



Cumbernauld Glen

**Exploring the perceived impacts of different
management interventions on woodland benefits**



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Background

Forests are an important part of Scotland's natural heritage and can provide a number of benefits to people, such as natural flood management and recreation. The type of benefits a forest delivers depends on the way it is managed and used. In addition, different people will perceive benefits differently and have different preferences. To understand how these things are interconnected, the James Hutton Institute is conducting a research project looking at forests in different parts of Scotland. One of our study areas are the woodlands near Cumbernauld, in North Lanarkshire, Central Scotland. Here in this report we specifically look at Cumbernauld Glen, a woodland of approximately 120 ha located centrally in Cumbernauld and managed by Scottish Wildlife Trust (hereafter the Trust). Within this study area, we looked at another woodland, the Forest Wood, also managed by the Trust. This is dealt with in a separate report. The other study areas are located in the Cairngorms and Argyll (Glen Creran).

To measure the perceived benefits from different management interventions and explore the differences in people's preferences, we chose a methodology which we call here scenarios workshops. This entails developing illustrative future management scenarios which form the basis of discussions about the management and use of the woodland. For Cumbernauld Glen, researchers at the James Hutton Institute developed, together with Duncan Clark and Ian MacKenzie from the Trust, six scenarios as

written narratives (Appendix 1). These build on documents such as management plans, surveys and scientific literature. One of the scenarios was based on the past (The Early 1990s), one on The Present (2019) and the other four were future scenarios set in the year 2031. The four hypothetical future scenarios were based on i) the current management plan (which we called Learning about Nature), ii) a strong emphasis on biodiversity and conservation (Wildlife Glen), iii) a focus on community engagement (A Picnic in the Forest), and iv) a final scenario (New Homes in the Glen), based around a scenario where budgets are very low and only management interventions required to fulfil minimum statutory requirement are carried out.

The Local Expert Panel Methodology

A local expert panel was assembled for a one-day facilitated workshop in June 2019. The panel comprised six local experts from different backgrounds and professions and included residents, greenspace officers and a forestry planner. The panel members were sent the six narratives a week before the workshop. Following an information session and explanation of the methodology, participants were asked to individually score (from 1-10) how well they thought each scenario performed against 11 ecosystem service (benefit) indicators (see Appendix 2 for full description of the indicators). Participants were also asked to indicate how confident (low, medium, high) they felt about their scores.

Following the exercise, the scores were displayed visually around the room for all the six scenarios, across the 11 indicators. Each expert's scores were represented using a different coloured dot. A facilitated discussion followed, to explore patterns, differences and similarities in the scores for different scenarios across indicators and individuals. For example, did any scenarios score particularly well across all indicators? How did scores for any particular indicator (i.e. Mental Restoration) vary depending on scenario? And what were the reasons behind any differences between individual scores?

Following the first deliberation session, participants were given an opportunity to revise their individual scores if they wished. Panel members were then asked to choose their favourite scenario, explaining why they made this choice, and what improvements or changes they would make to it.

Results from the scoring exercise

Table 1 below illustrates the median values of the six scenarios across the eleven indicators. While these values are based on a small number (six) of

participants and therefore need to be interpreted with caution, some overall response patterns can be highlighted. The highest performing scenarios, across all the eleven indicators, were Learning About Nature and A Picnic in the Forest, with a medians of median of 8 and 7.5 respectively (Table 1). The main rationale expressed for these two scenarios performing highly is that they both had high levels of engagement with the residents, leading to more people being able to access and realise benefits. These two scenarios both scored high on indicators often categorised as cultural services, such as Mental Restoration, Place Attachment and Learning, Knowledge and Skills. New Homes in the Glen was the poorest performing scenario, with a median of medians of just 2.5. It was felt that the overall lack of management interventions and maintenance of even basic access infrastructure in this scenario would lead to a dramatic decrease in benefits for local residents. One panel member found this scenario particularly depressing declaring: *"I would hate the last scenario, absolutely hate it."*



Graphic representation of scores for the indicator 'Place Attachment'.

Table 1: Median values of scenarios across the 11 indicators (where 1 is low and 10 is high). See Appendix 2 for the full description of each indicator.

	Early 1990s	Present	Learning about nature	Wildlife Glen	A picnic in the forest	New homes in the Glen
Employment	8.0	5.0	4.5	5.0	5.0	4.0
Target Species A	6.0	8.0	8.5	8.0	8.0	2.0
Target Species B	3.5	6.5	8.0	7.5	7.5	3.5
Timber extraction	6.0	4.5	4.5	5.5	5.5	3.5
Carbon Stored	7.0	5.0	5.0	5.0	5.5	2.5
Mental Restoration	8.0	7.0	8.0	6.5	8.0	2.5
Spirituality	5.5	6.0	7.0	5.5	6.5	3.0
Learning	7.0	5.5	8.5	5.5	8.5	2.0
Landscape Quality	7.5	7.5	8.0	7.0	8.5	3.0
Place Attachment	7.5	7.0	8.0	6.0	8.0	2.5
Natural flood management	5.5	5.5	5.5	6.0	5.5	2.5
Median of medians	7.0	6.0	8.0	6.0	7.5	2.5

It is notable that the Early 1990s scenario scored higher than the present and future scenarios in a number of indicators, namely Employment and Income, Timber Extraction and Carbon Stored. The rationale behind these scores was that in the past there were greater numbers of permanent and full-time staff employed to manage and maintain the woodlands and parks around Cumbernauld. The woodlands were also managed for timber production, and there was a working sawmill, leading to more local jobs.

Despite differences in the species composition and structure of the woodlands in the different scenarios the median scores in terms of the Landscape Quality and Character indicator did not vary much between the scenarios (from 7-8.5), with the exception of New Homes in the Glen (median=3). One panel member described the overall consistency in scoring down to the fact that for the vast majority of people it does not matter whether there are conifers, or native species or non-native species. They pointed out that: *“We get tied up in knots about it, should it be conifers, or should it be beech, or should it be sycamore? I think if you’re just walking in a woodland, for the general public – it’s just trees.”*

Figure 1 shows a summary of the scores as box-plots for the six scenarios across the 11 indicators. The horizontal line in the middle of each box is the median or middle score. A notable feature of the plots is the variation between the scores assigned by the expert panel members indicating a range of opinions on how different interventions impact human benefits.

In some cases, the differences in scores may however be attributed to differences in understanding or confidence on how certain interventions may influence benefits at a certain point in time. For example, some panel members found the scoring of Carbon Stored and Natural Flood Management challenging, whilst others, more familiar with these types of benefits were more confident in their scores. One participant revised their scores on Natural Flood Management and Carbon Stored following the first deliberation as they had gained new insight and understanding of these types of benefits and how different interventions could impact on them.

A number of participants also commented that they found it challenging to score the indicator ‘Spirituality’. For one participant the whole concept of spirituality was difficult to relate to on a personal level. For this reason, this participant gave Spirituality the same (low) score across all the scenarios. The indicator Spirituality varied considerably around the medium (long boxes), most notably in Learning about Nature, Wildlife Glen and A Picnic in the Forest. However, in The Early 1990s, The Present and New Homes in the Glen, there was little variation around the mean although there were a number of individual outliers (open dots).

The variation around the median for the indicators Mental Restoration and Spirituality in the future scenarios Learning about Nature, Wildlife Glen and A Picnic in the Forest may reflect differences in personal perspectives. In particular, the trade-off between increasing



the numbers of people visiting and engaging with Cumbernauld Glen (therefore more people potentially could receive restorative benefits) and the potential impact on peace and tranquillity (for restorative benefits). For example, most of the panel were of the opinion that even with increased public use of the Glen, such as in the Picnic in the Forest scenario, there would still be places for people to get off the beaten track for solitude and tranquillity. However, one panel member felt that the overall 'busyness' of the place would impinge on Mental Restoration; *"For me, ..., my mental restoration involves going away from everybody else with all my problems and a bit of solitude and the Picnic in the Forest scenario doesn't offer me that I'm afraid."*

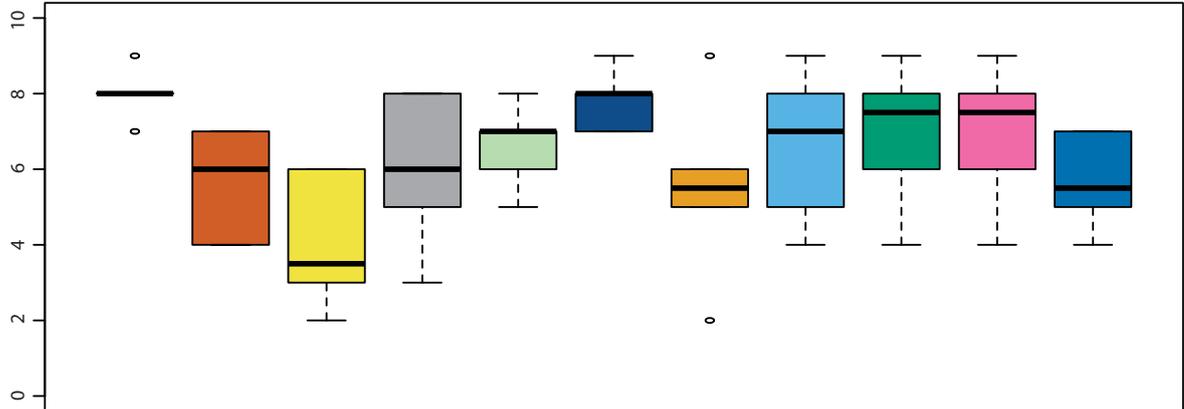
One participant who scored A Picnic in the Forest relatively high (8) for Mental Restoration explained that the Glen would feel safer for local residents due to the lighting, cameras and reduced anti-social behaviour. During the deliberation session another participant mentioned that there was evidence that showed that the more people there were, the less anti-social behaviour there was.

Figure 1: A summary of the scores as box-plots for the six scenarios across the 11 indicators. The horizontal line in the middle of each box is the median or middle score. The top line of the box represents the 75th percentile (upper quartile) and the bottom line the 25th percentile (lower quartile). The long 'whiskers' emerging for the boxes represent the maximum and minimum scores.

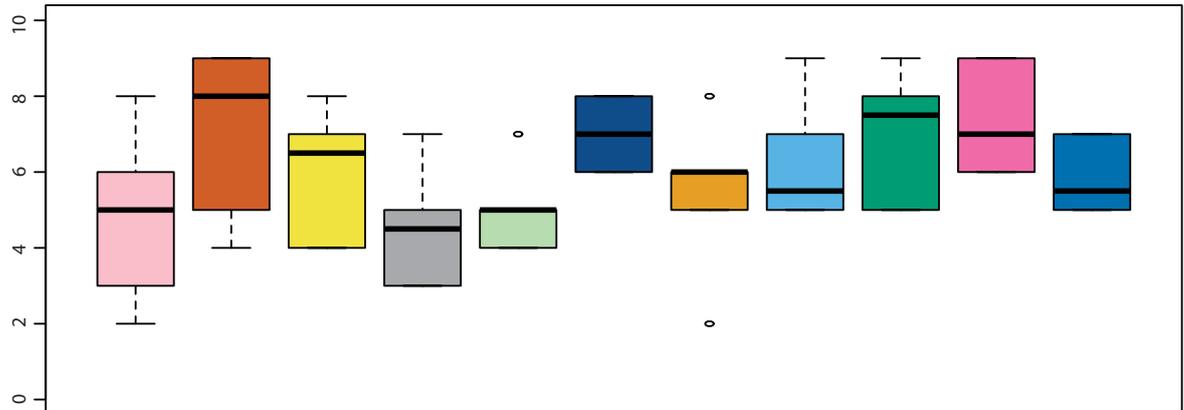
Legend

- | | | |
|--------------------------------|-----------------------------------|---|
| Employment and Income | Target Species A – Spring Flowers | Target Species B – brambles, bracken and rhododendron |
| Timber Extraction | Carbon Stored | Mental Restoration |
| Learning, Knowledge and Skills | Landscape Quality and Character | Place Attachment |
| | | Spirituality |
| | | Natural Flood Management |

The Early 1990s



The Present 2019



Learning About Nature

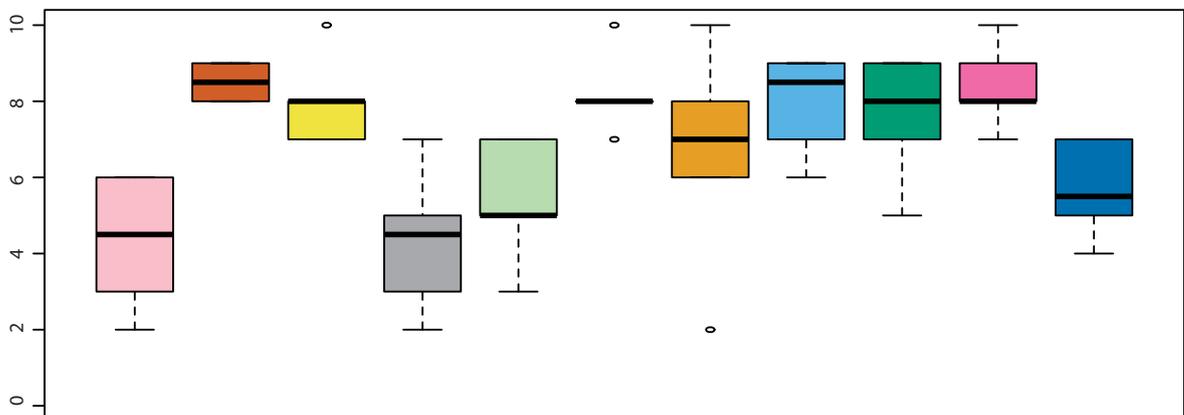
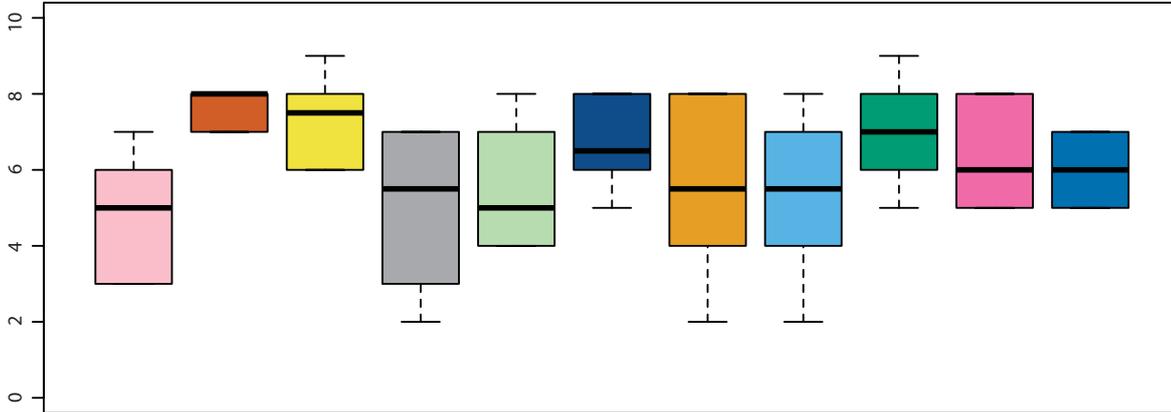


Figure 1. Continued.

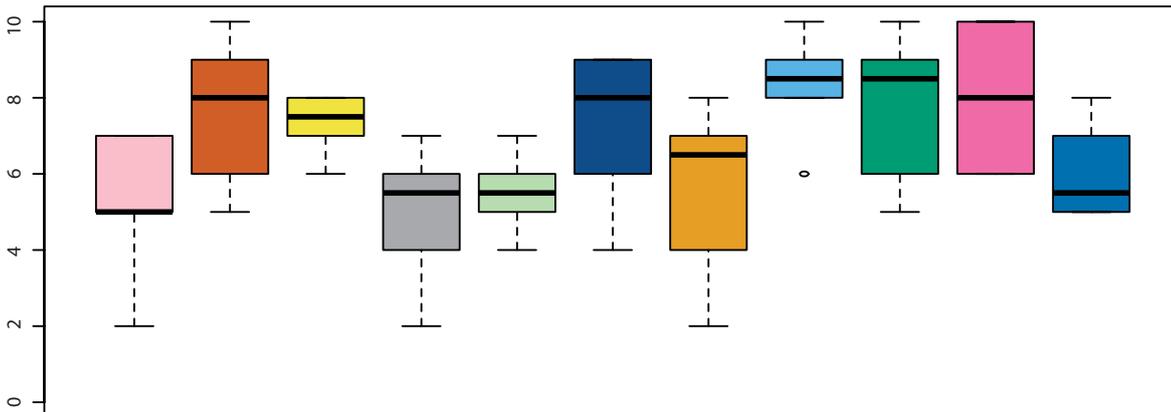
Legend

- Employment and Income
- Target Species A – Spring Flowers
- Target Species B – brambles, bracken and rhododendron
- Timber Extraction
- Carbon Stored
- Mental Restoration
- Spirituality
- Learning, Knowledge and Skills
- Landscape Quality and Character
- Place Attachment
- Natural Flood Management

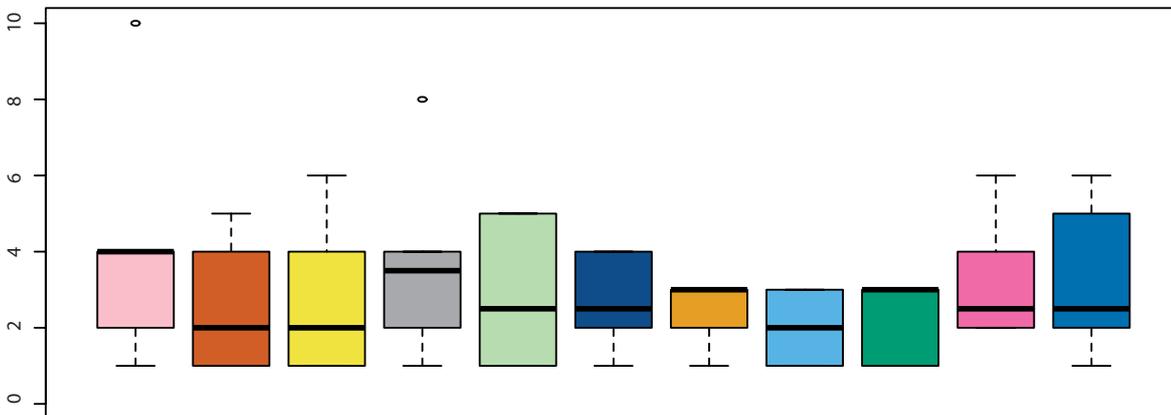
Wildlife Glen



A Picnic in the Forest



New Homes in the Glen



Key discussion points from the group deliberation

Public engagement and safety; their roles on perceived benefits

The expert panel were in general agreement that for local residents to be able to benefit from Cumbernauld Glen, especially with regards to benefits such as Mental Restoration, Spirituality and Learning, Knowledge and Skills, public engagement with local residents was fundamental. One participant of the panel felt that Cumbernauld Glen, and the other greenspaces in Cumbernauld were an under-utilised resource and there was a 'vast untapped potential' to engage more of its 18,000 residents. The participants expressed that for many residents, even for those that lived nearby, Cumbernauld Glen was largely unknown to them.

As one participant commented: *"I think overall it's just quite unknown though, because, see the people that come into my classes from Kilsyth, ... even Croy, places that are right on the doorstep, and they'll go 'I didn't know this was here'. 'I've been to the theatre but I didn't know there was this massive field and this big forest. This is great you know?'"*

It was generally felt that engaging with young children, in particular, was key in building a strong sense of Place Attachment. It was suggested by one participant that establishing a strong sense of place early on in life would help individuals stay connected with the Glen, enabling them to have the confidence to access benefits such as Mental Restoration throughout their lives. One participant recollected his days at the local primary school, when they'd visited the Glen for the first time to plant wildflowers, and how the anticipation of seeing the wildflowers bloom had been an incentive for him wanting to return to the Glen:

"It would be about 2007 we started doing wildflower planting up in the Glen, that's the first time I'd been there and every time we'd go for a walk, I'd be like let's go to the Glen, let's see if the wildflowers are there"

The panel expressed a concern that there were now generations of families who had not developed positive connections with the Glen or the other greenspaces in Cumbernauld. The importance of encouraging engagement and buy-in by local families and children was seen as very important for the future of the Glen. This was one of the reasons the panel were supportive of the interventions in those scenarios with emphasised outdoor education and learning, such as those in A Picnic in the Forest and Learning About Nature. For one participant, the greater level of

involvement and ownership in A Picnic in the Forest was seen as vital for the Glen's progress and protection into the future.

The lack of current engagement with the Glen was put down to several factors including the range of entertainment choices available nowadays for children that were not available in the past, such as smart phones, computer games as well as the prevalence of garden trampolines. Another key factor was the increase in perceived dangers and risks associated with visiting woodlands and that parents were much more protective of children now than in the past.

One participant commented *"the perception of what danger is, and isn't, has changed beyond recognition, ... When was the last time you went to a park and you saw a kid up a tree? You just don't see it anymore and if you do, mum and dad are generally shouting to get back down out of the tree because you'll fall, you know. Aye the bar has been lowered so far in terms of what's acceptable."*

It was commented that having the opportunity for adventurous play, and all the skills and learning associated with being able to just run wild, making dens, etc. was very important for children's development.

"All that kind of stuff is really valuable, for creating place attachment again these are brilliant interactions. The thing is often other users will look at them and...roll their eyes, in their eyes it's a misuse of the space, whereas that's an absolutely valid use of the space."

A participant who was more familiar with the public engagement and outreach activities undertaken by the Trust commented how they thought all the current work with the local schools and groups like Nature Ninjas was 'tremendous' and valuable for increasing community buy-in. This participant particularly liked the Picnic in the Forest narrative which described the continuity of community involvement where young adults who had been involved in nature groups when they were younger were now mentoring children.

Changes in management of Cumbernauld Glen; from manicured greenspaces to wilder, more natural ones

The older members of the panel recollected the significant changes in management approach between when Cumbernauld Glen was managed by the Cumbernauld Development Corporation (CDC), and after 1995, when the Trust took over its management. The biggest difference was that the CDC employed a lot more staff to manage the parks and woodlands, and the site felt more

manicured and managed. A participant described how the shift in managing for native wildlife and habitats had created consternation amongst residents:

"A lot of people think this is just messy and its untidy and it's not what they remember. I do remember comments being made and complaints being made to [the forest manager] saying you know the place is dreadful, it's going to wrack and ruin."

They also recalled the outcry by residents when the rhododendrons were removed *"One of the biggest outcries was about the rhododendrons, because when it was kind of manicured by CDC it really looked tremendous and I completely understand why people were up in arms about it ... there were different cultivars, there were yellows, and pinks and purples, it wasn't invasive, and it was quite spectacular."*

They felt that one of the reasons for the residents being dismayed at how the Glen looked now was the lack of understanding about why, for example, fallen trees aren't immediately cleared away *"to make the place look tidy."* It felt that this lack of understanding could be overcome through explanation:

"I think tell people why it's being done the way it is, people will buy in if they understand."

The panel also discussed how they felt that there was now a shortage of resources and staffing to manage and maintain the Glen,

whereas in the past there was a noticeable physical presence of people working in the Glen. This was one of the reasons why the Early 1990s scenario scored higher overall in terms in Employment and Income.

Whilst the panel appreciated the grievances from local residents on the impacts of more recent management interventions to the overall feel and look of the Glen, they also felt that there were enough parks and 'manicured greenspaces' in Cumbernauld and elsewhere, if that was what people were looking for.

One participant described how they actually enjoyed and liked that fact that the Glen was overgrown and wild in places as it added to their adventure experience:

"As a trail runner I like it when it's overgrown and there are trees being felled because, for me, that wee bit of plantation you're talking about where there are trees fallen over, we jump over them ... I think overall I'd say certainly from my point of view people quite like a wee bit of wilderness, a wee bit of adventure and there is a space for a really nice manicured place, but I would say probably the Glen might not be it."

Another participant described that walking in wild areas helped her solve problems *"I just think when you walk in wild areas you can sort of... without mentally thinking about anything to solve problems, it just kind of resolves an awful lot of things in your head. For me, my phrase is it restores your soul."*



Preferences for future management

The panel's preferred scenario was Learning About Nature, followed closely by A Picnic in the Forest. This was also reflected in the previous scoring exercise, with both these scenarios scoring the highest overall. As one panellist stated:

"I think that everyone is trying to get a balance between a place for wildlife and a place for people. It's trying to strike that balance where you get the best of both worlds, whereas that one [A Picnic in the Forest] was very much focused on people."

Whilst the participants really liked the high levels of engagement over several generations in A Picnic in the Forest, they felt that some of the activities were inappropriate for the Glen and better suited to Cumbernauld House Park or Palacerigg Country Park, for example. Another participant commented they didn't like the formalised nature of some of the activities in A Picnic in the Forest, nor the introduction of streetlights.

Suggestions for improving Learning About Nature were centred around empowering and engaging the local community more by, for example, reviving woodland craft skills, creating more volunteering or training opportunities, developing niche timber markets and working more with local schools on nature-based curricula and programmes. One participant suggested that introducing a new facility into the Glen could attract a new audience to the Glen, strengthening its appeal. They also noted that evidence has shown that anti-social behaviour decreases the more people there are in an area.

However, some participants were concerned that due to the narrow and central location of the Glen, some activities could potentially threaten its integrity, disturbing nesting birds or mammals known to reside there. The panel were keen to expand the woodland in the Glen to encourage more wildlife such as pine martens and badgers, and better integrate the woodland with other woodland areas in Cumbernauld. One participant felt that expanding the woodland would help reduce disturbance to wildlife if more people did begin to use the Glen.

"If you're going to make the Glen more of an attraction, get more people down there, it would be good to give the wildlife a wee chance to get away."

Another participant suggested that the Trust could work more collaboratively with other land-owners, such as the local council, to link the different woodland estates and pool resources together, thereby improving the overall management of the woodlands in Cumbernauld as well as making the woodlands far more sustainable financially.

"All the wee bits [of woodland] will cost money but on a bigger whole, there might be a bigger pool of timber to be looked at in terms of management and more coordination in terms of the management that you could actually sell that timber and bring in money"

They suggested it could be run as a cooperative, employing staff and allowing the more productive elements of the forests to be exploited for income generation. Finally, the panel expressed a concern about the further losses of woodland in and around Cumbernauld to housing and retail developments, thereby fragmenting woodland habitats further. As one participant remarked *"There are enough houses in Cumbernauld."*

Next steps

Over the next year we plan to conduct a further two local expert workshops in the Cairngorms, complementing our completed case-studies in Cumbernauld and Glen Creran. After that, our plan is to conduct a cross-site analysis of all the data to gain an overview about how different types of management interventions impact woodland goods, services and benefits from a range of perspectives.

Cumbernauld Glen

Site description

Cumbernauld Glen is an area of valley woodland located alongside the banks of the Red Burn and the Glasgow-Falkirk railway. The Glen is generally steep sided with a few well defined crossings linking east and west. The reserve is the largest of the four wildlife reserves in Cumbernauld, and being centrally located, is surrounded by dense housing and industrial estates. Over 18,000 people live within one kilometre of the site, so whilst bringing many benefits to the residents, the woodland's location also poses many challenges and pressures with regards to its management. The Glen forms a natural boundary to the housing areas of Abronhill to the east, Kildrum to the southwest, and Cumbernauld village and Seafar to the west. The 118.6 ha site is predominantly woodland and scrub, and is divided into three distinct areas, Dunns Wood, Crow Wood and Vault Glen. Around 65% of the reserve is designated as an Ancient Semi-natural Woodland and the Glen also includes smaller areas of heath and grassland. However, the character of the Glen is largely defined by policy woodland planting by the former owners of Cumbernauld House who incorporated the woodlands into the designed landscape of the house. Their legacy can be seen in the diverse composition of mature veteran trees (mostly non-native), some of which are over 150 years old. In the 1960s and 70s the Cumbernauld Development Corporation expanded the woodland significantly, planting more amenity mixed woodland and coniferous forestry mixes as well as creating a network of formalised paths, tracks and cycle routes of 10 km, linking residential areas to and through the Glen.



The Early 1990s

Remnants of the ancient semi-natural oak, ash and alder woodland are interspersed in between mixed policy woodland (mostly non-native broadleaves), new coniferous plantation blocks and mixed amenity woodland (mixed broadleaf with significant conifer elements). Apart from conifers planted in the 1970s, key tree species are sycamore, beech, and pedunculated oak. In spring, visitors can enjoy the extensive carpets of bluebells; however, these appear under threat from spreading Rhododendron and underplanted conifer blocks.

The Cumbernauld Development Cooperation employs around 25 foresters to manage the woodlands and new plantations across the sites. Works undertaken include thinning and draining plantations, removing diseased trees (elms, pollarding diseased limes), planting new oak plantations as well as fire patrols and staffing of fire observation posts at critical times. Planting mixes have included berried and fruit bearing trees and shrubs to encourage birds and other wildlife into the urban area. Great spotted woodpecker, treecreeper, woodcock and jay breed in the Glen, and wood warbler have been recorded as breeding birds in previous years. Red squirrel has become extinct around 1982. In terms of invertebrate life, the presence of small pearl-bordered fritillary is noteworthy.

The Red Burn and Bog Stank are heavily polluted, supporting very little aquatic life, and there are no records of otter or water vole. However, one or two pairs of dipper and grey wagtail do breed along the burn. There is a diverse range of birds that frequent the woodland (around 65 species), and mammals such as roe deer, badger, rabbit and red fox live in and around the Glen. Thinnings from the new conifer plantations are taken to the sawmill at Orchardton farm (the main forest depot). The forestry section of the Cumbernauld Development Cooperation also train and support a number of young trainees in forestry tree work and management, and the Youth Training Scheme is widely regarded as a success.

The woodlands are mostly used for quiet recreation, walking and cycling. The local residents appreciate the landscape scenery provided by the variable and diverse woodlands, open parkland and the screening and shelter belt effects provided by the woods. The Cumbernauld Historical Society is developing public interest in the archaeological and historical aspects of the area and a local youth group of the Scottish Wildlife Trust regularly uses the Glen for games and little projects. Nine primary schools and

two secondary schools are situated within walking distance of the Glen and many have expressed interest in making more use of the site for environmental education. It is hoped that increased involvement of local schools will also help to reduce widespread vandalism to trees, fire raising and fly-tipping.



The Present (2019)

In 1995 Forest Wood was gifted to the Scottish Wildlife Trust (SWT). This led to a change in management objectives, favouring the restoration and expansion of native woodland. Selective felling, restructuring and supplementary planting, mostly by forestry contractors, of native trees has opened up the diverse woodlands and has revealed a connected system of ancient woodland sites, which are now designated as one Ancient Semi-natural Woodland. This ancient woodland had been overplanted by conifer plantations in former decades. However, a large proportion of the woodland (75%) is still mature non-native (beech, sycamore, conifers) and mixed broadleaf within semi-mature conifer blocks.

The Scottish Wildlife Trust employs a Reserves Manager for all its four Cumbernauld reserves of which Cumbernauld Glen is one. Upgraded and well maintained footpaths allow the residents from the adjacent areas to enjoy leisurely walks through the woodland and to walk their dogs. The footpaths are also regularly used by residents to walk to and fro from the town centre and between residential areas. The purpose-built mountain bike trail is used intermittently. Previously, Abronhill High School, had used the trail for their physical education classes, but the school was closed, which reduces local demand for the trail.

The areas of Ancient Semi-natural Woodland come to life in spring with carpets of bluebells, and local residents often see roe deer. Woodpeckers can often be heard in the woodland, making use of the dead trees. Overall, there is a diverse range of birds that frequent the woodland (around 65 species), and mammals such as roe deer, badgers, rabbits and foxes live in the Glen. The status of butterfly populations hasn't been recorded. The 'Friends of Cumbernauld House Park and Glen' community group coordinates 2-3 litter picking events each year and is supportive of grant applications. Previously there had been a project officer to working with local volunteers, but now most of the woodland management work is carried out by contractors. The Creating Natural Connections, with three engagement officers, has just started within the Glen, hoping to engage local residents and schools with the Glen's stewardship. Anti-social behaviour such as littering, vandalism and fly-tipping is still a

problem and there is the occasional motor-biking. Lighting fires at the base of trees seems a popular pastime with the teenagers, and there are issues with safety with some residents not feeling safe, especially around the underpasses.

Non-native and invasive species, such as Japanese knotweed and Himalayan balsam are still present but the Trust is working hard to control and/or eradicate them.

The Red Burn's water quality shows signs of improvement but is still unsatisfactory.

The following four scenarios describe what Forest Wood might look like in the future (2031), if different hypothetical management approaches are followed:



Learning About Nature (2031)

A large part of the woodland on the site has now been selectively thinned and restructured to remove non-native conifers, and the native broadleaf woodland portion of the majority of the compartments is now above 35%. Ninety percent of ash copses have died, and many had to be removed due to ash dieback. With a lot of effort, larch trees had to be felled throughout the Glen as the presence of *Phytophthora ramorum* meant that Statutory Plant Health Notices were issued. The annual carpets of bluebells in spring attract increasing numbers of visitors from Glasgow and surrounding towns. Evidence of the elusive pine marten is on the increase, and it is hoped that with time, pine marten will further decimate the grey squirrel population for the red squirrel to fully re-establish. The Red Burn has now reached favourable water quality, despite the reoccurring dumping of shopping trolleys and litter.

The Creating Natural Connections programme has been successful, with increased attendance at 'Nature Ninjas' volunteer group (all now equipped with fit-bots) and Wild Watch sessions. The 'Friends of Cumbernauld Glen' group have also reported increases in their membership, which has allowed them to plant and manage 15 wildflower meadows that are effective in attracting a wide range of insects. Some of the ex-pupils from Cumbernauld Academy, who participated in the Creating Natural Connections programme, are still – 10 years later volunteering at the monthly Wildlife Watch activities for young children. A number of ex-pupils have also gone on to study countryside management courses and have found work across Scotland at a number of estates. The Glen has now 15 years of monitoring records for bats, woodland birds and garden

escapes/invasive non-natives and stream water quality thanks to the pupils of Cumbernauld Academy and the local The Conservation Volunteers group.

There are still issues with fly tipping (especially near the industrial sites) and litter is always an issue but repeated campaigns appear to have reduced it. Collaborations with neighbouring landowners have enabled a number of interpretation boards in the Glen to be erected, and detection and management of invasive non-natives is now fully collaborative and highly effective across boundaries.



Wildlife Glen (2031)

A large part of the woodlands in the Glen has been selectively thinned and restructured to remove non-native conifers and broadleaves such as beech. For restoration expedience this was conducted by forestry consultants from Stirling, and included clear felling some of the conifer plantations. The native broadleaf woodland portion of the majority of the compartments is now at 50%, although constant vigilance by staff is required to remove non-native saplings. The key native woodland types of the Glen are now clearly identifiable with oak and alder woodlands being most dominant. Unfortunately, 90% of the ash copses have died off due to ash dieback. The larch that had to be removed because of a Phytophthora infection has been replaced with pioneer native tree species e.g birch and rowan. Local residents are asked to keep their dogs on leads when passing through the conservation grassland, woodland and mire areas.

Habitat and species monitoring in the woodlands and restored grasslands is conducted by biology/ecology students every 4-5 years, using a mix of citizen science and internet-based crowd classification of remotely generated material (e.g., from camera traps and drones) and traditional monitoring and management techniques. This has allowed the control of Spanish bluebell, and native bluebell has expanded significantly. Goshawks are occasionally seen, and buzzards breed at the woodland edge. The red squirrel reintroduction has been successful, although the trapping of grey squirrels has caused serious repercussions with the local community and SWT head office, and any return of grey squirrels is kept in check by the slowly growing population of pine marten. Butterfly and other insects have also increased.

The woodlands and meadows are popular with the local residents who use it for dog walking and walking. Apart from the core paths, the pathway

network is being reduced and information signs are kept to a bare minimum (ground nesting birds - keep dog on a lead). Numbers of complaints to the SWT office, especially about management interventions such as tree felling, use of herbicides and grey squirrel control, as well as about the safety and accessibility of the paths, have increased. Fly-tipping, littering and dog fouling are still a problem, especially near the residential areas. The forest manager and ranger regular collect truckloads of litter from the site, especially during the summer.



A Picnic in the Forest (2031)

The Glen is a mixture mixed broadleaf, mixed conifer and plantation woodland. However, a large proportion of the woodland is still mature non-native (beech, sycamore, conifers) and mixed broadleaf within semi-mature conifer blocks, as priorities have changed since the Long-Term Forest Plan was developed, and especially non-native deciduous trees are now well-accepted. Unfortunately, 90% of the ash copses disappeared due to ash dieback.

The Friends of Cumbernauld House and Glen have enhanced the designed landscape in the park and around the house, including the veteran beeches and lime trees. This was agreed with the joint Scottish Wildlife Trust/community management initiative, which has seen greater community stewardship and responsibility for the Glen. The litter picks are well frequented and the CCTV cameras around the industrial areas have reduced fly-tipping and increased perceived safety amongst users. The woods have been opened up in areas to provide clear sight lines, more street lights have been installed, and a new family picnic and play area has been installed in Cumbernauld House Park.

Following on from the Creating Natural Connections programme community engagement activities have broadened out with four high schools around the Glen now fully engaged. There are regular outdoor events and activities including orienteering, mini-music festivals, night walks (e.g., RSPB's Big Wild Sleepout), buggy walks, etc that encourage a range of different nature experiences. The Wild Watch programme for younger children is essentially run by pupils and ex-pupils from Natural Connections and has received nationally acclaim, with even BBC Spring Watch filming a session recently. The participatory video campaigns on litter and fire-starting have gone down really well with community and the message seems to be getting through. Local membership of the Scottish

Wildlife Trust has gone up by 30%, and there is an active group of volunteers that manages the wildflower meadows, removes tubes around trees planted as replacements, helps keep invasive species under control, and helps to cut back dogwood with loppers. The Glen has now 15 years of monitoring records for bats, woodland birds, garden escapees/invasive non-natives and stream water quality thanks to the pupils of Cumbernauld Academy and the local The Conservation Volunteers group. Citizen science and crowd identification of insect records has helped to raise local gardeners' appreciation for the role of pollinators (supported, e.g., by the wildflower meadows), there is a local beekeeping group, and gardeners around the Glen have over time adopted more pollinator-friendly approaches to their gardening practices. Records of pine-martens have shown some decline in recent years, while populations of some insects have increased.

A spin off non-profit-organisation has been established with local authority funding; Forest Fitness for Life, which works with local GP practices to deliver green prescriptions and specialised sessions for target groups (older people, mental health service users, people with dementia, children).

New Homes in the Glen (2031)

The Glen is comprised of a mixture of semi-natural native, policy woodland and mixed conifer plantations. There has been no increase in native trees in the various forestry compartments. The most lucrative areas of the reserve (20 ha) have been sold to a private housing developer and turned into new homes. There is now one part-time reserve manager for all four SWT reserves in Cumbernauld, who contracts out only essential health and safety works, such as removing windthrown trees, diseased plants (all rhododendron had to be removed due to a Phytophthora infection) and spraying non-native invasive plants such as Japanese knotweed. As the areas where rhododendron had been removed could not be planted up, rhododendron keeps growing back. Ninety percent of the ash copses have disappeared due to ash dieback and have not been replanted. Obligatory surveys (for the compulsory felling orders) for bats and badger setts suggest populations of these mammals are stable but no information is available on the status of flowering plants or birds.

The local action group, 'Friends of Cumbernauld House and Glen', are still active, however activities are limited to bi-annual litter picks due to lack of capacity and resources for

more skilled woodland management. The annual carpets of bluebells in spring still attracts large numbers of visitors from Glasgow and surrounding towns. However, routes through the woods have been reduced due to health and safety concerns of senescing and diseased trees.

The main paths and key street lights are poorly maintained, and a number of the smaller routes are overgrown by nettles and brambles. A number of benches and sign-posts have fallen into disrepair. Litter, fly-tipping, dog and garden waste are an ever increasing problem. Spanish bluebells are spreading and hybridising with the native ones. Roe deer numbers are up considerably with local residents complaining of the damage to gardens and increased number of car accidents. Woodpeckers (green and great spotted) are regularly heard in the Glen.

Fire-raising is a regular event especially in summers, and the trust has lost over 10 hectares of mixed conifer plantation to fire. Parts of Abronhill had to be evacuated one year due to a fire that got out of control.

The Glen is still regularly used by local residents for walking, jogging and dog walking. There have been a number of complaints about anti-social behaviour to the manager and the lack of personal safety, particularly around the underpasses and overgrown wilder areas of the Glen. Mature trees regularly have to be felled as fires (e.g., in wheelie bins placed next to their stem) and diseases have weakened them so much that they are no longer safe.



Appendix Two - Indicators:

Changes in benefits from Cumbernauld Glen.

These indicators are common across the different research sites in this study. As such, some of the indicators (e.g. timber extraction; natural flood management) might be more applicable to the other woodland contexts than Cumbernauld Glen.

	Indicator	Explanation
1	<p>Employment and Income</p> <p>Overall, how well do you think each scenario delivers with regards to employment, i.e. the number of jobs directly or indirectly linked to the site?</p>	<p>Consider for each scenario the impact on employment for the area. Think about the impact each scenario has on the diversity of jobs available in the local area and whether these are likely to be unskilled, skilled or professional jobs.</p>
2	<p>Target species – spring flowers</p> <p>Overall, how well do you think the scenario encourages woodland spring flowers (bluebell, wood anemone, violets etc.)?</p>	<p>Consider for each scenario to what extent the various management interventions lead to more open, woodlands, with moderate levels of disturbance and species rich ground flora.</p>
3	<p>Target species – brambles, bracken and rhododendron</p> <p>Overall, how well do you think the scenario suppresses species such as bramble, bracken and rhododendron?</p>	<p>For this indicator we are interested in the impact of the scenario on species that are considered 'bad for biodiversity' as they potentially exclude others, leading to reduced species diversity. In this case, a high score indicates that these species would be kept at bay in a given scenario.</p>
4	<p>Timber Extraction</p> <p>Overall, how do you think each scenario will affect the actual extraction of different types of wood materials (i.e. construction timber, wood fuel, wood for pulp, craft woods) from the site?</p>	<p>This indicator refers to wood/timber materials for different uses that are extracted from the site under the different scenarios. Please consider in your answers both the availability of such materials and the extent to which it is actually taken off site.</p>
5	<p>Carbon stored</p> <p>Overall, how do you think each scenario will affect the amount of carbon stored at the site?</p>	<p>Please consider in your answer that all of the components of the site potentially contribute to carbon uptake and storage, e.g. trees, understory shrubs and grasses, mosses, but also the carbon in the soil itself.</p>
6	<p>Mental restoration</p> <p>Overall, to what extent does each scenario promote people's feelings of being relaxed and restored?</p>	<p>This indicator relates to subjective experiences that contribute to mental wellbeing. In your answer please consider how each scenario would affect users' feelings of calmness and tranquillity, stress relief and escape from daily hassles/problems, and feeling refreshed and re-energised. This includes local residents, visitors and any other people using the site.</p>

Indicator		Explanation
7	<p>Spirituality</p> <p>Overall, how well do you think each scenario delivers on opportunities for spiritual experiences?</p>	<p>This indicator refers to how each scenario fosters a sense of encountering something sacred or bigger than oneself, and promotes a sense of wonder.</p>
8	<p>Learning, Knowledge and Skills</p> <p>Overall, how well do you think each scenario delivers on opportunities for training, education and learning?</p>	<p>Please consider the full range of potential knowledge, skills and training opportunities and all age groups – from traditional land management skills to handicrafts, to research and monitoring, to outdoor education and mountaineering skills.</p>
9	<p>Landscape quality and character</p> <p>Overall, how well do you think the scenario delivers on perceived landscape quality and character?</p>	<p>To which extent do you think people will appreciate the landscape, in terms of its visual aesthetics as well as its other features and its overall character?</p> <p>Consider how the different elements and features (natural and human made) make up the landscape in the scenario.</p>
10	<p>Place Attachment</p> <p>Overall, how well do you think each scenario supports local people/visitors in forming and/or maintaining a strong attachment to this place?</p>	<p>How might each scenario affect people's emotional connection to the site? Please consider how the changes described in the scenario would affect the emotional significance of the place for individuals, as well as extent to which users would experience feelings of belonging and being 'at home'.</p>
11	<p>Natural Flood Management</p> <p>Overall, how well do you think each scenario provides protection from flooding, e.g. through natural flood management?</p>	<p>Do any scenarios increase or decrease the risk of flooding either in the upper or lower catchment? Consider how the vegetation and soil structure in each scenario may affect the volume and speed of surface water run off or soil permeability.</p>



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