

**Determining the pollinators of rare and  
endangered *Epacris* species: implications  
for conservation**

**Karen Johnson and Peter McQuillan**



**Progress Report for Australian Flora Foundation**

**December 2011**

# **Progress Report 2011: Determining the pollinators of rare and endangered *Epacris* species: implications for conservation**

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## **Summary**

There is almost no information on the pollinators of Tasmania's threatened *Epacris* species. Thus, the primary aim of our project is to determine the pollinators of *Epacris* species and explore the relationships between their pollinators, floral morphology, flowering time and habitat. Here, we report on our progress. In 2011, we established breeding systems experiments; made observations on the animal visitors to *Epacris* flowers; and collected data pertaining to morphology, flowering time and habitat. Preliminary results indicate that the rare and endangered *Epacris* species are visited by a diversity of animal pollinators - particularly flies, native and introduced bees, and butterflies. To date, no *Epacris* species have been exclusively fly, bee, or butterfly pollinated. Flies appear to account for the greatest number of pollinating taxa, consistent with their high local diversity in Tasmania. Overall, different animal groups have been found to visit a range of *Epacris* plants suggesting a lack of pollinator specialisation.

## **Introduction**

Many vascular plants require an animal pollinator if they are to reproduce by seed, and where research has been done, this appears to be also the case for *Epacris* species.<sup>i ii iii</sup> As natural habitat is increasingly fragmented and converted to human uses, the diversity of native plant and native pollinator interactions is likely to decline.<sup>iv v vi vii</sup> In addition, introduced flower visitors, such as the highly social honeybee and bumblebee (which are both present in Tasmania<sup>viii ix x</sup>) can competitively displace native solitary pollinators. With small ranges and low numbers of individuals, rare plants are most at risk from

pollinator decline, particularly if they rely on a single or small number of pollinators.<sup>xi xii</sup> For rare species requiring pollinators, conservation managers need to know the animals involved so that they may consider their habitat and foraging requirements.<sup>xiii xiv</sup> Although considerable effort has gone into the conservation of *Epacris* species in Tasmania, the Forest Epacrid Recovery Plan does not include any specific information on *Epacris*-pollinator relationships.<sup>xv</sup> Thus, there remains a critical gap in our knowledge of the reproduction of these threatened plants, and in our consideration of the conservation requirements of their potential pollinators.

The aims of this project are to determine the pollinators of Tasmania's threatened *Epacris* species; explore the relationships between pollinators, floral morphology, flowering time and habitat; outline the potential impacts of introduced insects, such as the exotic bumblebee and honeybee, on the pollinator relationships of threatened *Epacris* species; and assess the implications of this new knowledge for the conservation of *Epacris* and plant-pollinator interactions. Here, we report on our progress.

### Tasks undertaken in 2011 (\* see notes below)

Total tasks for 2011 and 2012	Achieved in 2011
<b><i>Preliminaries</i></b>	
Review literature	√
Refine methods	√
Develop flowering-time calendar	√
Schedule fieldwork	√
Obtain permits as required	√
<b><i>Field, laboratory and herbarium</i></b>	
Set up autonomy and open pollination experiments	√*
Fruit-set analyses from pollination experiments	
Undertake pollinator observations on <i>Epacris</i> species	√*
Undertake morphological and habitat characterisations	√*
Pollen load analyses	
Confirm invertebrate ids with relevant authorities as required	
<b><i>Report</i></b>	
Data analyses	
Interpretation of data in relation to objectives	
Report and poster	

## Autonomy and open pollination experiments

### Progress

*Autonomous- selfing*— To investigate whether *Epacris* species can self-pollinate, I am examining seed set in the absence of animals. In 2011, branches on 6 to 10 individual plants of *E. apsleyensis*, *E. limbata*, *E. virgata* Kettering, and *E. exserta* were bagged with Terylene mesh bags (approximately 20 cm by 30 cm, with ¼ mm mesh) to exclude animal visitors. A minimum of 380 buds were bagged for each species. No other manipulation was undertaken.

*Open control*— To investigate whether pollination is occurring in the wild, I am examining seed set in *Epacris* plants. In 2011, one branch with good flowering on 6 to 10 plants of *E. limbata*, *E. virgata* Kettering, and *E. exserta* were marked with an inconspicuous green twist tie and left open to all pollinators. Twist ties were located on the same branch as the flowers but distant from them to minimise any possible influence on flower visitors. A minimum of 450 flowers were marked for each species. No other manipulation was undertaken.

### Work remaining

*Seed-set*— Following capsule development in the autonomous-selfing and open pollination experiments, I will examine the seed-set. I will perform a cut-test under dissecting microscope to assess seed for the presence of endosperm.

*Open pollination*— to be set up on *E. apsleyensis* in early 2012.

## **Pollinator observations**

### **Progress**

In 2011, over 60 hours of field observations were made on the animal visitors to *Epacris* species. Observations were made over multiple days on each of *E. apsleyensis*, *E. barbata*, *E. exserta*, *E. virgata* Kettering, *E. virgata* Beaconsfield, and *E. graniticola*. Surveys were conducted between 9.00 and 16.00 hours on fine days with generally little wind (< 3 m per sec). Flowers with available nectar and pollen were chosen for observation in person and by video camera (JVC Digital Video Camera, model no. GZ-MG465, 1.07 MP, 32x optical zoom) on a tripod.

Samples of the foraging insects were collected by capturing directly into a plastic screw-top container wetted with ethanol. Insects were stored in screw-top vials with 70% ethanol.

### **Work remaining**

Observations remain to be made on *E. limbata*, *E. grandis*, and *E. glabella*. Site reconnaissance has been carried out for *E. limbata* and *E. glabella*. For *E. grandis*, information pertaining to site access is being investigated by the Department of Primary Industries, Water and Environment.

## **Morphological and habitat characterisations**

### **Progress**

*Morphological characterisation*— *E. apsleyensis*, *E. barbata*, *E. exserta*, *E. virgata* Kettering, *E. virgata* Beaconsfield, and *E. graniticola* flowers collected and stored in 70% ethanol.

*Site/ habitat information*— including vegetation types, and sympatric species collected for *E. apsleyensis*, *E. barbata*, *E. exserta*, *E. virgata* Kettering, *E. virgata* Beaconsfield, and *E. graniticola*.

Work remaining

Collect information for *E. limbata*, *E. grandis*, and *E. glabella*.

### **Funding for 2011**

The funding has been fully spent on expenses outlined in the original grant proposal.

### **Photo gallery**



*Rutilia* sp. visits *E. barbata*



Long-legged tachinid fly visits  
*E. virgata* Kettering



**Hoverfly (*Melangyna* sp.) visits  
*E. virgata* Beaconsfield**



**Bee fly (*Villia* sp.) visits *E. barbartia***



**Native bee (*Exoneura* sp.) visits *E. barbartia***



**Introduced honeybee (*Apis mellifera*) visits  
*E. graniticola***



Painted lady butterfly (*Vanessa kershawi*)  
visits *E. graniticola*



Australian admiral butterfly (*Vanessa itea*) visits  
*E. graniticola*

## References

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