

Oryx

The wild life of one of the rarest apple trees

By Brett Wilson, 7th June 2019

In the spring of 2017 I was introduced to the tree *Malus niedzwetzkyana*. Fauna & Flora International were looking for a young conservation researcher to undertake a project with their Global Trees Campaign, exploring the threats to this wild apple tree in the walnut-fruit forests of Kyrgyzstan. Under the guidance of Dr Colin Clubbe at the Royal Botanic Gardens Kew, Dr Morena Mills at Imperial College London, and the Fauna & Flora International team both in Kyrgyzstan and the UK, I accepted this challenge. Two years and over 500 km of walking later, I reported our findings in my first ever [scientific article](#), in Oryx. However, although this may have been a triumphant moment personally, the findings themselves are nothing to celebrate.



The beautiful pink flowers of *Malus niedzwetzkyana*.

Malus niedzwetzkyana was already listed as Endangered before our research began, with only a

few fragments of its walnut-fruit forest habitat still intact. The tree's population was known to be small and threats were thought to be increasing within its habitat, especially from livestock grazing and firewood collection. Previous research highlighted that this species had anthocyanin pigments that not only occurred in the skin of its fruit, as with most apples, but also in the flowers, leaves, and even in the flesh of the fruit, making it unique. These pigments are thought to have antioxidant, anti-carcinogenic, and anti-inflammatory properties, making this wild species a potentially important genetic resource for developing new varieties. The tree's threatened status and its genetic potential emphasized the need for new directed action—that's where our research team came in.



The red fleshed fruit of *Malus niedzwetzkyana*.

Our study explored the extent of the two key threats—livestock grazing and firewood collection—in four of the largest remaining walnut-fruit forest fragments in Kyrgyzstan. We also assessed the species' population, investigated its ecology and modelled its distribution. This was a huge undertaking that required a strong team, extensive trekking through the forest and many hours battling modelling software back at base. Conservation is not easy but our team was highly motivated to protect this wild apple and overcome the many obstacles that lay in our path, both metaphorically and literally. Importantly, our hard work enabled us to make some vital findings that could help save this species.



Guide and translator heading home after a day's hike.

We found that two of the forest fragments, Gava and Dashman, are heavily degraded, with the other two fragments, Sary-Chelek and Kara-Alma, also showing some damage but with more promise of safe areas for this tree. Our work highlighted livestock grazing as a broader and more acute threat than firewood collection, and that controlling livestock would be an important part of any future plan to manage these forests. Few saplings appear to survive the hungry mouths of livestock or their trampling feet. We estimated the population to number 149 individual trees and we assessed the populations across all sites as ageing, with limited regeneration. We also discovered that the trees favour open areas on south-west facing slopes that are not overly steep.



The beautiful, but challenging landscape of Kyrgyzstan's Sary-Chelek Biosphere reserve.

Together this information showed that individual *Malus niedzwetzkyana* trees, as well as the walnut-fruit forest fragments in general, required better protection. Community engagement will be essential in reducing key threats, and planting new saplings into these forest fragments is required to boost the population. Notably, knowing the types of areas that this tree species favours will hopefully increase the survival chances of these newly planted saplings.

Looking at the bigger picture, we explored the extent of this tree's habitat across Kyrgyzstan. Our models indicated that climatically suitable areas for the species are much broader than where the trees are now found and that *Malus niedzwetzkyana* individuals are limited by the extent of current forest fragments. Furthermore, much of the climatically suitable area for this tree is now agricultural land or harvested forest areas, suggesting that previous habitat conversion has significantly reduced the tree's range. Forest restoration may be an important strategy for future work.



A ranger monitoring the walnut-fruit forest of Dashman reserve from its highest point.

Unfortunately it seems we are still battling to conserve the wild relatives of our much beloved apple. Its unique characteristics highlight the need for protection, but it is clear it continues to suffer from habitat loss, livestock grazing and firewood collection. *Malus niedzwetzkyana* remains threatened with extinction. Our findings emphasise the species' fragile state in the wild but provide information to help protect it.

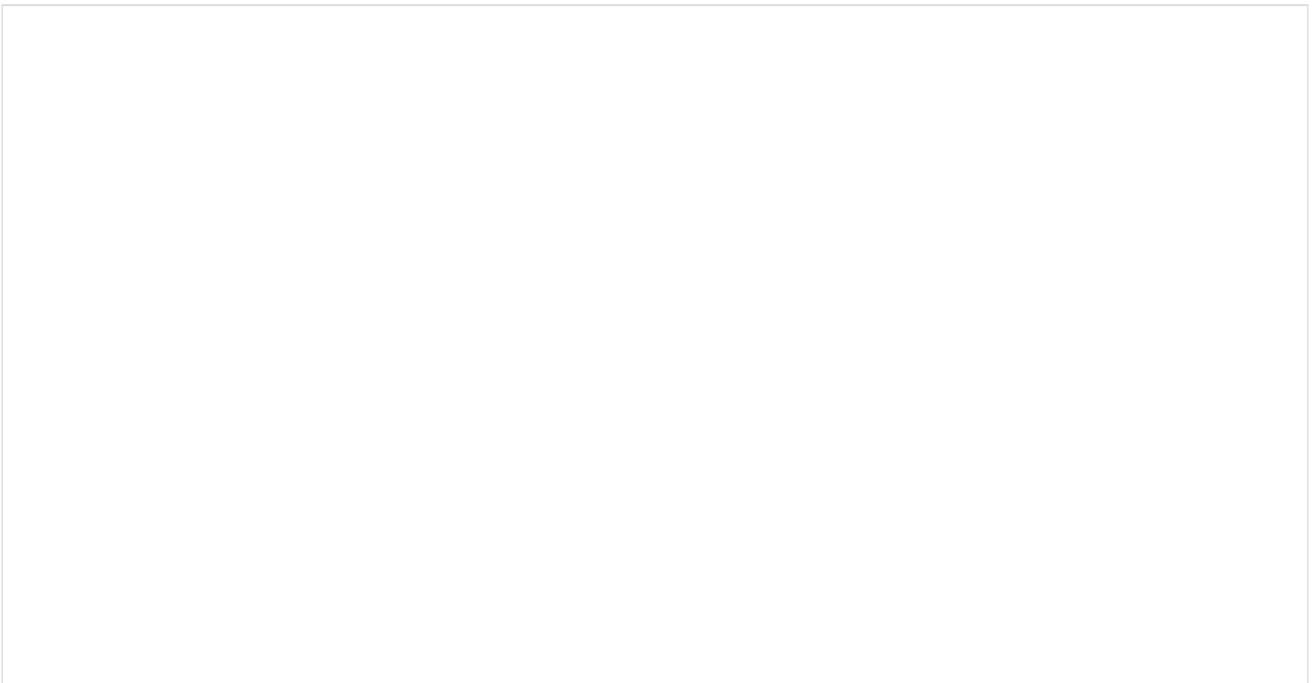
For me, this is the critical part of the story. Our research is now guiding Fauna & Flora International's sapling planting project and directing future community work in Kyrgyzstan. It is reassuring to know there are people fighting for the survival of the ancestral apple and that there is hope for this magnificent and iconic tree.

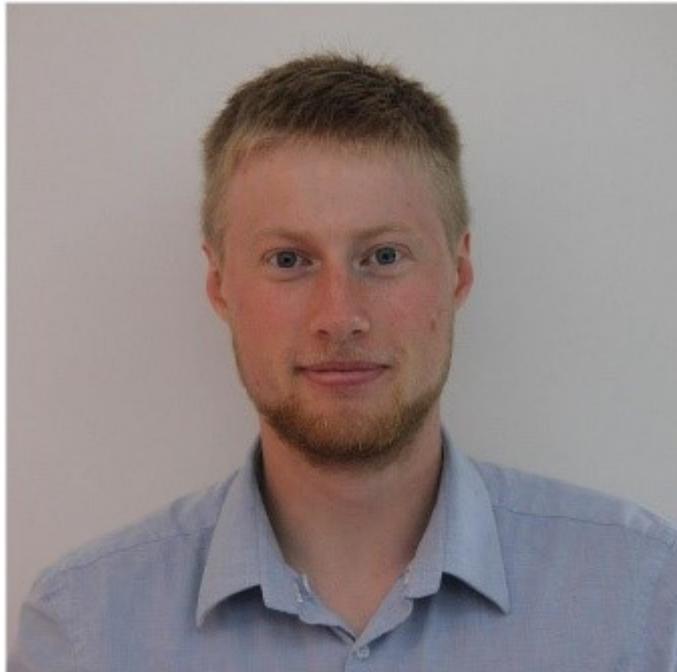


Brett Wilson after completing his final measurements.

All photos credit to Brett Wilson.

The article [The future of walnut-fruit forests in Kyrgyzstan and the status of the iconic Endangered apple *Malus niedzwetzkyana*](#) is available in *Oryx—The International Journal of Conservation*.





Brett Wilson

Brett Wilson studies, amongst other matters, the status of wild tulip diversity in Central Asia. His research interests lie in phylogenetics, species distribution modelling, and the social sciences, and he has expertise in the conservation of the flora of Central Asia, and in particular of Kyrgyzstan.