

Biodiversity Assets of NSW and QLD Cotton Growing Areas

Synthesis of data and identification of priority areas

Executive Summary

A Project for the Cotton Research Development Corporation

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EXECUTIVE SUMMARY

The cotton industry is a major player in Australia’s agricultural sector. It produces around 3% of the global cotton crop, delivers an average \$2 billion per year in export earnings, and employs up to 10,000 workers across numerous regions. The industry comprises over 2,500 individual farms that cover over 45,000 km² of farmland, mainly in inland NSW and Queensland with smaller areas in Victoria and Western Australia.

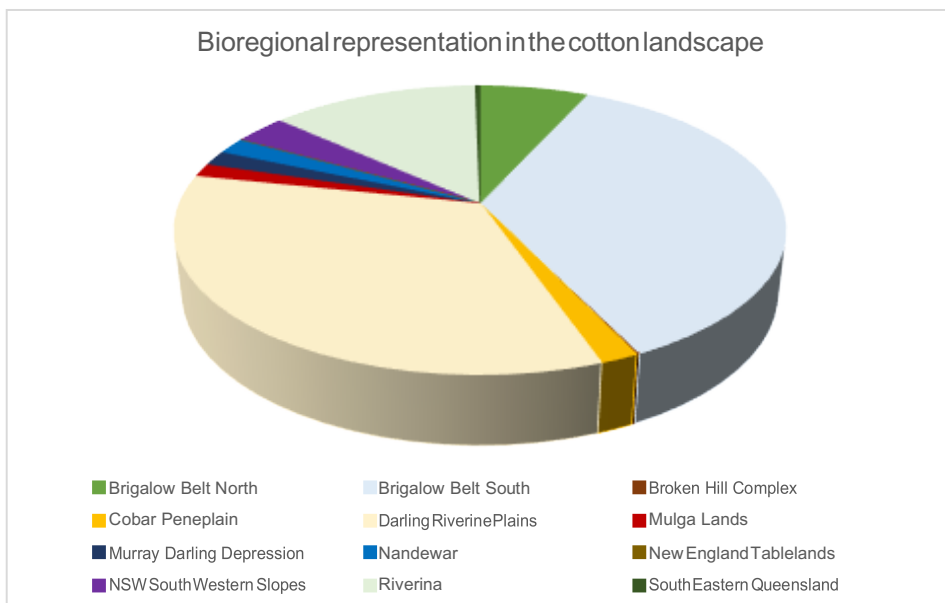
The cotton industry is reliant on a significant stock of natural capital that includes soil, water and biodiversity assets of the major riverine floodplains. While past management practices within the industry have depleted natural capital stocks over the past 50 years, emerging initiatives such as ‘myBMP’ seek to place the industry on a sustainable footing through improvement of on-farm practices that include better irrigation, use of chemicals, and management of native vegetation. These initiatives are being driven by a growing awareness that protection and restoration of natural ecological processes and ecosystem complexity in agricultural landscapes are important factors in the control of agricultural pests, maintenance of healthy rural landscapes, and improvement of farm profits.

Improving knowledge about natural systems in the cotton landscape will provide industry with a better evidence-base from which to set objectives and prioritise actions for natural capital enhancement via whole-of-industry management. This report presents a snapshot of key biodiversity assets across the cotton growing regions of NSW and Queensland, and uses these data to identify places in the landscape that would benefit from efforts to protect existing ecological systems or reconstruct/restore former native vegetation.

To understand an important component of natural capital in cotton growing regions, key biodiversity data were compiled across the combined extent of all cotton properties (45,070 km²) as well as the ‘cotton landscape’ (136,117 km²) which includes all cotton properties plus a 5 km buffer. A snapshot of key biodiversity assets within cotton farms and in the cotton landscape is as follows:

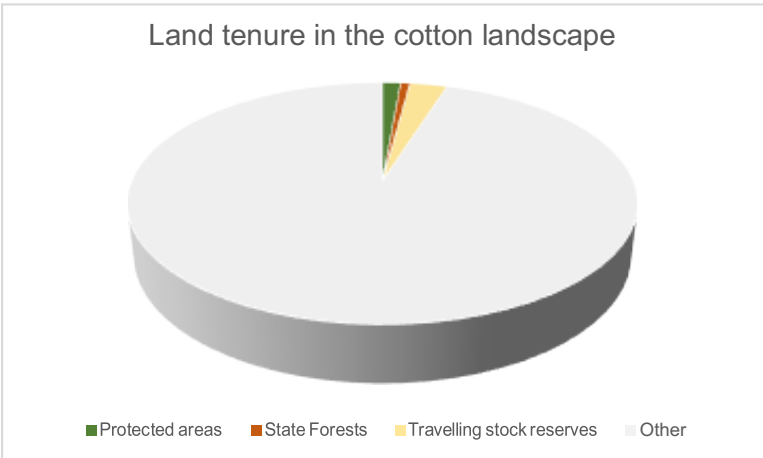
Bioregions

The cotton landscape of eastern Australia extends across 12 of the 89 Australian bioregions. Four bioregions - Brigalow Belt South, Brigalow Belt North, Darling Riverine Plains and Riverina -collectively include 89% of the cotton landscape. These four bioregions support large inland rivers and floodplains, and a range of unique ecosystems and species.



Public land reserves

A total of 6,682 km² of public land reserves occur in the cotton landscape including protected areas, state forests and travelling stock reserves. These represent just 5% of the cotton landscape.

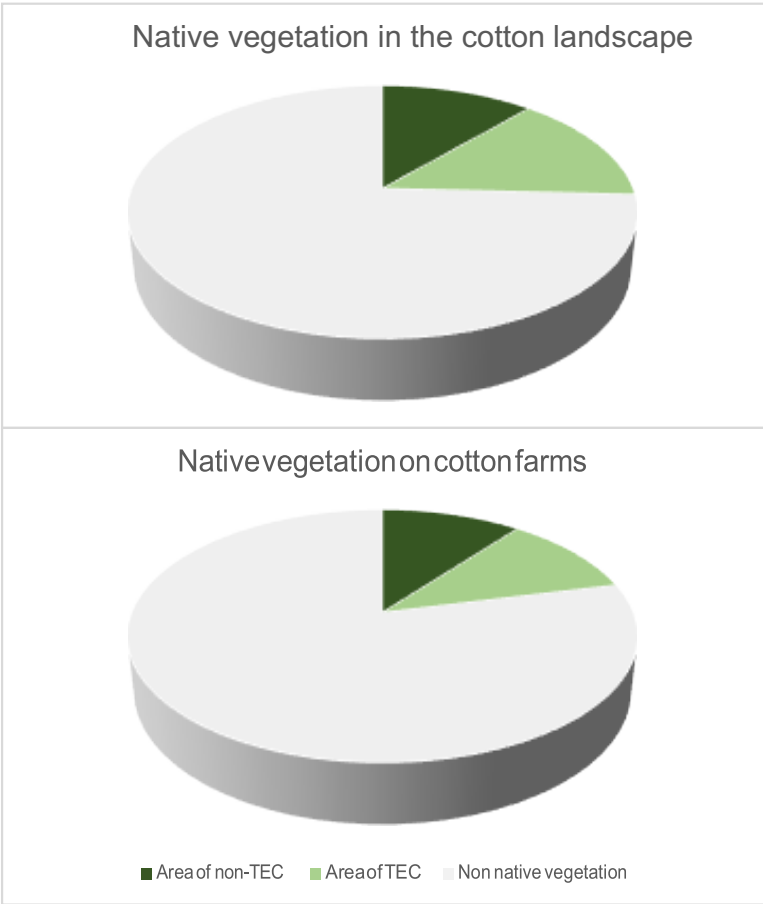


Native vegetation types

A total of 490 vegetation types are mapped in the cotton landscape, including 147 types that are directly or partly equivalent to a threatened ecological community (TEC) listed under state and/or Commonwealth environmental legislation (25 TECs occur in the landscape). A subset of 348 vegetation types occur on cotton properties in the region. The most extensive vegetation types include Coolibah open woodland, Black Box open woodlands, Poplar Box woodlands, and various grassland communities. River Red Gum occurs along all the major rivers in the cotton landscape.

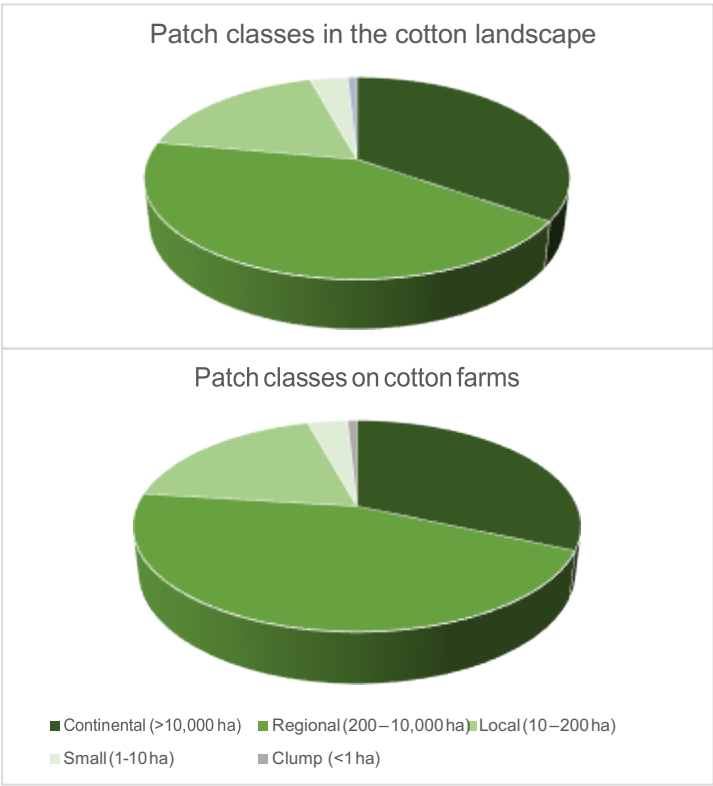
Native vegetation extent

A total of 35,083 km² of remnant native vegetation occurs in the cotton landscape, almost half of which is TEC. About 26% of the cotton landscape and 21% of the combined extent of all cotton properties retains a cover of remnant native vegetation.



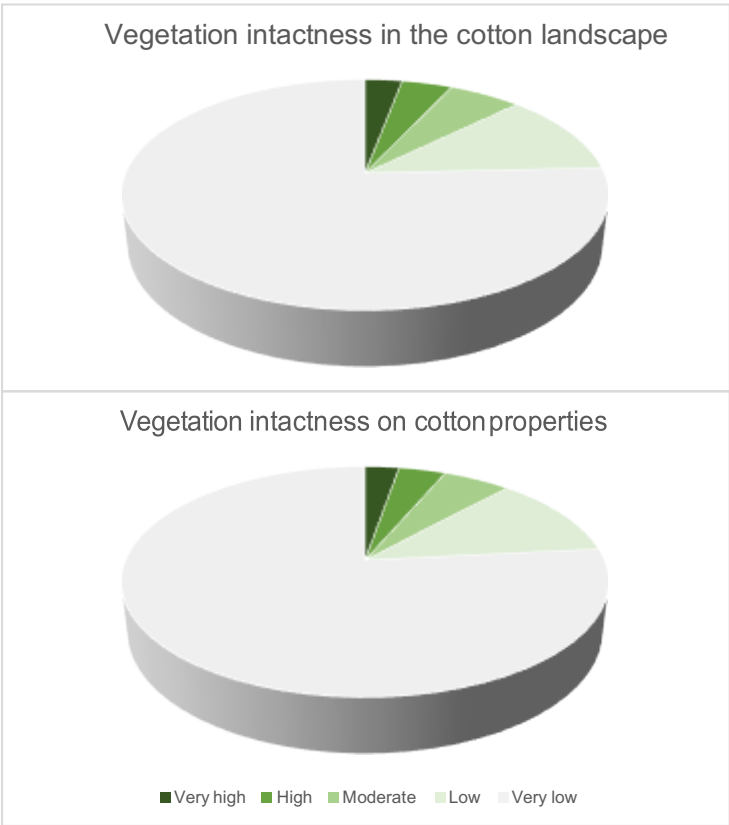
Native vegetation patches

The vast majority of remnant vegetation patches are small patches or clumps <200 ha, however most of the extent of native vegetation (> 75%) is retained in larger patches > 200 ha, both in the cotton landscape and on cotton properties.



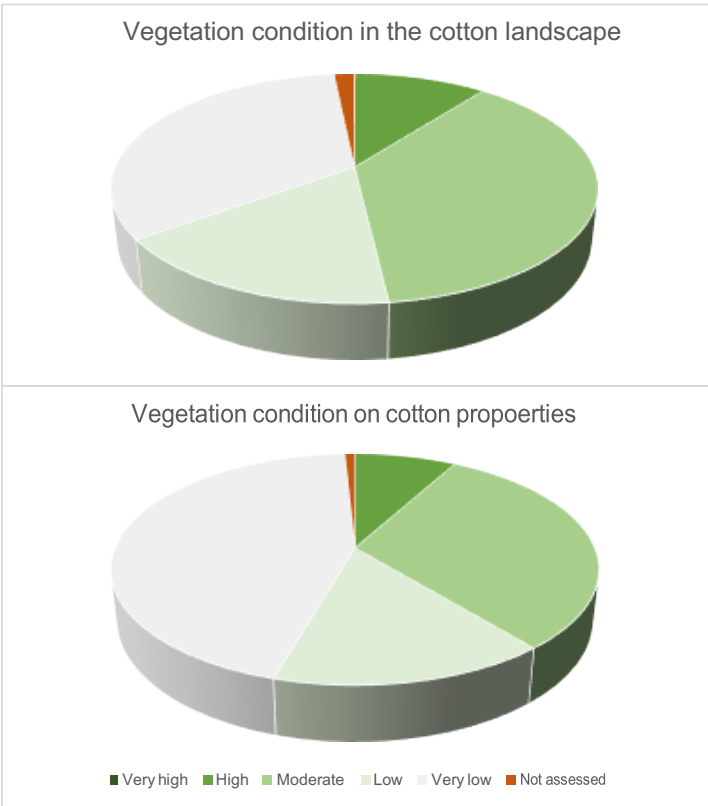
Native vegetation intactness

About 13% of the cotton landscape has 'moderate', 'high' or 'very high' intactness, denoted by a relatively high proportion of vegetation cover and a low degree of fragmentation. However most of the cotton region exhibits relatively poor intactness as a result of historical clearing of vegetation.



Native vegetation condition

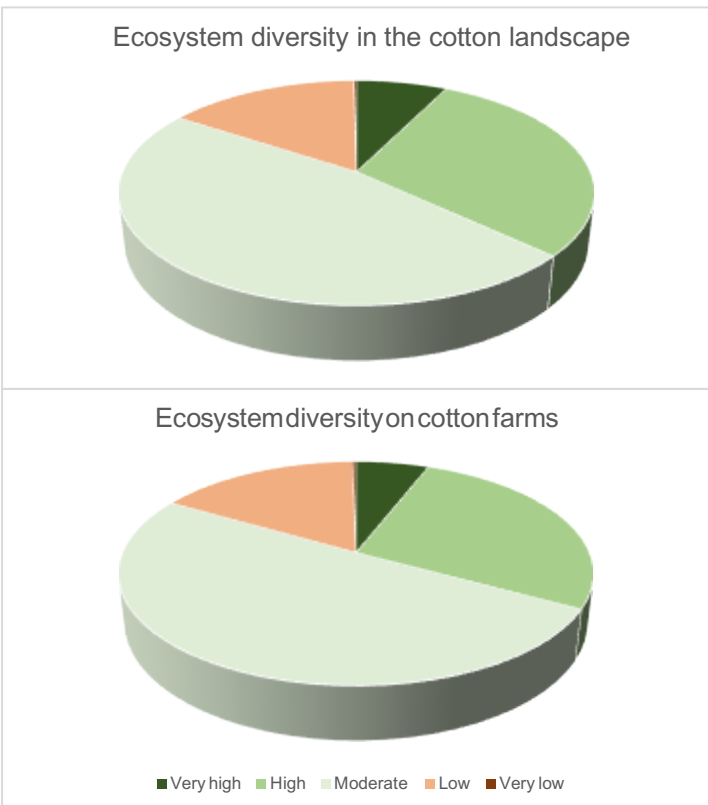
Condition data were sourced from the NSW Office of Environment and Heritage, and were informed by foliage cover, land use, tenure and soil resilience. While virtually no areas of 'very high' condition occur in the cotton landscape, almost 50% of the landscape and 40% of cotton properties exhibit 'high' or 'moderate' condition.



Ecosystem diversity

Vegetation types were amalgamated into 54 broad vegetation associations for the purpose of evaluating the level of ecosystem diversity across the cotton landscape and on cotton farms.

About 35% of the cotton landscape and cotton properties comprise a 'high' or 'very high' ecosystem diversity (i.e. at least 12 associations within 5 km), with eastern parts of the Brigalow Belt South region and Liverpool Plains having notably high ecosystem diversity.



Landscape corridors

Landscape corridors are parts of the landscape best facilitate movement of native species and should be a focus for retention and restoration of remnant forest and woodlands. Landscape corridors were delineated as bands of 2 km width that linked major contiguous patches of at least 10,000 ha via a series of connected smaller remnants including stands of linear riverine vegetation, small patches and clumps.

A total length of 5,754 km of corridor is mapped within the landscape, enclosing 11,300 km² of land, of which 43.6% remains vegetated (over twice the cover level of the broader cotton landscape). There are many opportunities to protect and restore corridors on cotton farms as they collectively comprise 1,135 km in length and enclose 3,360 km².

A large proportion follow major rivers of the MDB, joining major areas of intact vegetation on the western slopes to the semi-arid western plains which are largely uncleared. A number also offer links between major river valleys.

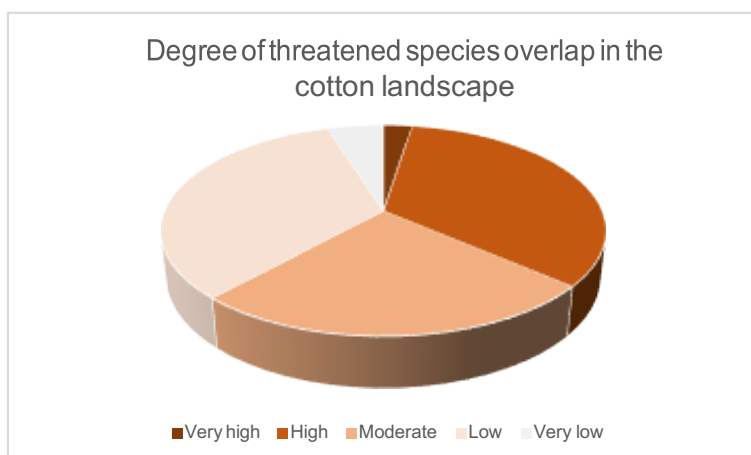
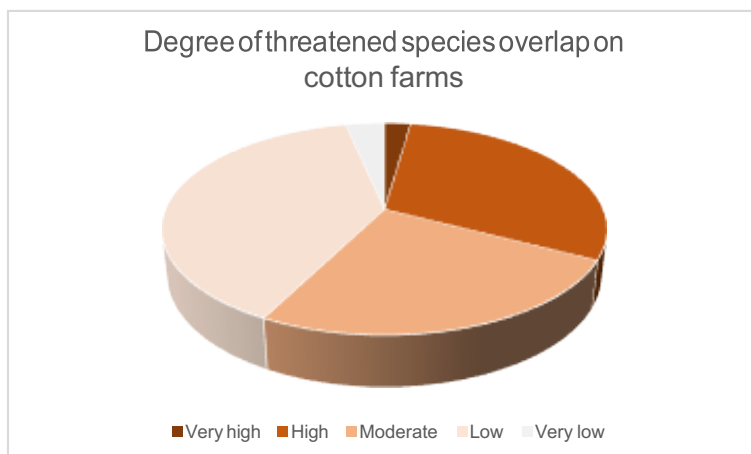
Threatened species

A total of 115 plant and 164 animal species listed as threatened under State and/or Commonwealth legislation, or migratory under Commonwealth legislation, have been recorded in the cotton landscape in eastern Australia or are predicted to occur there. These include:

- 4 mammal, 1 bird and 1 plant species are Presumed Extinct nationally.
- 5 animal and 2 plant species are Presumed Extinct from NSW.
- 18 animal and 6 plant species are considered to be Critically Endangered in at least one jurisdiction and/or nationally.
- 27 animal and 49 plant species are considered to be Endangered in at least one jurisdiction and/or nationally, and 5 animal species occur within an Endangered Population in NSW.
- 76 animal and 57 plant species are listed as Vulnerable in at least one jurisdiction and/or nationally.
- 28 bird species are listed exclusively as Migratory (an additional 3 species listed as Migratory are also listed as Critically Endangered, Endangered or Vulnerable).

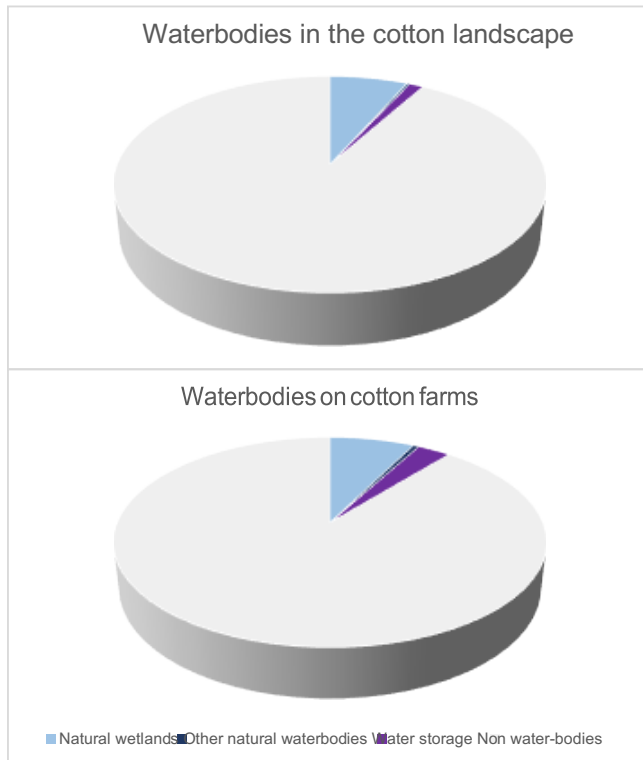
A subset of 109 threatened animal species have been recorded on cotton farms (mainly birds and mammals) while 39 threatened plant species have been recorded on cotton farms (mainly herbs and forbs).

A habitat distribution model was developed for each of 138 threatened species, from which a threatened species 'composite' or 'hot spot' map was created. About 35% of the cotton landscape is considered to have 'very high' or 'high' overlap of threatened species, with the Darling Downs in southern Queensland and the Lachlan and Murrumbidgee Valleys in southern NSW representing focal areas of threatened species.



Wetlands and waterbodies

A total of 16,340 individual wetlands are mapped in the cotton landscape, covering 9,800 km² (about 7% of the region). These include 2 Ramsar-listed wetlands and 11 wetlands of national importance. Cotton properties contain 6,625 individual wetlands including parts of both Ramsar sites.



Rivers and creeks

A total of 45 rivers and 194 major creeks are located in the cotton landscape, with a combined length of over 16,000 km.

Hundreds of minor creeks (including 479 named creeks) also occur within the cotton landscape, with a combined length of over 33,000 km.

The cotton landscape contains 1,391 km² of land that is within 50m of a river or major creek, most of which retains native vegetation.

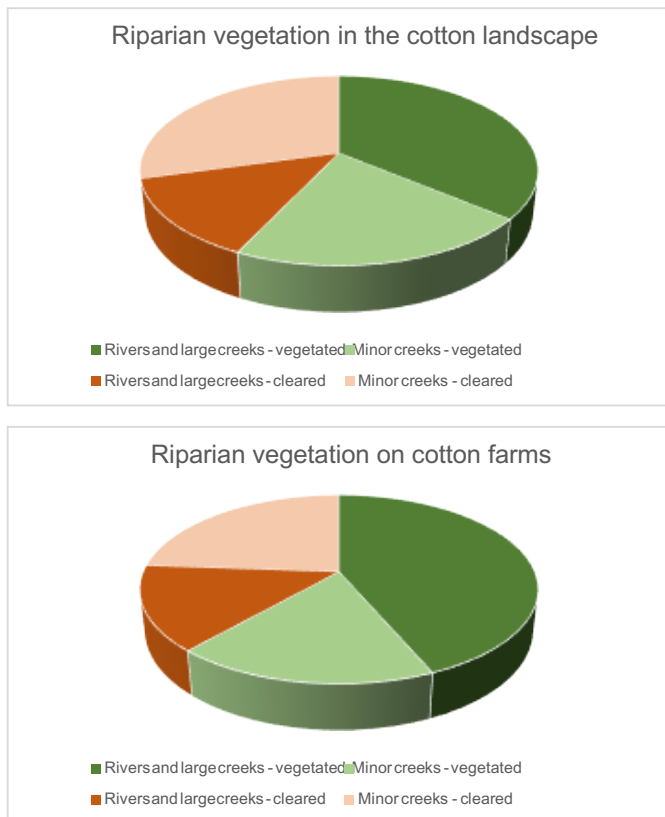
The cotton landscape also contains 1,410 km² of land that is within 20m of a minor creekline, most of which has been cleared.

A total of 35 rivers and 149 major creek flow through cotton properties in NSW and QLD - a combined length of about 7,300 km within cotton properties, including 740 km adjacent to cotton fields.

A further 10,480 km of minor creeks intersect cotton properties while 2,080 km is adjacent to cotton fields.

Cotton farms contain a combined 627 km² of land that is within 50m of a river or major creek, most of which retains native vegetation.

Cotton farms also contain a combined 453 km² of land that is within 20m of a minor creekline, most of which has been cleared.



Proximity to habitat

Distance to forest margin and available shade are known to be critical variables that help to explain the composition of bird, bat and invertebrate communities in agricultural systems. It follows that native vegetation next to cotton fields will support a higher composition of native predators and parasitoids of adjacent crop pests that are beneficial to the growth of cotton crops.

A total of 2,490 km² of cleared land and 470 km² of remnant native vegetation is located within 100 m of mapped cotton fields in the cotton landscape.

Cleared areas adjacent to cotton fields should be vegetated where practicable to maximise the biomass of native predators of cotton insect pests over the long term, particularly where the same land serves some other biodiversity service (e.g. close to a major watercourse or part of a landscape corridor). Similarly, remnant native vegetation (including paddock trees) that persist next to cotton fields should be retained and potentially improved.

Following the identification and mapping of biodiversity assets in the cotton landscape, a spatial methodology was developed to enable identification of areas in the landscape considered to be most valuable for the long term conservation of biodiversity through vegetation enhancement (improving the condition of existing vegetation) or vegetation reconstruction (rebuilding of vegetation communities via revegetation or facilitation of natural regeneration on farmland that has been historically cleared of native vegetation).

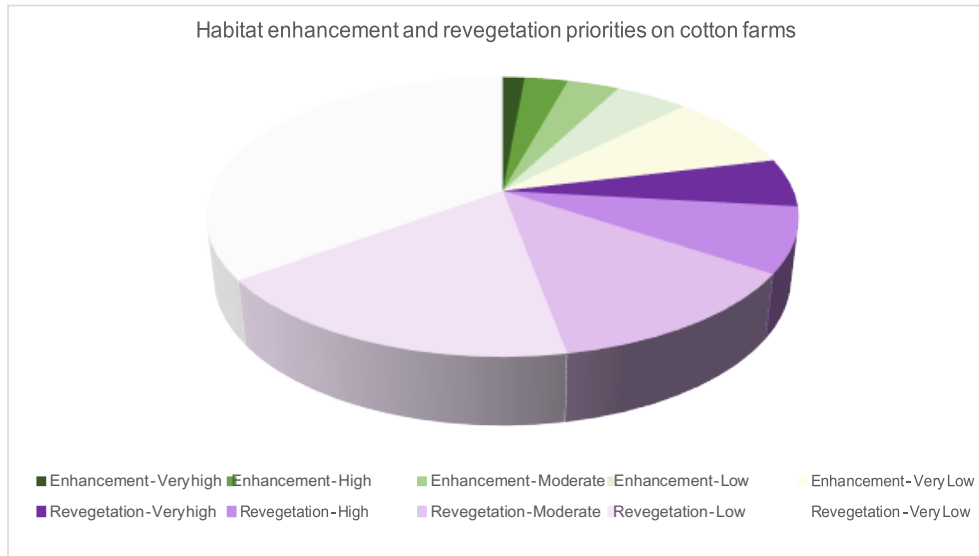
The spatial methodology involved the use of rules and thresholds to rank different parts of the landscape using the following 11 biodiversity themes, each expressed as an individual priority map for either vegetation protection/enhancement or vegetation reconstruction:

- Status and rarity of ecosystem;
- Local ecosystem heterogeneity;
- Local vegetation cover;
- Vegetation intactness;
- Vegetation condition;
- Patch size;
- Land tenure;
- Riparian areas;
- Threatened species;
- Landscape corridors; and
- Proximity to cotton fields.

Each of the 11 layers were overlaid to construct a final priority map for vegetation protection/enhancement and vegetation reconstruction.

About 1.4% of the area of all cotton properties (644 km²) contains remnant native vegetation considered to be very high priority for protection and enhancement on account of a combination of its status, intactness, condition, proximity to riparian areas, proximity to cotton fields, association with landscape corridors, and habitat for threatened species.

A further 5.6% of the area of all cotton properties (1,285 km²) contains cleared land that is considered to be very high priority for revegetation and reconstruction of native vegetation on account of the extent of vegetation in the surrounding landscape, its proximity to reserves and different patch sizes, its association with riverine environments and wetlands, whether it is associated with a landscape corridor, and whether it is adjacent to mapped cotton fields.



A number of management actions are identified that will add to the capacity of biodiversity to persist in the landscape at both local and enterprise scales. Of these, a subset of actions that will help to address the emerging challenges of climate change should be accorded the highest importance and should be undertaken within or adjacent to areas designated highest priority for enhancement. These actions are:

- Protection of areas of intact high-value habitat;
- Enhancement of landscape corridors;
- Enhancement of riparian vegetation;
- Enhancement and protection of wetlands;
- Revegetation adjacent to existing vegetation, particularly public land reserves;
- Ongoing management and control of invasive plants and animals; and
- Effective monitoring, evaluation, reporting and improvement.

On the basis of findings of this report, it is recommended that Cotton RDC consider the development of the following strategies for the cotton industry:

- Climate change adaptation and mitigation strategy;
- Native vegetation strategy; and
- Biodiversity strategy.