Banded Iron Formation (BIF) Ranges

Photo credit: Johnson Range. (Photo: A. Markey)

Background

On June 2004 the Department of Mines & Petroleum (DPM) provided an briefing to the Department of Environment and Conservation (DEC) and the Environmental Protection Agency (EPA) indicating that over 30 Banded Iron Formation (BIF) ranges across the Yilgarn (the old Precambrian shield south of the Pilbara) were considered prospective for iron ore production. DPM considered that a number of proposals for mining these ranges would be presented to DEC & EPA in the short to medium term.

Following the surveys of seven ranges in the Goldfields by DEC in the mid 1990's and the information gathered during the assessment of Portman's Windarling Project, it was clear that some of these small isolated ranges had very significant conservation values but little was known of the flora and vegetation of most of these ranges.

In order to provide a regional context for assessment of any future mining proposals and to gain an understanding of the conservation values of these ranges the Director General of DEC funded three projects to fill in these knowledge gaps under the Save Our Species – Biodiversity Conservation Initiative.

Taxonomy Project

The first project involved detailed taxonomic studies to resolve and expedite the scientific description of unnamed vascular plant taxa concentrating on those that may be vulnerable to future mining activity. This work resulted in a special edition of DEC's taxonomic journal *Nutysia* in which 95 taxa were described, 36 of which occurred on BIF ranges or similar ironstone habitats (Wege, JA, Shepherd, KA & Butcher R (eds) 2007 Nutysia **17**:1-492).

BIF Ranges Surveys

The second project was a quadrat based survey of 24 BIF ranges over four field seasons from the spring 2005 to spring 2008 (see BIF & Greenstone site map and Science Information Sheet 23/2009). These surveys established a total of 1217 quadrats (c. 50 per range) in which all vascular plant taxa were recorded. A detailed analysis of the patterns of the flora and the perennial vegetation on each of the ranges was undertaken and these are being published in DEC's journal *Conservation Science Western Australia*. In all some 134 community types and subtypes have been described.

In addition a series of factsheets have been developed for both the communities described from each range and quadrats that make up these communities.

Access to the factsheets, the reports, and the analysed data sets (perennial taxa only with some amalgamations to the highest consistently recognised taxonomic level) are provided in the table below.

24 BIF Ranges [click to display]

Range name	Range code	Papers / Manuscripts	Perennial analysed data	Factsheets
Barloweerieand Twin Peaks greenstone belts	Wooleen	Flora and vegetation of Twin Peaks.pdf	Wooleen.zip	Wooleen
Booylgoo Range	Booylgoo	Flora and vegetation of Booylgoo Range.pdf	Booylgoo.zip	Booylgoo
Brooking Hills	Brooking Hills	Flora and vegetation of Brooking Hills DRAFT.pdf	Brooking Hills.zip	Brooking Hills
Cashmere Downs Range	Cashmere Downs	Cashmere 349-361.pdf	Cashmere.zip	Cashmere Downs
Central Tallering Land System - Part 1	Minjar	121-151 Markey.pdf	Central Tallering.zip	Minjar
Central Tallering Land System - Part 2	Karara	121-151 Markey.pdf	Central Tallering.zip	Karara
Gullewa	Gullewa	Flora and vegetation of Gullewa area.pdf	Gullewa.zip	Gullewa
Herbert Lukin Ridge	Wiluna	Herbert 391-412.pdf	Wiluna.zip	Wiluna
Jack Hills	Jack Hills	89-103 Meissner.pdf	Jack Hills.zip	Jack Hills
Johnston Range	Diemals	Flora and vegetation of	Diemals.zip	Diemals

		Johnston Range.pdf		
Koolanooka and Perenjori Hills	Koolanooka Hills	73-88 Meissner.pdf	Koolanooka.zip	Koolanooka Hills
Lake Mason zone of the Gum Creek greenstone belt	Lake Mason	Flora and vegetation of Lake Mason.pdf	Lk Mason.zip	Lake Mason
Lee Steere Range	Lee Steere	Flora and vegetation of Lee Steere.pdf	Lee Steere.zip	Lee Steere
Montague Range	Montague	Flora and vegetation of Montague Range.pdf	Montague.zip	Montague
Mt Forrest - Mt Richardson Range	Bulga Downs	Forrest - Richardson 377-389.pdf	Bulga.zip	Bulga Downs
Mt Gibson and surrounding areas	Mt Gibson	105-120 Meissner.pdf	Mt Gibson.zip	Mt Gibson
Mt Ida greenstone belt	Mt Mason	Flora and vegetation of Mt Mason.doc.pdf	Mt Mason.zip	Mt Mason
Northern Yerilgee Hills	Lake Giles	Flora and vegetation of Yerilgee.pdf	Lk Giles.zip	Lake Giles
Perseverance greenstone belt	Violet Range	Flora and vegetation of Violet Range.pdf	Violet.zip	Violet Range
Robinson Ranges and Mt Gould	Robinson Range	Robinson 363-376.pdf	Robinson.zip	Robinson Range
South Illaara greenstone belt	South Illaara	Flora and vegetation of south Illaara GB.pdf	South Illaara.zip	South Illaara
Weld Range	Weld	153-178 Markey.pdf	Weld.zip	Weld
Western Narryer Terrane	Mt Narryer	Flora and vegetation of Mt Narryer Dugel Nairn v2.doc.pdf	Narryer.zip	Mt Narryer
Yalgoo	Yalgoo	Flora and vegetation of Yalgoo.pdf	Yalgoo.zip	Yalgoo

Ravensthorpe Range Survey

The third project was a quadrat based survey of the Ravensthorpe Range (see Science Information Sheet 30/2009). This is a known area of very high conservation values which is also highly prospective for mining. The survey was carried out of two years during which 266 quadrats were established. A detailed report of the flora of covering the first 200 quadrats has been released (Kern *et al.* 2008) as had a detailed assessment of 40 taxa of particular conservation concern (Markey *et al.* 2009). Further publications are

pending. Access to the published reports is provided in the table below. Note the file size of 33Mb.

A series of factsheets have also been developed for the range illustrated by photos of S. Kern & R. Jasper (Plots 1-200) and A. Markey & J. Allen (Plots 201-266).

Ravensthorpe Range [click to display]

Range name	Range code	Papers / Manuscripts	Factsheets
Ravensthorpe Range	Ravensthorpe	Ravensthorpe Range Reports.zip	Ravensthorpe

Eastern Goldfields Ranges Surveys

Seven BIF and greenstone ranges had been surveyed in the eastern goldfields by DEC in the mid 1990s using the same methodologies as the BIF & Ravensthorpe Range surveys. The published reports relating to these surveys are provided in the table below.

Eastern Goldfields Ranges [click to display]

Range name	Range code	Papers / Manuscripts
Bremer Range	Bremer	JRSWA 81(2)gibson1.pdf
Helena & Aurora Range	Helena & Aurora	CALMSciencev2p231.pdf
Highclere Hills	Highclere Hills	JRSWA 84(2)gibson.pdf
Ironcap Range	Ironcap	Vol 87 pt 2 gibson 49-62.pdf
Jaurdi Uplands	Jaurdi	JRSWA 84(3)gibson.pdf
Mt Manning Range	Mt Manning	Vol 87 pt 2 gibson 35-47.pdf
Parker Range	Parker	JRSWA 81(2) gibson2.pdf

Data availability

Data from all of these surveys have had been uploaded on to NatureMap. These data cover 32 greenstone and BIF ranges, 1853 quadrats and over 47000 records. These data are supported by over 8200 voucher collections which have been lodged in the Western Australian Herbarium in order to provide a link between these quadrat based data and future taxonomic change.

In addition to availability of the data through the normal NatureMap querying interface it also possible to download the actual quadrat based data allowing access to presence and absence data in addition to the normal presence only information. This facility to download complete datasets has been added to allow easy access to data needed to undertake detailed compositional analysis. Given the very high species turnover found on these ranges any assessment of proposed impacts would require such analyses.

These data provide a valuable resource that will allow the development of a deeper understanding of the patterns of the flora and vegetation across these ranges and provide a regional context in which to develop and assess future mining proposals in these ranges.