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# Integrated plant conservation on Pitcairn Island, south-central Pacific Ocean

Right: Native forest in McCoy's Valley, towards the south west of the island showing the canopy trees with decumbent stems (*Metrosideros collina*), and a rich fern layer on the forest floor. Several individuals of the critically endangered *Coprosma benefica* grow in this location, and an unnamed *Myrsine* was discovered in this valley in 2003 which was previously considered extinct.



Pitcairn Island is a small, isolated island at the eastern extremity of the main group of Polynesian islands, roughly half way between New Zealand and South America and just south of the Tropic of Capricorn. The research interest of Trinity College, Dublin (TCD) in the island began in 1991 during the Sir Peter Scott Commemorative Expedition to the Pitcairn Islands, which focussed its attention mainly on 'nearby' Henderson Island (a World Heritage Site) and two atolls Oeno and Ducie. During this expedition it became apparent that the main conservation issues with the flora of these islands was on Pitcairn itself. As a U.K. Overseas Territory governed from the British High Commission in New Zealand, the responsibility for biodiversity conservation on the island

rests with the UK Government. Accordingly, TCD and the Irish National Parks and Wildlife Service (NPWS) secured funding from the U.K. Foreign & Commonwealth Office in 1997 to examine in detail the floristics, vegetation communities and conservation status of the native flora.

The 1997 visit to the island provided a more complete floristic inventory than was previously possible, adding 12 new records of presumed native species to bring the total native flora to 81 taxa, of which 10 are considered endemic. Vegetation communities were described and mapped, and the conservation status of native species assessed, including assessments of the major threats, population size and demographic structure for certain taxa

considered to be most at risk. In some cases these data were backed up with a molecular assessment of genetic diversity. Therefore, a large amount of baseline data was provided which facilitated prioritisation of future conservation activities. The main threats to the native species were identified as those posed by invasive non-native plants, by critically small population size or distribution, by habitat loss, and by erosion. The main invasive species causing problems are *Syzygium jambos*, introduced originally for fuel wood, and *Lantana camara*; both are well known as invasive species elsewhere. Several native species were found to exist in either very restricted areas, such as *Lastreopsis* aff. *pacifica* where all but one individual occurred in a colony occupying an area of 20 x 60 m<sup>2</sup>, or occurred in very low numbers, such as the endemic *Coprosma benefica*, where only 12 individuals were recorded. Only one male plant of the dioecious *C. benefica* was found, though the sex of several individuals could not be determined. The vulnerability of species with such low numbers was made evident when the largest specimen of *C. benefica* blew over in a storm during a visit. The endemic *Abutilon pitcairnense* and *Myrsine* sp. previously recorded from the island could not be located on this visit.

Following the 1991 expedition, recommendations were made that a Conservation Officer be funded as a



Far left: Pitcairn Islanders and Noeleen Smyth in the island nursery

Left: *Lastreopsis* aff. *pacifica*, known from only two locations on Pitcairn

local government position, and this was achieved in 1997 when Jay Warren was appointed to the post. Jay also received training in practical plant conservation by attending a course in the U.K. in 1999 on 'The Cultivation and Conservation of Threatened Plant Species' at the Royal Botanic Gardens, Kew, U.K, through the U.K. Darwin Initiative aimed at U.K. Overseas Territories.

The U.K. Foreign & Commonwealth Office provided funding in 2003 to investigate methods to remove *Syzygium jambos* and reinstate native forest species, while minimising the potential effects of soil erosion. At the same time, Fauna and Flora International provided funding to undertake recovery work on critically endangered plants, and the Irish Research Council for Science and

Technology provided a research fellowship for Noeleen Smyth. Very recently, the Stanley Smith Horticultural Trust has provided a grant to improve the horticultural capacity of the island nursery.

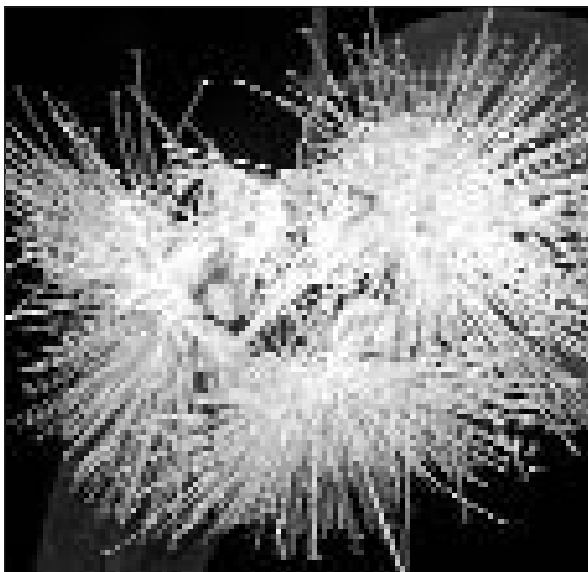
In the meantime, a specimen of the *Abutilon* had been had relocated by Carol Warren, and it was successfully propagated by Carol and Jay from cuttings, proudly displayed to Noeleen and Steve when they visited in July 2003; a cutting is now also growing strongly at Trinity College Botanic Garden, and some self-pollinated seedlings have already been planted out on Pitcairn. A trial translocation of the endemic giant fern *Angiopteris chauliodonta*, undertaken during the 1997 visit, was successful, with 26 young plants established in Jack Willems Valley from 40 transplanted

stipules (fleshy outgrowths of the stipe base, containing an axillary bud). A young plant of a *Myrsine* species was discovered in McCoy's Valley, and two plants have been raised from cuttings at Trinity College Botanic Garden. Molecular studies will determine whether this taxon differs from *M. hosakae*, considered endemic to nearby Henderson Island.

Perhaps the most exciting event was the construction and subsequent development of the island nursery, which is providing a facility to propagate both threatened native plants and plants that are of economic benefit to the islanders. For example, there is a plan to introduce a range of avocado cultivars grafted onto standard stocks, which will greatly increase the avocado season on the island. Noeleen's practical horticultural

Far left: Inflorescence of *Syzygium jambos*: this species was originally introduced for fuelwood, but has subsequently invaded degraded areas of cultivation and now forms a dense thicket over much of the northern side of the island.

Left: Jay Warren and Noeleen Smyth examine a young *Cyclophyllum barbatum* transplanted into a plot cleared of *Syzygium jambos*, which can be seen as a dense thicket in the background.



Right: Noeleen Smyth surveys *Lastreopsis* aff. *pacifica*, known from only two locations on Pitcairn; the 2003 survey showed an increase in numbers since the initial survey in 1997, perhaps suggesting that this taxon is a relatively recent colonist. Pitcairn plants of this taxon are very glandular and have minute, caducous indusia; they may merit taxonomic recognition, and plants grown ex situ at Trinity College will aid taxonomic studies.



training will be put to use in training islanders with grafting techniques. The nursery is also being used to raise stock for planting into experimental plots cleared of *Syzygium*, as well as propagation of critically threatened species, such as *Coprosma* and *Abutilon*. A series of 20 plots have so far been surveyed, and these are being cleared of *Syzygium* as stock for replanting is propagated and grown on. Almost the whole community of the island is working with Noeleen on the plot survey, clearance and propagation, providing a useful source of local income as well as undertaking practical conservation and emphasising the importance of local conservation action within the community.

A strategy for the recovery of critically endangered species have been devised which involves firstly securing the existing genepool by vegetative

propagation, followed by an assessment of genetic variation using AFLP markers, and then controlled breeding to try and maximise diversity. For instance, *Abutilon*, seedlings from selfed seed have been raised and the next step will be to characterise them genetically before selective crossing from the most dissimilar genotypes. Ultimately this work might include a study of the relative effects of inbreeding and outbreeding depression. Many problems remain to be studied, not least the taxonomic identity of taxa such as the *Myrsine* and *Lastreopsis*. Several of the *Coprosma* surveyed in 1997 could not be refound in 2003; no trace remained of the largest plant that blew over in 1997, and the solitary male from that time had recently died. However several other specimens were located and, intriguingly some plants that were 'female' in 1997 now appeared to be

exclusively 'male'. Molecular markers will again be used to confirm or refute whether the individuals that have been relocated are the same.

Clearly, there is still much to learn, including the most effective means of invasive species control. But so far the team are extremely optimistic about the approach taken, which involves a genuine partnership between the local community with their practical skills, and the baseline information that the scientific team from Dublin can provide. Many activities undertaken over the past 13 years make contributions towards the Global Strategy for Plant Conservation, and hopefully it will be both possible to set local targets for Pitcairn, and to achieve these by 2010. By working together, a real synergistic contribution to practical plant conservation on the island can be made and the approach taken on Pitcairn may serve as a model for conservation on other islands.

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