature: more people involved in decision making, getting out and enjoying it and helping to look after it.

Priorities:

- greater collaboration and engagement in land use decision making
- recognise and celebrate good conservation work
- provide opportunities to get involved
- more people actively and responsibly enjoying nature.

Delivery: In addition to the specific organisations listed under different targets, there are various broader partnerships and delivery groups. This includes two landscape scale partnerships that have developed over recent years, providing a focus for ecosystem restoration and moorland management:

Cairngorms Connect: a partnership of 4 neighbouring land managers (60k ha) with a 200-year vision to enhance habitats, species and ecological processes.

East Cairngorms Moorland Partnership: this brings together 6 estates to collaborate on delivering the public interest priorities alongside estate objectives including sporting management. This includes management to provide increased woodland and scrub habitat alongside moorland management.

There are three Catchment Management Partnerships: Dee, Spey, South Esk – all are well established.

In addition, there are two overseeing strategic groups, as follows:

Cairngorms Nature Strategy Group (CNSG): (open to all organisations with direct involvement in delivery of biodiversity gain in CNP with agreement of existing members) which coordinates, allocates resource and maintains an overview of processes in place to deliver actions and meet targets.

Cairngorms Upland Advisory Group (CUAG): newly-formed group aiming to promote better understanding between all organisations with an interest in upland management in the Park, advise on key issues, share examples of good practise and latest relevant research.

A peatland restoration officer helps to deliver peatland restoration within the Park - Peatland Action is a programme led by SNH, with a remit to restore this damaged habitat across Scotland (applications can be made for Peatland Action plans, which if successful are delivered through grant-aid).

CNP Forest Strategy 2018

This is the key document providing strategic direction on future forest management and the

restoration of woodlands in the CNP over the next 20 years. This strategy has ten Strategic Objectives that support the Park Partnership Plan aims:

- Promote the creation of new woodlands that complement other land use
- Enhance the condition of existing forests
- Restore lost or vulnerable forest ecosystems
- Encourage natural regeneration of native forests
- Promote the creation and enhancement of productive forests
- Protect forests from disease and invasive species
- Increase employment in the forestry sector
- Encourage innovation in the use and marketing of native forest products
- Promote access and active enjoyment of forests
- Promote community involvement in forest management.

The Strategy also groups into 4 main areas its relevant Policy Guidance, and each is broken down into specific issues/topics and the principle of how the Plan aims to address them. The first specific topics under 1 are given more details here by way of example, the others are just listed with titles.

1. Woodland creation. This explicitly highlights (a) the desire to create/enhance forest habitat networks, and the preference for natural regeneration - through grazing and muirburn reduction; and (b) integration with managed moorland; (c) integration with agricultural land, maintaining the culture of crofting and farming in the Park, and in particular protecting priority sites for wading birds; (d) integration with peatlands (current restoration target in CNP is 5000 ha restoration in 5 years); (e) deer management – to ensure densities are compatible with the need to allow woodland regeneration; (f) deer fencing as a short-term tool where impractical to reduce densities BUT with careful consideration of potential negative impacts; (g) landscape and wild land – need to make sure new woodlands enhance the landscape and increase a sense of naturalness; (h) designated sites – caution must be applied for any woodland creation in such areas; (i) biosecurity, invasive species and wildfire – improved connectivity can potentially lead to increased threat from disease, invasive species and the spread of wildfire – important to take these threats into account at all times.
2. Habitat enhancement. (a) Montane Woodland; (b) riparian woodland; (c) aspen; (d) woodland remnants; (e) ancient and semi-natural woodlands; (f) felling.
3. Rural development. (a) employment; (b) productive woodland; (c) natural flood management; (d) low carbon and carbon trading.
4. Forests and people. (a) community woodlands; (b) responsible access; (c) health (links directly to Active Cairngorms Strategy).
5. Targeting woodland creation – the final section of the Plan – is guided by maps, combining preferred and more sensitive areas in a GIS which has allowed the identification of 'target areas' to direct preferential funding. Annexes give details on assessment of suitability of different SACs and SPAs for woodland expansion/creation.

Other strategy documents not detailed here include: Active Cairngorms; Cairngorms Economic Strategy; Local Development Plan and associated assessments and actions; Communications and Engagement Strategy; Corporate Plan; and several more local initiatives (listed in Cairngorms Nature

APPENDIX 3

List of questions asked to key members of staff within the CNPA, during one-to-one interviews carried out on 1st April 2019.

Questions:

Your job title and role in CNPA?

CNPA Strategy documents – your role in delivery of specific areas?

Biggest challenge topics in your work; and for each one:

Which ones do you think suffer from a lack of supporting (research) information? (e.g. peatland restoration – which methods work best? / best approaches for local buy-in? etc)

Which have good supporting information (but may have other challenges…)?

Your priority key themes for a CNPA research publication database?

Database format, updating, etc – most important 'needs' to facilitate easy access and use?

APPENDIX 4

Keyword search for research of relevance to the CNP in the Natural Assets Theme of the Scottish Government's Strategic Research programme 2017-2021.

Projects were identified using keyword search: "Cairngorm*" and "CNP*". I then sifted them for relevant information to include in the summary description in the table below, to help ID relevance to the Park

For further details and contact information for any specific individuals named below, please contact Holli Hunter: holli.hunter@hutton.ac.uk

[Hutton lead the Natural Assets Theme so it was straightforward to gather the information for this search and put together the summary information below. If this is useful to CNPA staff, we can request similar searches for the other two RESAS Themes].

Key Contact	Work Package	Research Deliverable	Date	Summary Description
Artz, R (Hutton)	1.1	1.1.2	2018-20	Scientific study on effects of 3 years of drought condition on the success of vegetation recovery and decomposition processes in restored peatlands. Primary location is Forsinard, but includes Cairngorms experiment that has now also been installed (see also RD1.3.3.)
Wilkinson, M (Hutton)	1.2	1.2.1	2016-17	Publication / report development on the current state of knowledge/ terminologies used in NBS for flood management. View more online here
Macleod, K (Hutton)	1.2	1.2.4 (was 1.4.3)	2016-18	Stakeholder workshop on logic chains - developing an outcome-based approach for understanding the effectiveness of interventions in catchments for multiple benefits (2017 report available on Hutton website) View more online here
Hester, A (Hutton)	1.3	1.3.1	2016	A woodland connectivity workshop (2016 report available on Hutton website). View more online here
Finger, A (RBGE)	1.3	1.3.1	2017-18	Provision of ecosystem maps that target experimental reintroduction of threatened plants highlighted in the Biodiversity Route Map to 2020. View more online here

Finger, A (RBGE)	1.3	1.3.1	2018-19	Reintroductions of Cicerbita alpina. Achieving 2020 Route Map targets. (Includes Glen Clova and Mar Lodge). View more online here
Eastwood, A (Hutton)	1.3	1.3.2	2016-21	Woodland study (on a gradient from peri-urban to remote) for assessment of ecosystem service impacts under different management scenarios. View more online here
Eaton, S / Ellis, C (RBGE)	1.3	1.3.2	2020-21	Third Year Monitoring for translocation of community-dominant oceanic species (Lobaria pulmonaria, Frullania tamarisci) into restored Scottish woodland. Continue. View more online here
Newey, S (Hutton)	1.3	1.3.3	2016-17	Conduct a literature review on the habitat associations of Capercaillie in Scottish woodland. And in collaboration with the CNPA and Capercaillie Framework partners gather expert opinion on the habitat factors that influence the distribution of Capercaillie within the CNP. View more online here
Newey, S (Hutton)	1.3	1.3.3	2017-19	GIS model CaperMap: habitat suitability for Capercaillie and exploration of likely impact of human disturbance and proposed mitigation measures. View more online here
Newey, S (Hutton)	1.3	1.3.3	2017-18	Select second case-study species – mountain hare -discuss proposed HareMap with key stakeholders. View more online here
Gilbert, L (Hutton, now Univ Glasgow)	1.3	1.3.3	2017-21	Create tick environmental limit models over National and European scales (includes study site of Ballogie in CNP). Use this to predict how climate warming will affect tick distributions / range shifts, and study adaptation / resilience of ticks to local climate changes. View more online here
Artz, R (Hutton)	1.3	1.3.3	2019-21	Regional assessment of peatland restoration success. We will test our Sentinel-2 based restoration assessment model at Forsinard to see if changes over 3 years can be detected, and explore whether the approach is transferrable to another site, using the Cairngorms (Balmoral) experimental Peatland Action site (pre-restoration) for comparison. Use all data collected to assess the potential for predictive modelling of restoration management impacts on peatland habitat composition. View more online here
Novo, P (Hutton)	1.3	1.3.4	2017-18	Interviews for assessing stakeholder attitudes towards new biodiversity management measures. KE – policy meetings to inform and discuss fieldwork on influence of social values, place and identity on biodiversity management. View more online here
Gimona, A (Hutton)	1.4	1.4.1	2017-18	ESS flows and Inventory Assets: Preliminary habitat maps - we will look for statistical relationships between land cover maps and the satellite data, undertaking an experimental EUNIS classification of habitat aided by SENTINEL products (direct link to SNH work). View more online here
Aalders, I (Hutton)	1.4	1.4.1	2018-19	Mapping intangible Cultural Ecosystem Services. View more online here
Gimona, A (Hutton)	1.4	1.4.2 and 1.4.3	2016-21	Policy Option Appraisal for delivery of multiple benefits. Climate adaptation and mitigation impacts on multiple benefits: ESS impacts of trading off agriculture against woodland expansion and peatland restoration, - develop national-scale multi-criteria models of trade-offs between forest, peatland and agricultural land cover effects on key ecosystem services.

				This national level focus is being combined with work in 1.4.3 to help the CNPA with identifying ecosystem-services based opportunities to improve land use/management in the Cairngorms National Park to achieve multiple objectives, including e.g. flood alleviation, connectivity for biodiversity, protection and enhancement of C stocks. View more online here
Gimona, A (Hutton)	1.4	1.4.2	2018-20	Maps of future connectivity under different scenarios. Maps will refer to connectivity and range expansion for umbrella species. At national level, this will highlight areas of the landscape that might need policy intervention to alleviate low connectivity problems. View more online here
Hester, A (Hutton)	1.4	1.4.2	2017-21	Test different spatial datasets for use in defining patch size / connectivity at different scales. Assess the role of habitat patch size and connectivity on long term vegetation compositional change in woodland and other upland habitats. View more online here
Waylen, K (Hutton)	1.4	1.4.2	2016-17	Aligning existing and new delivery mechanisms: Stakeholder feedback on analytical approach. Our comparative analysis of institutional processes to deliver soil, water and biodiversity policy goals in agricultural, woodland and peatland settings will begin by designing our analytical framework and collating the secondary data. We will check our approach and assumptions with policy stakeholders. View more online here
Nijnik, M (Hutton)	14	1.4.2	2018-20	Using social innovation to deliver multiple benefits in rural areas with a special focus on multi-functional forestry: data collection (with a particular focus on mountains). View more online here
Wang, C (Hutton)	1.4	1.4.2	2018-20	Visualisation Tool for Integrating Open Data Kit (ODK) with Google Earth. Link to CNP through Will Boyd Wallis. Development of a user friendly tool for visualising woodland expansion through Stereo panorama Images. View more online here
Brown, K (Hutton)	1.4	1.4.3	2016-17	Woodland expansion adaptive management issues (focus on capercaillie). View more online
Brown, K (Hutton)	1.4	1.4.3	2017-20	The use of digital storymapping (incorporating Minicam video ethnography as developed in the previous programme) - to allow the hard-to-capture values such as spiritual and symbolic attributes associated with woodland and its ESS to be assessed. View more online
McLeod, K (Hutton)	1.4	1.4.3	2017-21	Mapping ESS and benefits to illustrate adaptive and integrated catchment management – river Dee catchment focus. View more online
Blackstock, K/ Eastwood, A (Hutton)	1.4	1.4.3	2018-20	Use catchment case studies to improve our understanding of how the approach to adaptive management might vary and for what reasons (CNP link: Andy Ford). Includes production of research brief on understanding stakeholder knowledge and learning in Adaptive Management (Eastwood). View more online

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