Plant Health Centre
Scotland's Centre of Expertise

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Investigation into the causes of Alder (Alnus glutinosa) mortality in Scotland

Policy Summary

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Forest Research

Royal Botanic Garden Edinburgh

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1 Policy Summary

1.1 Background

In light of concerns expressed by key stakeholders to PHC that the health of common alders in Scotland had recently deteriorated, this project aimed to determine whether a widespread and rapid decline in the condition of the species was evident and to identify the agents affecting alders which were currently unhealthy.

Common alder (*Alnus glutinosa*) is a key component of freshwater ecosystems delivering important benefits to biodiversity, water quality and temperature, bank stability and flood alleviation. In the more impoverished riparian ecosystems of upland Scotland, it is frequently the only tree species which is present, with no obvious alternatives available to fill its niche should it be lost. Even in richer lowland riparian systems, historic loss of elm due to Dutch elm disease and increasing levels of ash mortality due to Chalara dieback suggest that there will be an increasing dependence on alder to provide the ecosystem services noted above in the future. Therefore, understanding the nature and extent of current threats to the health of alder in Scotland is of importance. This is of particular concern at a time when the risk of introducing pests or pathogens may be increased as a result of efforts to restore riparian woodlands in various river catchments by planting of alder.

1.2 Key Research Undertaken

1. Survey data from Scottish Forestry personnel and Observatree volunteers was utilised to identify areas of particular concern for alder decline.
2. Eight sites were selected for in depth surveys to understand the causes of decline.
3. A literature review was undertaken to provide further information on alder ecology, threats to alder, and to establish what previous research had been undertaken.

1.3 Research Undertaken

This project built on initial observations of alder decline by Scottish Forestry personnel, by engaging with the Observatree citizen science programme to encourage additional reports of locations at which alders were apparently in decline and by carrying out surveys at eight sites selected from the combined Scottish Forestry and Observatree volunteer reports to determine the current condition of the trees and identify the agents affecting their health.

1.4 Main Findings

- This review provides the most up to date evidence regarding the ecology of alder and the threats to this species.
- The surveys carried out did not indicate the occurrence of a single, dramatic, recent decline in the health of alders in the north of Scotland or detect one particular agent associated with damage to trees across all of the sites surveyed.
- Trees at a variety of locations displayed evidence of historic episodes of dieback, with little apparent change in condition having occurred over many subsequent years. As a result, populations of alders with prominent dead limbs evident in many crowns were not uncommon but the living portions of the branching structures were often free from signs of recent damage or disease. These findings do not rule out the possibility that a more protracted decline in the health of trees, which may progress incrementally, is occurring. Longer-term monitoring of selected alder populations would be required to detect such a deterioration.

- Causes of current alder decline at the sites surveyed included waterlogging and competition from invasive tree species as well as infection by *Phytophthora alni*, crown dieback associated with colonisation of branches and stems by the weak pathogen *Valsa oxystoma*, infection by *Armillaria* spp., with occasional instances of infection by *Heterobasidion annosum* detected. At one location, a small number of trees with potential bacterial infection of the bark and underlying xylem was also noted. In some instances, predisposition of trees to damage by short-or long- term changes in site conditions was considered probable.
- There was a marked tendency for alder populations to be even-aged, with few instances of regeneration following their initial establishment, even in the oldest stands and those with extremely open canopies. Although grazing may be curtailing regeneration in some cases, the key factors limiting survival of seedlings and saplings were not always clear at the sites which were investigated and would be worthy of further study. In addition, the lack of regeneration could give the impression that there are more older alders in decline, however, caution needs to be applied to this assumption as it would require many more observations to confirm.
- Grazing pressure is an issue with alder establishment and spread so planting projects should consider how best to protect trees from grazing.
- Determining the ownership of riparian strips is not always straightforward because river banks and fishing rights are not necessarily jointly possessed. This poses challenges both in relation to obtaining permission from landowners for investigation of riparian woodlands and of ensuring that relevant information on their husbandry will reach its intended audience.

1.5 Key recommendations

- Improved surveillance and reporting of alder health problems in Scotland will be required to ensure that the causes of any future declines, including the advent of new threats to the species, are detected and investigated in a timely manner. The variable pathology of alder and the existing range of damaging agents affecting the species present challenges in terms of effective monitoring and reporting of alder health.
- The need for further structured surveys focussing on alder health requires in-depth discussion in the light of policy priorities and available resources. However, fresh observations of recent decline and apparent impacts of pests or diseases are always helpful in providing the latest picture of tree health across the range of species found in Britain. TreeAlert provides a readily accessible portal for reporting such concerns and can be used by professionals and members of the public to provide observations on alder and other tree species.
- Research is required on the most effective ways to promote natural regeneration and carry out direct seeding of alder in riparian habitats. In the short term, employing these techniques on sites where maximum environmental benefits (and maximum risks associated with pest and disease introductions) are anticipated – for example in river headwaters – would be recommended. In addition, more flexibility could be integrated into grant aid where natural regeneration & direct seeding are attempted.
- The current drive to plant trees to maintain or restore riparian habitat should be carried out with the utmost care to ensure that further pests and/or diseases are not introduced into sensitive habitats such as the upper reaches of river systems.

- A supplementary discussion document which considers the biosecurity risks associated with planting of riparian alders is being prepared. This will draw upon the findings of this project and the recently published UKFS Practice Guide 'Creating and managing riparian woodlands'
- The adaptation of small groups of alders to very specific local environmental conditions over long periods of time may have taken place at some sites. This should be recognised when conserving certain areas because introduced trees may be maladapted, therefore natural regeneration or direct seeding with locally collected material might be a more effective approach to maintaining tree cover. Further research into adaption is required.

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