

Symposium Presentation No. 9

Pollen Pathways: A project to reconnect Matted Flax-lily populations along the Merri Creek

Brian Bainbridge

Merri Creek Management Committee

www.mcmc.org.au

Summarised by Dr Peter Mitchell, Biolinks Alliance

What does a bottle of pasta sauce have to do with connectivity? Read to the end for an answer.

What does habitat connectivity look like to a plant with its roots rooted to a spot? In a series of projects on the conservation of the Matted Flax-lily (*Dianella amoena*), the Merri Creek landscape has been looked at from a plant's-eye view. Along the way, the projects uncovered a whole range of stories that have really captured the imagination of the local community.

Plants might be rooted in the soil, but they need their seeds to disperse around the landscape to areas suitable for colonisation – or re-colonisation. And to produce that seed, most plants need pollen from another plant probably not too closely related. Without that outcrossing, plants will not produce viable seed. So we need to consider habitat connectivity from the point of view of a “pollen pathway”.

Different plants have different seed dispersal and pollination syndromes and these are affected to different degrees by fragmentation. Ary Hoffman (see Talk 2) identified how we need to have genetic diversity in plants to foster adaptation – what he called “adaptive capacity”. So we need to think about pollen when we think about habitat connectivity.

For wind pollinated she-oaks and grasses, even quite large gaps can be spanned by pollen. As mentioned in previous talks, grasses can move from mountain top to mountain top – so genetics can cross entire mountain ranges. And seeds of some species are spread by birds; many of the local windbreaks have an understorey of native Tree Violet which has been spread around the landscape by Silvereyes.

The Matted Flax-lily (*Dianella amoena*) was described in 1994 and was regarded as critically endangered. But ironically, in the Merri Creek valley north of Melbourne it is the most

Linking Landscapes Symposium

Bendigo, May 2017

Biolinksalliance.org.au



common species of flax-lily. This is not saying all that much, as the valley is in a heavily-developed urban area. There are a few protected areas in the valley plus areas to be protected during the expansion of Melbourne (in the next 30 years, urban areas are projected to cover the entire catchment). But overall it is an uncommon plant and we don't see any young flax-lilies actually germinating in the grasslands. It needs our help. So Merri Creek Management Committee (MCMC) and Friends of Merri Creek have become involved in planning movement corridors through the catchment.

How does the Matted Flax-lily disperse? The berries show all the features of a plant dispersed by birds. But most of the fruit-eating birds are canopy birds, like the Mistletoebird that concentrates on mistletoe fruits, and the Silvereeye that prefers shrubby landscapes. In winter, Spiny-cheeked Honeyeaters come south to feed on the Boxthorn and Kangaroo Apple, but the flax-lily berries have long gone by then. The answer is one that reminds us that the current landscape has radically changed from the landscape looked after by Aboriginal people for 60,000 years. The presentation of the berries – their location in the landscape and the hard shell around the seed inside the berries – all suggest they were eaten and spread by Emus.

Emus are great dispersers of seeds. They move several kilometres each day, the food they eat may stay in their guts for several days, and their droppings are fantastic nurseries for young plants. So have we been ignoring the keystone role of Emus in our grassland conservation and habitat connectivity?

Do we need to re-introduce Emus to the Merri Creek valley? There are some hefty barriers in their way (such as the Hume Freeway). The potential for re-establishing Emus may appear low, but MCMC has always had high ambitions. This may be a target for consideration in those still undeveloped areas further north in the catchment. It might be a case for strengthening the corridors that community members have been fighting for, including eco-bridges and underpasses that allow animals to cross these sorts of landscapes. We have been successful in retaining kangaroos even in the urban areas of the Merri Creek and these animals have shown remarkable adaptivity to those landscapes, surviving in the larger grassland reserves around places like Craigieburn. However, until we see flocks of Emus along the creek, we will have to replace their role and move flax-lilies around the landscape ourselves to restore their adaptive capacity.

Pollens of the Matted Flax-lily also tell a fascinating story. The lilies flower in early summer. They have carnation-centred blooms and bundles of tiny micro-filaments on each filament that release perfume. The pollen is in rolled-around anthers with only a tiny hole at the tip where pollen can be released. Many insects can't get to the pollen, but this plant attracts special bees that have learnt the trick of buzz-pollination. The largest of these are the Blue-banded Bees.

As the bee approaches the flower, it grabs the anthers and vibrates its wing muscles. The vibration causes the pollen to pour out of the hole in the anther and gather on the hairy

Linking Landscapes Symposium

Bendigo, May 2017

Biolinksalliance.org.au



abdomen of the bee. When the bee moves to the next flower, some of that pollen is rubbed onto the stigma to fertilise the seed. But flax-lilies don't produce much nectar, so the bee also visits other flowers that provide more nectar, including native species and garden species like basil and oregano. It mixes the pollen and nectar to create balls of bee porridge and shoves this into tunnels made in mud banks or under boulders or even crumbling mortar on houses. The bee then lays its eggs in the tube and creates a mud cell for the grubs to grow and emerge the following year.

One estimate suggests that Blue-banded Bees have a foraging distance of about 300m (Duncan 2003) and thus plants within 300m of each other may be connected via pollen. All Matted Flax-lilies in the Merri Creek valley have been mapped. 150m radius circles around each plant show that, while some plants are well connected, other plants and groups of plants are quite isolated.

The group has undertaken a range of actions to increase habitat connectivity for Matted Flax-lily. Some plants are under a lot of stress due to very weedy conditions, so can't produce a lot of pollen to share with other plants. De-risking actions have included very extensive weed control and protection from rabbits; some treated plants have produced hundreds of flower stems and shared pollen with other plants. A small grant allowed us to train people from TAFE and nurseries to do detailed weeding. Flax-lilies are rhizomatous so weeds tangled in the plant can't be treated with herbicide. So the weeding by volunteers has been very valuable.

We can also become Emus by augmenting the population of lilies with unrelated plants. Our "Buzz" project this winter will plant 200 lilies grown with volunteer assistance from 20 parent plants dug up as rhizome cuttings (under licence). These will be planted to join up some of the isolated remnant plants, and hence create pollination partners and produce viable seed. We will also establish some new populations to fill in gaps. Eventually this will create one large inter-connected population.

Our community has been working for nearly 30 years – some up to 50 years – advocating, planting and more to secure the Merri Creek as a place for native plants and animals. How do we maintain motivation? Our Matted Flax-lily projects have provided ideas and inspiration. Researchers discovered that Blue-banded Bees not only vibrate their wing muscles at a flower, they also bang their heads on the anthers at hundreds of times per second. The discovery that the Blue-banded Bee is actually the Head-banging Bee captured a whole cohort of young music-loving residents of the Merri Creek valley. It became a feature of a very successful crowd-sourcing project last year. A sold-out concert by Jen Cloher and Courtney Barnett was one of the rewards for donating to the project. It brought a new young demographic to the Friends of Merri Creek – membership increased by 330 to over 700.

With this support we have been able to improve mapping with help from Victorian National Parks Association volunteers. We now have ways to get people excited about weeding and

Linking Landscapes Symposium

Bendigo, May 2017

Biolinksalliance.org.au



this is now a regular Friends activity. Corporate volunteers have been involved in pollinator counts. And we have gathered a store of knowledge and stories.

The story of the Matted Flax-lily – a plant stranded in fragments of habitat and the animals that are helping the lilies to transcend their fate – is a powerful story. It attracts people's interest and has re-vitalised our vision of the Merri Creek catchment.

Questions

Q: *Yellow-faced Honeyeaters will eat Dianella berries. Could they replace the role of Emus?* **A:** Not as effectively as Emus. Emus have stones in their gizzard that scarify the seeds, and large droppings for seed germination. Also Yellow-faced Honeyeaters don't visit the grasslands where Matted Flax-lilies grow.

Q: *re germination.* **A:** Nurseries can germinate the seeds quite well when they can get seed. But plants only produce small numbers of berries and these drop to the ground rapidly. Emus feed on the ground – another reason why Emus may be good dispersers of seed. Blue-tongue Lizards will also eat berries but are not good dispersers of the seed.

Q: *Are European Wasps a threat to Blue-banded Bees?* **A:** The bees are fast fliers and the mud nests are good protection for the young. Bees and European Wasps are often found together so the wasps are probably not a significant threat.

Finally

Tomato flowers are similar to Dianella flowers in many ways. In South America where tomatoes come from, they are also buzz-pollinated. In fact, a whole range of plants around the world have developed similar structures. Blue-banded Bees are happy to visit tomato flowers and plants visited by Blue-banded Bees produce up to 30% more tomatoes. And thus more pasta sauce.

Reference:

Duncan, David. 2003. *Pollination of Black-anther Flax-lily (Dianella revoluta) in fragmented New South Wales Mallee*. Report to the Australian Flora Foundation, November 2003. http://aff.org.au/wp-content/uploads/Duncan_Dianella_final.pdf