

How distinguishable are hawkweeds from co-occurring vegetation species in the eye of hyperspectral sensor?

Hsing-Chung Chang¹, Kerrie Tomkins¹, Rene Heim¹, Will Farebrother¹, Chad Ajamian¹, Mark Hamilton² and Hillary Cherry²

¹Department of Environmental Sciences, Macquarie University, New South Wales 2109, Australia

²Pest and Weeds Unit, NSW National Parks and Wildlife Service (NPWS), Hurstville, New South Wales 1481, Australia

Summary Hawkweeds are an eradication target in New South Wales, Australia, and infestations occur in remote and mountainous areas of Kosciuszko National Park. Traditional field-based surveys are critical to detect plants, but are very time consuming and labour intensive. Therefore, there is a strong demand to use remote sensing to detect hawkweeds over remote terrain to assist eradication.

This study collected hyperspectral profiles (ranging from 350 nm to 2500 nm of the spectrum of electromagnetic radiations) of orange and mouse-ear hawkweeds and co-occurring vegetation species in Kosciuszko National Park. Samples were collected using both an optic lens and a leafclip. The optic lens measures the overall spectral information of the plant

and includes any disturbance/noise interference. The leafclip, with its own illumination source, measures the reflectance of the leaf directly. The spectral ratios of hawkweeds compared to other co-occurring species were analysed to show the wavelengths at which there were significant differences between the spectral profiles of selected target species. A classification method called 'Random Forest' was used to test the accuracy of identifying hawkweeds and differentiating them from co-occurring species. The ability to detect hawkweed plants using remote sensing will assist program managers to search large expanses of inaccessible land in a cost effective manner, allowing delimitation of the entire infestation, and ultimately, eradication.