The co-operative membership Cymru/Wales

The Vincent Wildlife Trust

# Forestry trends in Wales, in relation to potential pine marten recovery

## Introduction

One of the major factors thought to underpin the decline of the pine marten population in Wales is the loss of woodland and fragmentation of habitat. In order to successfully re-establish the population it is vital to understand the current and future trends in woodland cover and composition, which will also enable us to confidently justify why we have chosen this time to reinforce the population. This brief document analyses government and independent forestry data, and assess the intentions and ideals for Welsh woodlands in the future, commenting on the relevance to our work.

## Contents



## 1 - Overall trends, National Forest Inventory 2013:

- The latest National Forest Inventory statistics attribute to Wales a forested area of 306,000 hectares, 15% of the total land area (compared to approximately 37% in Europe, Fig 1).
- 36% is owned by Natural Resources Wales, of which 84% is conifer woodland where sitka spruce is the dominant species.
- 49% of the total wooded area is conifer woodland, which compares with 74% in Scotland and 26% in England (Forestry Commission, Forest Service, National Forest Inventory 2013). Conifer, as a proportion of total woodland composition, differs slightly in the RSPB's State of Nature report which states that 43% of woodland is coniferous, with 38% broadleaf and 4% mixed native woodland (RSPB, State of Nature report 2013).
- There was a 900 hectare increase (0.003%) in woodland from 2013, greater than the average 400 hectare per year increase since 1990. Interestingly, 89% of it was broadleaf woodland outside of NRW ownership – representing grant aided schemes and natural regeneration.
- New planting and regeneration is under-estimated due to the inability to record young and small trees from the areal census.


**Fig 1: Distribution of woodland of 0.5 hectares and over (Forestry Commission 2011).**

## 2 - Commitment to woodland in Wales – the 'Woodlands for Wales' strategy.

The government produced a national woodland strategy, **Woodlands for Wales** in 2004, which was revised in 2009, and which makes for positive reading. There is an acknowledgement that the woodlands of the 20th century were managed too exclusively for timber, and that an updated, increasingly holistic and environmentally friendly approach to forestry is now required, with the goal that Wales becomes renowned for its 'high quality woodlands'.

- The strategy forecasts a thrust towards improving woodlands for provisioning services (timber, forest products), cultural services (amenity value), regulating services (flood defence, soil anchoring, wind breaks etc.), and supporting services (carbon sequestration). **A moderate level of management for timber products will likely benefit pine martens by increasing productivity and turnover of plants and trees, whilst affording protection to old growth for its amenity value is also beneficial. More intensive management for commercial operation has the potential to cause disturbance and to threaten territory structure through woodland clearance or significant alteration. Retaining woodland for carbon sequestration and other regulating services will be beneficial to overall biodiversity, and therefore to martens.**

- Bringing more woodlands into active management is a key step outlined by the strategy, though this might be more pertinent for small, privately owned woodlands currently unmanaged, where the government 'buys' active management from the owner. **Management of rank woodlands within range of pine marten colonisation could be beneficial, as woodlands are made more productive for wildlife through moderate disturbance and clearance of rank growth, promoting regeneration and productivity.**

- The positive effects of diversified woodlands are recognised, though it is acknowledged that diversification is likely to be most pronounced on a landscape scale – i.e. some mixing of species within commercial forests on a local scale, but greater complementarity at the landscape scale through promotion of diverse forest types. Where there is a strong ecological case for clearing forest on formerly open ground, forest could be removed. **Diversification of conifer monocultures, of both species and age structure, will benefit pine martens and overall biodiversity. Forest clearance, particularly in the uplands where formally sites may have been treeless, could reduce the range for pine marten, though this may be compensated for by the creation of richer habitat and foraging opportunities in the vicinity of remaining forest - there may be potential for controversy and conflict with species characteristic of open habitat in the future (nightjar, grouse sp, waders etc).**

- Emphasis is given to connecting fragmented patches of woodland to protect and increase biodiversity under the EU Habitats Directive and BAP species framework. **This will have obvious benefits to pine marten by connecting woodlands, creating foraging opportunities and facilitating the spread of the population by making the landscape more permeable.**

- Clear fell is recognised overall as an unsustainable and environmentally damaging practice (Fig 2). Greater incorporation of Continuous Cover Forestry (CCF) and Low Impact Silvicultural Systems (LISS) are to be incorporated where possible. Clear fell will still be used where appropriate. **CFF and LISS systems will benefit overall biodiversity by promoting more complex woodland structure and diversification of species, without the catastrophic clearance of habitat characteristic of clear fell. This will have obvious benefits to pine martens including long-term habitat suitability, increasingly complex habitat, home range stability and reduced disturbance (particularly catastrophic clearance of habitat), though some clear fell will still be used.**

- It is forecasted that most woodland increase will come as a result of regeneration and planting on farmland. **Planting on farmland may have limited relevance for pine martens – it depends on the location of the farm. There could be potential to facilitate ecotourism, though there could also be potential for conflict with livestock.**

- Deer and squirrel control are to be investigated and supported. **This sets the pine marten up as a potential ally for foresters, and should ensure government support if the potential benefits of squirrel control are judged to outweigh the misgivings of the minority.**

**Fig 2:** Clear fell of an upland sitka spruce coop in the Dyfi Forest, Gwynedd. Photo courtesy of Mairi Ayres.

**Fig 3:** Mixed species noble fir plantation resembling more of a Continuous Cover Forestry approach, with young oak, birch, beech and hazel in amongst the conifer. Note the well-developed ground flora of common heather and bilberry. Cwm Ystwyth, Ceredigion.

## 3 – Climate change and forestry

Climate change will impact forestry operations in Wales to some extent, and therefore the species that are dependent on forests. Forest Research were tasked with assessing the future impact of climate change on forestry practice within Wales in 2008; the findings and recommendations made for future forestry management are pertinent to the future of a recovering pine marten population.

- The forecasted warmer climate is expected to increase annual tree growth nationally. **Increased regeneration of habitat, growth of trees and subsequent woodland cover – increased range, habitat and foraging opportunities for pine martens.**

- LISS forestry systems and use of greater species mixes are likely to provide the basis for secure adaptation strategies. **The move away from single age, single species monocultures will benefit overall biodiversity.**

- Wider range and genetic diversity of tree species. **As above**.

- Acceptance of natural colonisation of some non-natives (beech for example) may be an acceptable adaptation strategy (subject to case by case review). **Increased diversity of tree species.**

- Natural regeneration is likely to benefit from the increasing average temperatures and reduced seasonal variance of temperature, ie warmer, wetter winters. Succession is already evident across much of Wales in response to reduced grazing pressure and lower intensity management, and its contribution to increased woodland cover has likely been underestimated, particularly for ffridd woodland (scrub woodland, typically found on hillsides), which softens the edge between established woodland and the uplands (Fig 4).

- In a warmer climate, bramble growth may become more rank and dominant. **Increased cover, denning opportunities and food availability (directly from the fruit, and the associated small mammals).**

**Fig 4:** Natural regeneration from reduced grazing is highlighted in the contrast between land fenced off from livestock and grazed land. The left image is of Cefn Banddu, Carmarthenshire, and the image on the right was taken at Bwlch Llyn-bach, between Corris and Dolgellau, courtesy of Huw Denman.

## 4 – Large scale tree disease & future threats; *Phytophthora remorum* & *Chalara fraxinea* (ash die-back).

Two recently emergent tree diseases in Britain, *Phytophthora remorum* and *Chalara fraxinea* have the potential to significantly affect the structure of woodlands in Wales, particularly in the short term. The potential effect on a recovering pine marten population is uncertain, but it is unlikely to seriously jeopardise their ability to either survive or recolonise former range. So far as we know, pine martens have no specific reliance on the particular species of trees affected by the diseases (Currently Japanese larch & European ash) but exhibit an adaptive preference for three dimensionally complex habitat that fulfils the requirement of providing secure refuge sites, breeding dens and foraging opportunities.

### *Phytothphora remorum*

- Fungus-like pathogen that causes mortality and damage to a range of plant and tree species; it is called 'sudden oak death' in America, but no effect on British Quercus (oak) species has been observed. In Britain, it is particularly devastating for Japanese larch, but has also been observed in Douglas fir and Sitka spruce – all important commercial species – and has affected beech trees in America and Europe.

- The total area of larch in Wales is 22,400 hectares, 8% of the total woodland in Wales. Surveys in May 2013 found a total of 5000 hectares of infected larch, with the total rising. Infection has been most concentrated in south Wales, notably the Afan Valley, Garw Valley and the Vale of Glamorgan, but infection has spread to a number of sites further north (Fig 5). **Potential disruption and fragmentation, loss of valuable mature stands and change in prey availability.**

- The spores of the disease can be wind-borne over long distances, as well as transported by wildlife, people, dogs and water. It is therefore very difficult to stop the spread: infected government owned woodlands have had the larch component felled, whilst the government delivers statutory Plant Health Notices to woodland owners with infected larch, which they are then obligated to remove. The disease is forecasted to spread, particularly with the development of warmer and wetter winters: almost all of Wales is in the high risk zone, Zone 1 (Fig 7). **There is obviously a dramatic impact of clear felling on such a scale, both at a local and landscape scale, though the sites we have shortlisted are in areas currently experiencing little or no impact. The disease is predicted to spread north in Wales however, and sites we may choose will likely contain a larch component. Felling may cause short term disturbance to individual home ranges and effect movement in the landscape, but this may be offset by greater foraging opportunities associated with increased rodent abundance in clear fell, natural regeneration or young plantation. The disease may come to affect more species, particularly Douglas fir and Sitka spruce – this could lead to significant disturbance and habitat modification in the future.**

  Perhaps more worrisome is *Phytophthora kernoviae*, which behaves in a very similar way to *P. remorum* and has been found in the UK on bilberry (*Vaccinium myrtillus*), cowberry (*V. vitis-idaea*), bearberry (*Arctostaphylos uva-ursi*) and crowberry (*Empetrum nigrum*). Bilberry is a significant component of native oak woodland in Wales, and is patchily present in planted conifer forest – it provides ground cover and a major source of food from mid-summer through to late autumn. *P. kernoviae* is currently confined to SW England where it mostly affects Rhododendron sp and beech, but has been detected in isolated sites in Scotland. **Infected berry-bearing shrubs could have a significant direct effect on pine martens through loss of a food source and ground cover, and also indirectly by depriving prey species of a source of food. In the event that this occurs, perhaps it will be offset by the increasingly favourable growing conditions for bramble predicted in the future, though blackberry fruits later and has a shorter**

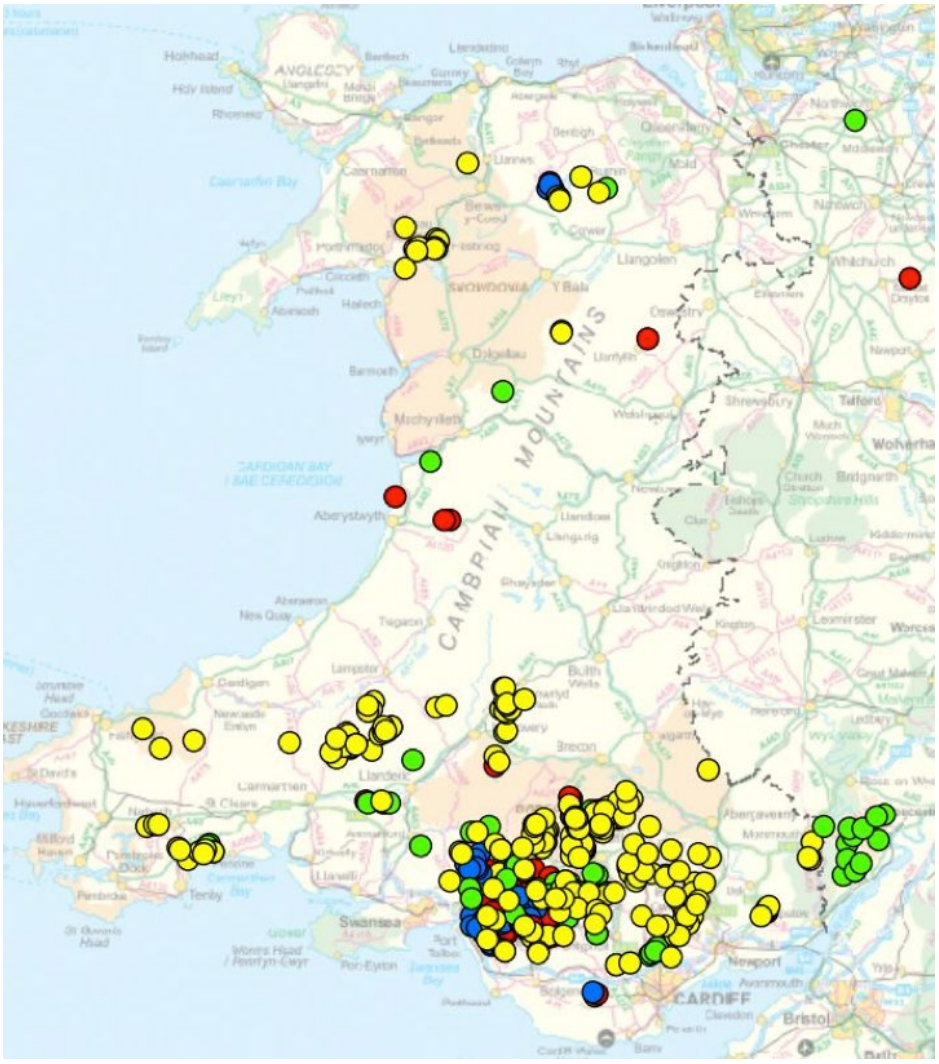


Fig 5: Incidences of *Phytophthora remorum* in Wales and the English border as of 29/10/13. Circles - blue, 2010; red, 2011; green, 2012; yellow, 2013. (www.forestry.gov.uk).

Fig 6: The larch component of the forest is removed following infection by *Phytophthora ramorum*. Nant yr Arian, Ceredigion.


Fig 7: The risk zones designated for *Phytophthora remorum* in August 2013, where Zone 1 is the highest risk (www.forestry.gov.uk).

## *Chalara fraxinea*

- Pathogenic fungal disease effecting ash trees, causing leaf loss, crown die back and eventual death of the tree. Young trees have been observed to die in as little as a single growth season, whereas older trees resist for some time before succumbing to continued exposure or attack from another pest pathogen acting on the weakened tree. It is a significant threat to ash trees in Britain: losses of 60-90% of the ash population have been observed in Denmark. The spores do not spread as pervasively as those of *P. remorum*, but can be wind-blown locally over some tens of miles.

- There is no action plan to treat or remove infected trees, but biosecurity measures are in place to limit the spread of infection. The greatest concentration of incidence are in the east of the UK, where the disease is thought to have entered the country, though isolated infections are cropping up around the periphery of Wales, and will likely increase (Fig 8). Genetic resistance has been found in a small proportion of Danish trees, and the hope is that this will be the case for Britain. Forest Research is actively pursuing this with propagated saplings. **There is unlikely to be an effect of the disease on pine martens. Diseased ash trees will remain in the woodlands, attributing to the deadwood and potentially providing arboreal denning cavities. Lost trees will be replaced by other colonising species, and any loss of associated biodiversity is unlikely to impact the generalist marten diet - so far as we know.**

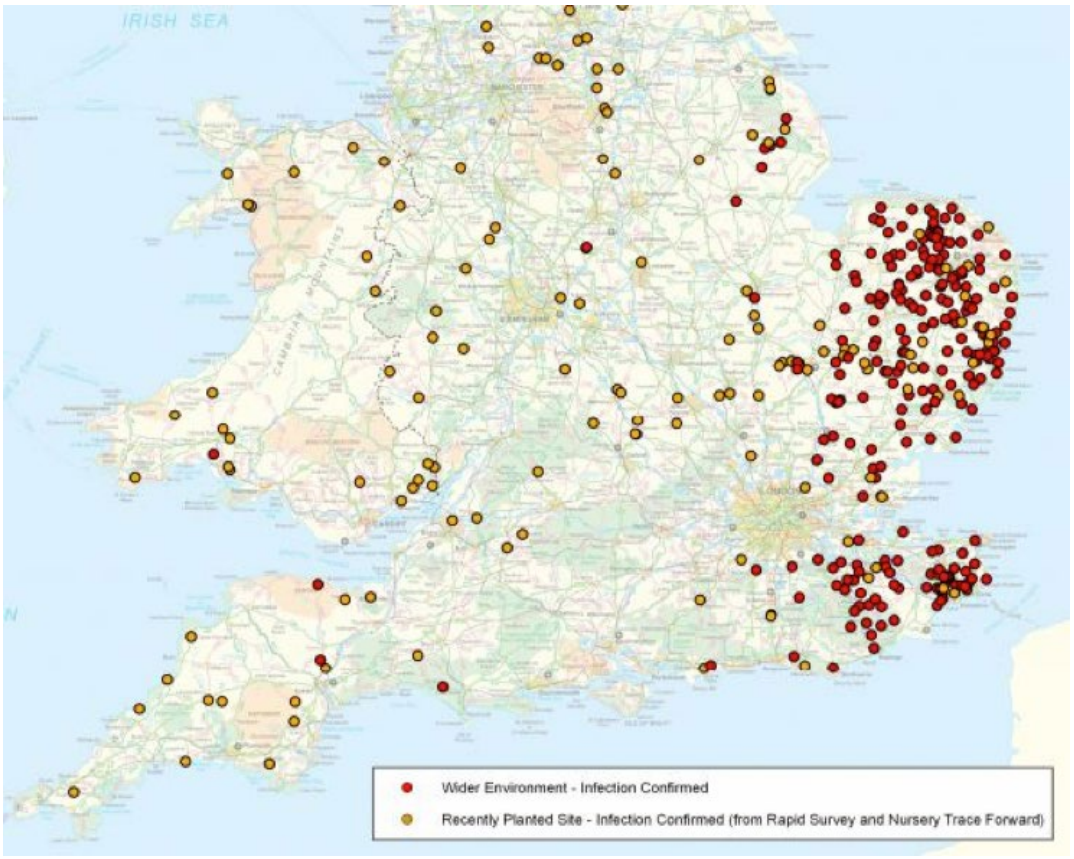


Fig 8: Incidences of *Chalara fraxinea* in Southern Britain, as of 23rd June 2014. The majority of incidences in Wales are associated with recently planted sites (yellow circles). It is likely under recorded in the wider environment (red circles), (www.forestry.gov.uk).

- Aside from the established tree diseases that we are aware of, it is realistic to expect an increase in tree pathogens and invertebrate pests facilitated by a warming climate and the ease of global trade. Perturbations of this kind will be incredibly hard to control, and has the potential to effect tree diversity across international boundaries.

- Though not classed as a pest, the increased migration of deer into Wales, and expansion of existing populations, will likely have an impact on broadleaf regeneration as experienced in England. Fallow deer have been established in the Mawddach catchment for some time, and are controlled by one ranger in Coed y Brenin. Roe deer are now widespread, though not abundant, whilst non-native species sika and muntjac are increasingly reported. The impact of increasing deer numbers on pine martens is unknown, though there may be negative effects associated with overgrazing/browsing of vegetation and regenerative trees, impacting on marten prey species and through reduction of forage and protective ground cover. Deer carcasses may provide a source of carrion over the winter, which would be an obvious benefit.

## 5 – Renewable energy development: onshore wind farms.

The Welsh government has committed to increasing the proportion of electricity produced by renewable energy nationally, in line with UK wide targets for renewables to produce 15% of the UK's power by 2020.

- There are currently 7 wind farms with a capacity of 50MW or greater operating in the mid-Cambrian mountain zone, totalling 267 turbines (Fig 9, National Assembly Wales).

- The largest single operation, near Pentre in Montgomeryshire, has 103 turbines. In general, the greatest concentration of wind farms are in the coastal areas of the south/south-west, and **are unlikely to be relevant for pine martens in the initial phase of a population recovery.**

- The large scale wind farms are mainly sited on the un-forested mountain plateaus and hill tops, or in forestry which is sub-optimal for pine martens. Proposed farms over 25MW are to be cited in Strategic Search Areas designated by government planning policy (National Assembly Wales 2013). These strive to avoid areas of natural beauty and high biodiversity value (Fig 9).

- There are a further 26 ***proposed*** wind farms in the Cambrian region, totalling 534 turbines. 2 farms totalling 16 turbines have been consented so far.

- Some of the wind farm developments involve 'key-holing', a process which involves permanen-tremoval of trees in a 50 to 100 metre radius of the turbine. This is likely to improve habitat by providing prey rich areas of scrub and rough grassland in otherwise monoculture stands of plantation conifer.

- There are no existing or planned schemes *with a capacity for generating over 25 MW* in Gwynedd - there are just 2 turbines within the boundaries of Snowdonia National Park, at the eastern edge near Bala.

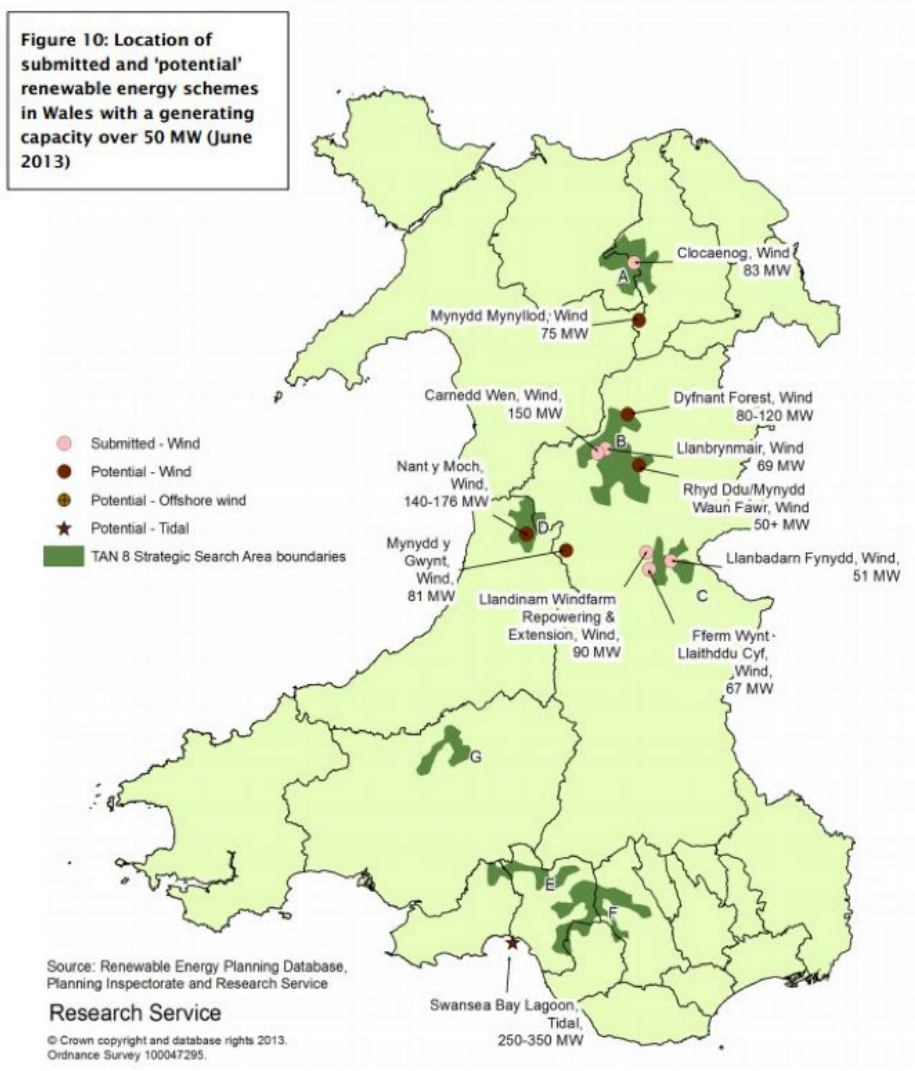


Fig 9: Location of submitted and 'potential' renewable energy schemes in Wales with a generating capacity over 50 MW (June 2013). Wind farms with a capacity to generate over 25 MW have to be sited in the Strategic Search Areas (SSA) in green (National Assembly for Wales).

## Summary


- The Welsh government has set out an action plan to bring Welsh forestry into the 21st century, and although the plan is in its early stages and criteria for outcomes look yet to be finalised, the direction and aspirations look very promising in relation to our work to recover the pine marten population.

- In general, woodland management is forecasted to become more environmentally friendly, delivering benefits for biodiversity and planning for contingency against climate change. This is to be achieved by diversifying woodland structure (mainly in commercial plantations) through active propagation and regeneration of native species, introducing a greater variety of timber tree species, and connecting existing woodland patches. Given that 49% of Welsh woodlands are conifer forests, these changes could have a significant impact. The projections are encouraging when framed within the context of recommendations made in the RSPB's State of Nature report in 2013, which is essentially an audit for biodiversity with a specific section on woodland. The report stresses the need to plant new native woodlands, and to promote structural complexity and species diversity to meet wildlife needs, whilst having non-intervention areas.

- Emphasis on promoting the regulatory role of woodlands for water quality and soil anchorage, as well as carbon sequestration, will secure some woodland in perpetuity, whilst greater adoption of continuous cover forestry and low impact silvicultural systems over clear fell will make commercial plantations much more stable and suitable for wildlife – though there will still be some clear fell, particularly when dealing with diseased stands. Private forestry operations will likely continue to use clear fell. CCF and LISS require more complex planning, and there is therefore a danger that any transition away from clear fell regimes may be slow, and not as ambitious as the strategy lays out.

- One of the key drivers for woodland change outside of the Woodlands for Wales strategy has been the Water Framework Directive, which has in some cases lead to permanent deforestation of areas of upland forestry. Though this represents a loss of woodland, the habitat that is created is arguably much richer in biodiversity, benefiting a range of wildlife including pine martens, in contrast to the relatively species poor, low yield class forest (typically lodgepole or sitka spruce forest) it has replaced.

- Woodland increase over the last year has been almost entirely down to grant funded planting and regeneration – the strategy has committed to continue to provide funding for planting and to 'buy' active management of woodlands. Sheep stocking densities have been gradually declining over the last decade due to changes in subsidy payments from the Common Agricultural Policy. This is set to continue, encouraging regeneration in the uplands, particularly of the ffridd woodland, creating habitat and increasing connectivity.

- The strategy may fail to live up to its ambitions, but the change in *approach* is encouraging. Pest control, particularly of grey squirrels, is a key component of the commitment to make woodland creation more inviting to private landowners – this has proven so far, and may continue to be, a vitally important component in our work to fully engage and win over the support of the rural population (whilst acknowledging the caveats). The role of the pine marten as a potential predator of grey squirrels falls neatly within the current conservation paradigm which favours species or processes that provide ecosystem services. The predicted reduction in grey squirrel abundance will benefit biodiversity by reducing pressure on deciduous trees, facilitating more rapid regeneration whilst arguably benefiting other protected wildlife which either suffer from the depredations of grey squirrels, or through competition and disease transmission (red squirrels). Foresters will again be able to grow hardwoods for timber, incentivising a move away from low yield conifers, further promoting native woodland planting.

- Tree disease is a worrisome issue in general, but is currently unlikely to majorly impact on a pine marten recovery, though the disease appears to be spreading into Snowdonia, particularly around the Vale of Ffestiniog. The *Phytophthora* sp pose a greater threat than the ash die-back; *Phytophthora* has the potential to infect multiple species, all of which are significant components of both commercial forest and native woodland, and spread more pervasively than the ash die-back, with forecast of a continued northerly spread. Removal of large blocks of larch could lead to habitat fragmentation, disturbance, loss of refuge/breeding sites and territory alteration, but could also provide increased foraging opportunities if felling occurs on a small scale. Even if the areas felled within forests are proportionately small, there may be a disproportionate impact if trees of greater age and higher biodiversity value are removed.

- In a worst case scenario, *Phytophera* would infect multiple species over a large area, impacting on all aspects of pine marten life history at an individual level, though the adaptability and habitat plasticity of the species should infer resistance at the population level. Ash die-back, though potentially affecting native woodland composition, is unlikely to affect pine martens.

- Renewable energy development is also unlikely to affect pine marten populations, unless there is significant development outside of the governments SSAs. There may be some effect on connectivity for an expanding population, associated with forest clearance for wind farm infrastructure, particularly in the uplands of the Cambrian Mountains, but this is likely to be negligible and only be an issue with substantial forest clearance. There are no published studies of the effects of wind turbines on small carnivores, though some disturbance has been reported for large predators and ungulates during the initial stage of construction (Helldin *et al.*, 2012). Helldin *et al.* (2012) report that, after the initial period of disturbance, predators could actually benefit from the creation of new edge habitat and scrub/open areas associated with key-holing for turbines. This may be even more pertinent to the species-poor conifer forests of the Welsh uplands. *Benitez-Lopez et al. (2010)* conducted a meta-analysis of the effect of infrastructural and road developments using data from 49 studies on 234 mammal and bird species, and found a general trend of reduced population density close to development. Future renewable energy developments in areas with an expanding pine marten population might provide an opportunity to study these effects. A potential source of aggravation, rather than outright conflict, may arise if development is considered for an area with pine marten presence. Pine martens are a Schedule 5 protected species, and a ‘species of principal importance’ in Wales, and this may impose restrictions on developers.

## Conclusive comment

Overall, the trends in forestry in Wales are ambitious, and very encouraging in the context of our work. With the exception of an increasingly pervasive and widespread disease scenario, the habitat availability for pine martens looks set to not only increase in area but also in quality in the future, with the specific mitigation of some of the key factors (fragmentation, habitat loss & simplification) thought to underpin the pine marten’s decline. This places us in a strong position to defend our decision to reinforce the marten population at this time.

*I would like to acknowledge and sincerely thank Huw Denman for his input and advice in producing this report and to the Co-operative Wales for generously funding the People & Pine Martens in Wales project.*

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