JACOB'S LADDER (*Polemonium caeruleum)*
Species Action Plan

1. Introduction

Jacob's Ladder *(Polemonium caeruleum)* is a native plant confined to a few areas of Northern England. Garden escapes, distinct in form from the native plants, have however naturalised stream banks and waste places and can be locally abundant. It is a component of a distinctive tall-herb community in open ash (*Fraxinus excelsior)* woodland on soils of high organic matter, of a pH of more than 7, and in the case of the Cheviots, on brown earths. The species is a late glacial relic, typical of what is thought to have been lightly shaded wooded grasslands and is regarded as an indicator of long term botanical stability. Now restricted to ungrazed screes and cliff ledges, Jacob's Ladder is a long-lived, polycarpic perennial, which reproduces by seed with vegetative reproduction occurring infrequently from the occasional splitting of old rhizomes. Plants form leaves in April and grow rapidly as part of the tall herb community in the moist soils of shaded north facing banks. Seedlings are particularly vulnerable to wilting. Flowering occurs June to August and pollination is by bumblebees although the species is also self fertile. Seed ripens from August onwards but it is only released in autumn. Experiments have shown that free from or with infrequent grazing by cattle or mowing, the plant is capable of colonising drier and warmer sites under some circumstances.

2. Current Status

2.1 National

Jacob's Ladder is a Red Data Book and UK Steering Group species of conservation concern (long list) with its status in Britain being lower risk and near threatened. It is not threatened in Europe. It occurs in only 2 areas in the Pennines away from its Northumberland stations with a total of 22 locations in 14, 10 km squares within the UK.

2.2 Local

Jacob's ladder is a priority species in the OTA ILMP. This rare plant has a very restricted distribution in the county with only two sites occurring, both of which are in the National Park. Sites are located on north and northwesterly facing crags adjacent to the Ridlees Burn and the River Coquet near Linbriggs, Upper Coquetdale within the MOD's Otterburn Training Area. An occasional plant has been found on the banks of the River Coquet near Harbottle and at Holystone but is not clear whether these are of the native type found upstream or garden escapes. Pigott in 1958 drew attention to the importance of low temperatures for plant survival. This has the effect of reducing transpiration and evaporation from the soils around the plants. A generally northern aspect is therefore characteristic of the sites. The Coquet sites are located in deep gorges and are kept moist by seepage and periodic flooding by the river. This enables soil moisture levels to be maintained at suitable levels despite having the lowest rainfall of any Jacob's ladder location in the UK. The effect of flooding has at times reduced plant numbers by their physical removal, seedlings being particularly vulnerable (NNP annual monitoring data).

Plant numbers (as distinct to flowering spike numbers) have varied little over the 5 year period 1997 –2001. The Linbriggs site has averaged 120 plants with extremes102 to 138. The Ridlees site has averaged 17 with extremes being 15 to 19. The number of flowering spikes did however vary considerably from year to year with individual plants sometimes producing multiple flower spikes. The Linbriggs site recorded from 22 in 1997 to 161 in 2001 and Ridlees Burn site recorded a maximum of 11 in 1997 to a minimum of 2 in 2000. See data below. Only 1-3 plants have ever flowered at Ridlees compared to 14-43 at Linbriggs. On average 24% of the Linbriggs plants produce flowers, whereas only 11% are produced at the Ridlees site.

Table 1. Numbers of Jacob's ladder plants at 2 locations in the NNP. NB. Plant numbers are approximate, due to the difficulty in separating closely growing individuals.

Linbriggs					
Year	**Non-flowering**	**Flowering plants**	**Total flowering spikes**	**Total Plants**	**Comments**
1997	124	14	22	138	
1998	87	15	34	102	
1999	64	43	113	107	
2000	99	32	86	131	
2001	85	36	161	121	Plant numbers reasonably stable
Ridlees					
1997	12	3	11	23	
1998	16	2	7	23	
1999	17	2	5	22	
2000	17	1	2	19	
2001	16	1	4	20	Plant numbers stable

Recorded by S. Hackett and EJ Steele

3. Current factors Causing Loss or Decline

3.1 **Grazing** pressure from stock historically, has restricted the colonies to areas of inaccessible crags providing favourable soil and aspect conditions. Grazing currently restricts plant distribution on the lower slopes of the outcrop at the Ridlees Burn site. Apparently suitable, yet un-colonised crags may be accessible to stock at times of low water or be vulnerable to other herbivores like hare or rabbit. It seems desirable however to establish plants on other crags upstream of the present sites, to safeguard the species from sporadic losses or other natural events.

3.2 **Pollination.** The recently documented decline in bumblebees (Eales, 2000) may pose problems as pollination is via this insect group. This may be more significant were it not for the fact that the plant will apparently self-pollinate. It may be pertinent to investigate the particular species of bees involved in pollination, in view of their rapid decline.

3.3 **Flooding.** The effect of flooding at the Linbriggs site, physically removes seedlings from the lower slopes restricting expansion of the community at this site.

4. Current and Recent Action

4.1 NNPA survey and annual monitoring took place from 1997 to 2001. No monitoring was undertaken in 2002. It is proposed to monitor plant numbers in 2003 and 2004 and 3 yearly intervals thereafter.

4.2 Seed was been collected in 2002 with a view to propagating seedlings for transplanting in future years. Agreement in principle to this work has been received from EN.

4.3 It has been agreed that the Ridlees Burn site is to be fenced by the MOD.

5. Broad Objectives and Targets

5.**1** Maintain and enhance Jacob's Ladder at all existing stations in NNP.

5.**2** Undertake monitoring of flowering at existing sites periodically.

5.**3** Expand the number of colonies by introducing propagated seedlings to 2 experimental sites, upstream from the existing sites.

5**.4** Ensure continued flowering at existing and new experimental sites in order to maintain the seed bank and viability of the sites.
5**.5** Increase the awareness of this native plant and the need to conserve it.

6 Proposed Actions.

6.1 Policy and Legislation

None proposed

6.2 Site Safeguard and Management

Action	Target	Partners	Achieving Objective
6.2.1 Map all sites using GPS.	2004	EN, MOD	1,2,

6.3 Species Management and Protection.

Action	Target	Partners	Achieving Objective
6.3.1Monitor existing and experimental sites for flowering/ grazing by herbivores.	2004, 2005 and thereafter 3 yearly	EN, MOD.	1,2,3,4
6.3.2.Propagate seedlings for translocation	2004	EN, MOD	1,3,4,
6.3.3. Select and agree 2 suitable sites to introduce propagated seedlings	2004	EN, MOD	1,3
6.3.4 Transplant seedlings into 2 new sites	2004 if propagation successful	EN, MOD	1,3
6.3.5 Fence the Ridlees Burn site and introduce strimming on a 3 year cycle if necessary to secure plant survival/ colonisation.	2004, 2007, 2010	EN, MOD Tenant farmer	1,2,4
6.3.6 Ensure Ridlees Burn fence remains stock proof and around new sites.	At least annually from 2004	MOD tenant farmer	1,4

6.4 Advisory.

Action	Target	Partners	Achieving Objective
6.4.1 Advise landowner and tenant farmers of the importance of the species and the measures being undertaken to safeguard and enhance it. Enlist their support for all works and monitoring.	Contact all by 2004	MOD ,tenant farmers	1,2,3,4,5,

6.5 Future Research and Monitoring.

Action	Target	Partners	Achieving Objective
6.5.1 Monitor introduced seedlings in experimental sites for viability and flowering.	2005	MOD, EN	3,4
6.5.2 Monitor the Ridlees Burn site following fencing for plant colonisation	2004 and yearly for 5 years?	MOD, EN	1,2,4,
6.5.3 Establish the species of bumblebees involved in pollination.	2004	MOD, H Eales	1,2,3,4

6.6 Communications and Publicity.

Action	Target	Partners	Achieving Objective
6.6.1 Include the species in written articles and lectures as important BAP species;	1 article and 2 talks annually from 2004	MOD,EN	5

7. References.

Eales, H.T. (2000). A review of the historic and current status of the bumblebees *B. monticola, B.sylvarum, B.distinguendus* and *B.ruderatus* in Northumberland and County Durham (VCs 66-67-68). Report to English Nature, Peterborough. Oct 2000.

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Pigott, C D (1958) Biological Flora of the British Isles. *Polemonium caeruleum* L. Journal of Ecology, 46:507-525

Rich TCG. (1997) The management of semi natural lowland grassland for selected rare and scarce vascular plants- a review. English Nature research reports No216, 25-27.

Swan G. (1993) Flora of Northumberland.