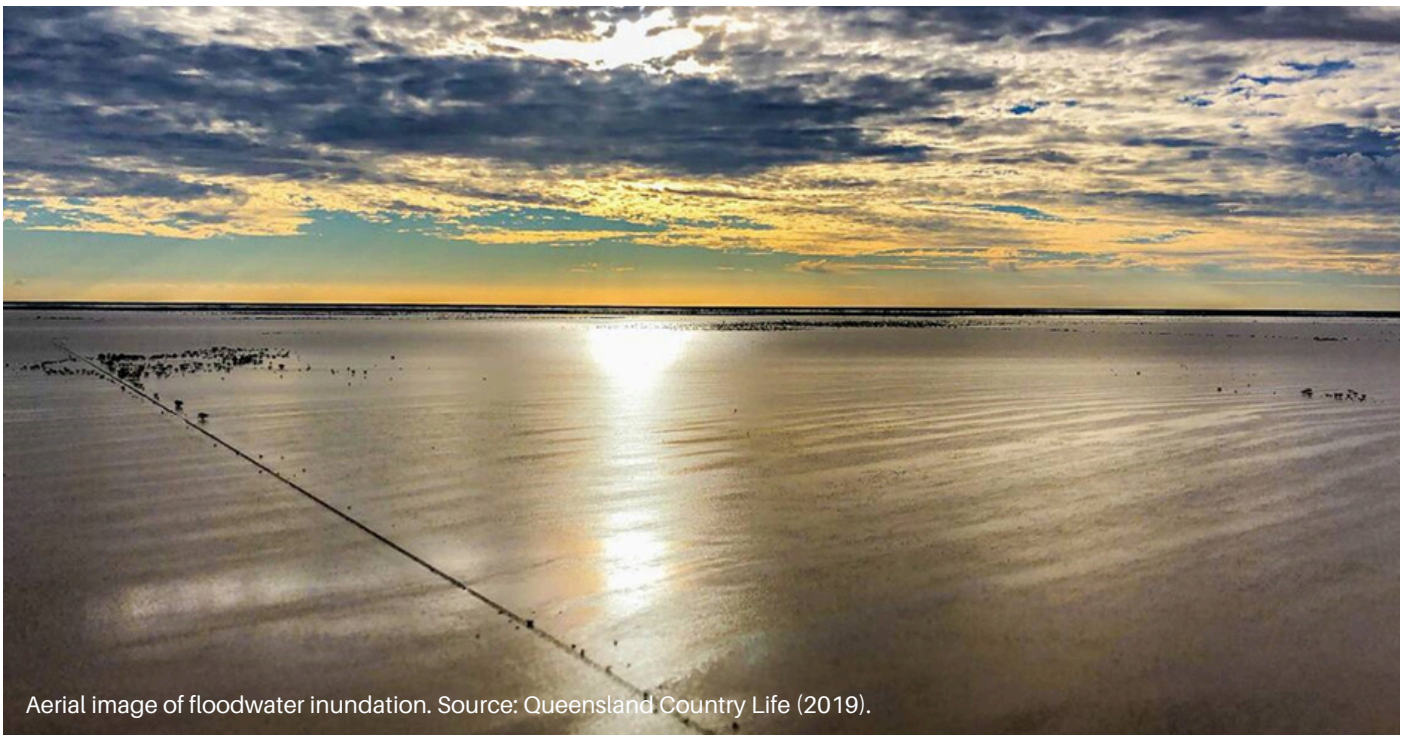
Recovery in Grazing Land Condition on the Mitchell Grass Downs Five Years after the 2019 Flood

Background

- The 2019 flood and associated wind chill event had a devastating impact on the Southern Gulf's grazing industry and local communities, where high stock mortality, infrastructure damage, and business disruption were experienced.
- Rangeland condition was also severely impacted by the flood event that caused loss of valuable soil, nutrients, and seed bank. These factors, together with prolonged inundation, contributed to the death of key pasture plants.
- This project seeks to assess land condition recovery on the Southern Gulf Mitchell Grass Downs five years on from the 2019 flood.



Aerial image of floodwater inundation. Source: Queensland Country Life (2019).

Take home messages

1. Land that is in good condition (A or B) is more resilient to the impacts of extreme climate events (both flood and drought) and recovers more quickly.

2. Land condition at many sites heavily impacted by the 2019 flood has improved significantly. The recovery has been supported by conservative grazing land management and good rainfall conditions in recent years.

3. The Mitchell Grass Downs soils are some of the most resilient grazing lands in northern Australia, and Mitchell grass plants have a long survival period. This resilience, and careful grazing land management, support the continued regeneration potential of these pastures.

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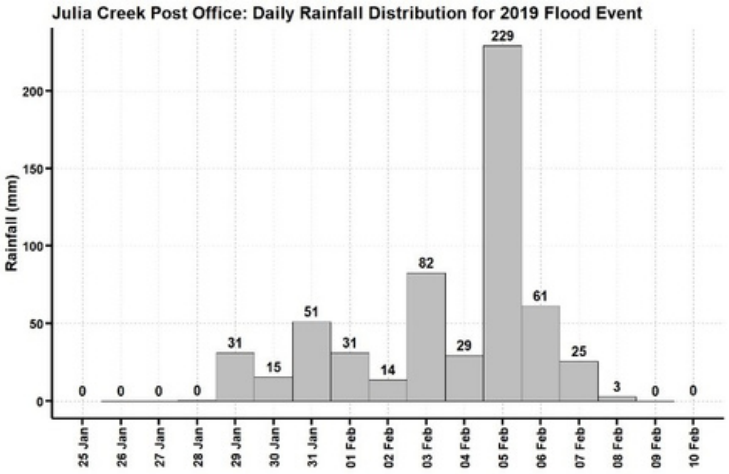
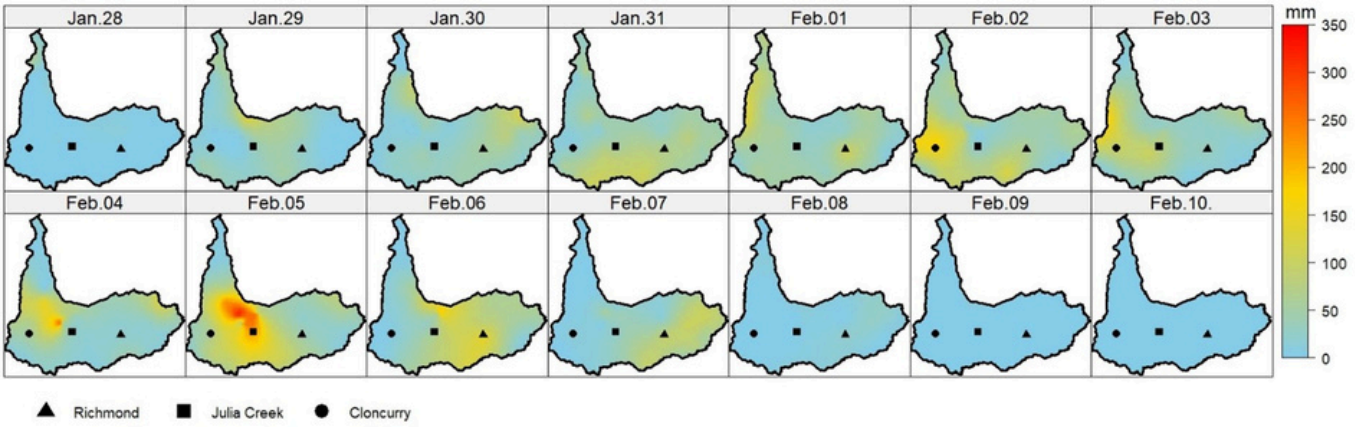
Rainfall during the 2019 flood

- The Flinders catchment had a period of 10 consecutive days of widespread rainfall greater than 50 mm between 29 January and 7 February 2019.
- Julia Creek Airport, for example, recorded 571 mm over the event, with a maximum daily total of 229 mm on the 5th February.
- The rainfall occurred as two periods of heavy rainfall, the initial one in late January, and the second a more intense burst of very heavy rainfall five days later. This resulted in two flood peaks.



Daily rainfall at recorded at Julia Creek Airport during the 2019 flood event. Data source: SILO (2024).

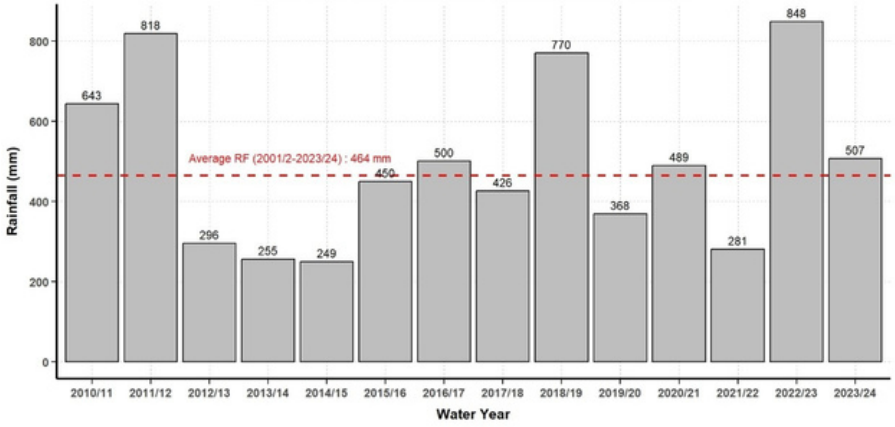
Spatial distribution of daily rainfall during the 2019 flood



Data source: SILO (2024).

Rainfall before and after the flood

- In the six years prior to the 2019 flood event, much of the Flinders catchment experienced average to below-average rainfall. The McKinlay Shire and Richmond Shire were drought declared.
- In the three years following the flood, rainfall was average to below average and the McKinlay and Richmond Shire remained drought declared.
- 2022/23 and 2023/24 were above-average rainfall years.



Annual rainfall recorded at Julia Creek Airport since 2010-11. Note, annual rainfall is the sum of rainfall between July 1 and June 30 the following year. Source: BOM (2024).

The extent of the 2019 flood

- Using available cloud-free satellite imagery in the days following the peak of the event, the Queensland Government estimated a flood inundation extent of over 2.3 million hectares, with some inundated areas spanning over 70 km east to west and over 400 km north to south.
- AgForce produced a separate map of the flood extent using MODIS imagery from the 9th of February 2019. This map suggested a much larger flood extent of over 13.2 million hectares.

2019-2020 surveys

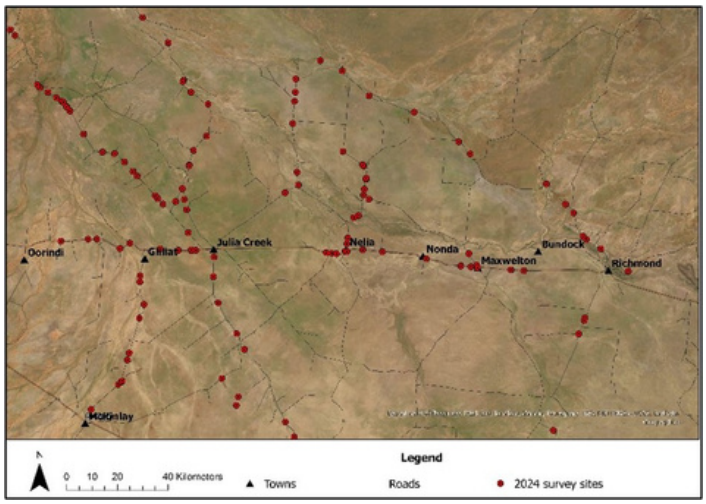
- Soon after the floodwaters receded in 2019, the QLD Department of Agriculture and Fisheries undertook field pasture inspections at 130 sites (see Hall, 2019). Sites were limited to land alongside a selection of major highways or secondary roads, on Mitchell Grass Downs and Gulf Plains land types.
- In August 2020, the status of the pastures, grass tussocks and seedlings, were recorded along with the soil surface conditions, sediment and erosion, at most of the sites surveyed in 2019 (see Hall, 2020).

Extent of the 2019 flood as mapped by: (i) the QLD Government, and (ii) AgForce.

2024 field surveys

In September 2024, James Cook University, in collaboration with Southern Gulf NRM, and Trevor Hall and Jenny Milson (who conducted the 2019 and 2020 surveys), revisited 56 of the original sites and made 14 new assessments, focused on the Mitchell Grass Downs.

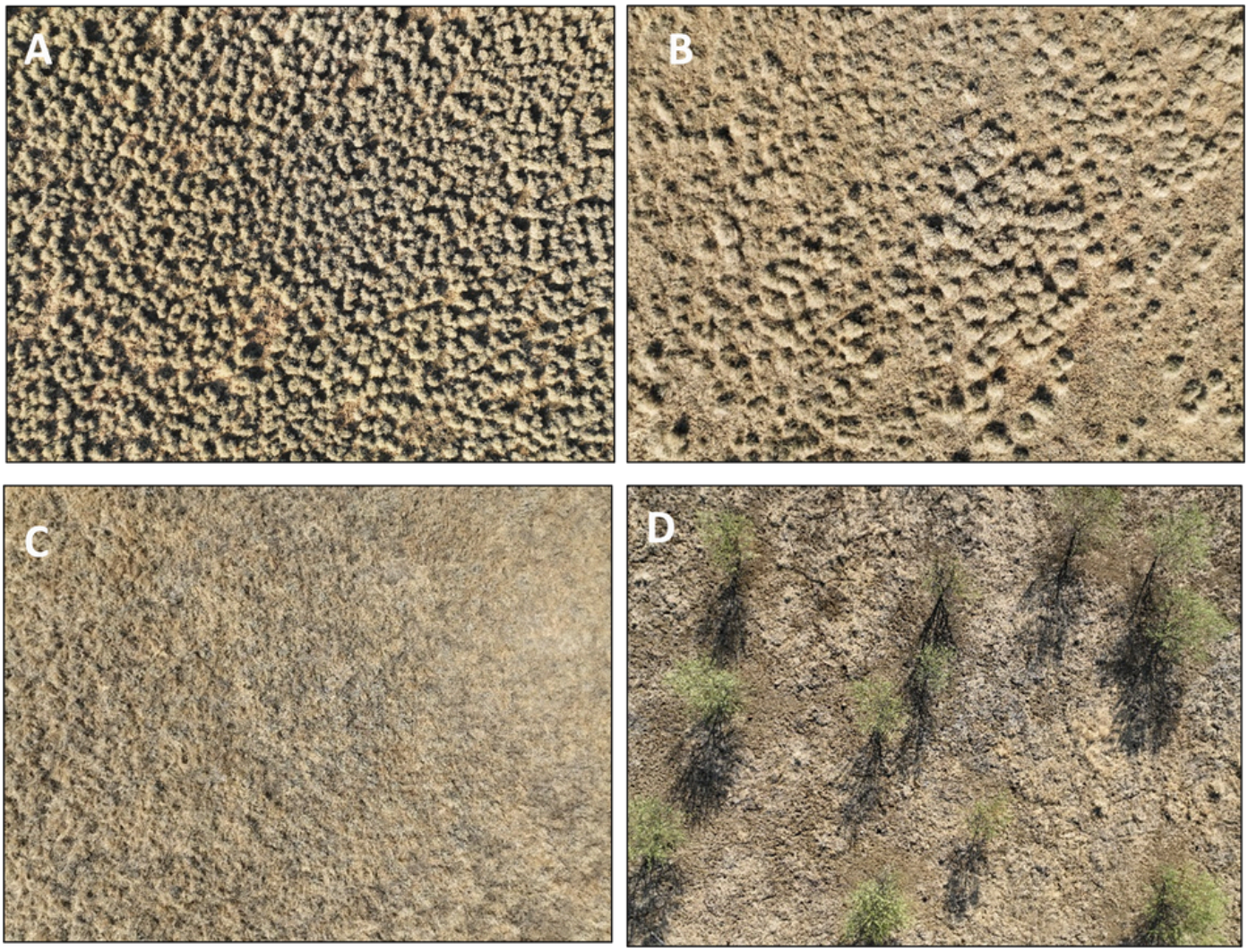
Pasture quadrat measurement in September 2024.



Location of sites surveyed in 2024

Land condition ratings for pasture assessment 2024

Category	A	B	C	D
3P (perennial, productive, palatable) pasture cover (%)	>75	45-75	10-45	<10
Weeds	No weeds	Very few	Some	Obvious
Soil condition	Good	Some decline	Obvious erosion	Severe erosion
Productive capacity	100	75-85	45	20



Aerial images of sites in different states of land condition, captured in September 2024.

Key findings from the 2024 field survey

Out of the 56 sites re-assessed in 2024, **land condition**:

- **Improved** at least one condition score (e.g., from C to B condition) at 26 sites (46.4%);
- Remained at the **same** condition score at 27 sites (48.2%); and
- **Declined** at least one condition score at 3 sites (5.4%).

Out of the 56 sites re-assessed in 2024, **soil condition**:

- **Improved** at least one condition score (e.g., from C to B condition) at 50 sites (76.9%);
- Remained at the **same** condition score at 7 sites (10.8 %); and
- **Declined** at least one condition score at 4 sites (6.2%).

Land condition change between 2019 and 2024 at surveyed sites

Status	Land condition score	Number of sites	Percentage of sites
Improved	D to C	3	5.4
	D to B	7	12.5
	C to B	8	14.3
	C to A	5	8.9
	B to A	3	5.4
No change	D	1	1.8
	C	19	33.9
	B	7	12.5
Declined	C to D	1	1.8
	B to C	2	3.6
Total		56	100

Photos of a site that was heavily impacted by the 2019 flood with complete loss of pasture cover and serious scouring (D condition). In 2024, the site has recovered to B condition with high coverage of Curly Mitchell grass.

General management advice following flood events

- Wet season spelling is important for pasture recovery after flood events, and to be effective, stocking rates need to be carefully managed.
- For country that is badly damaged (e.g., substantial erosion, tussock roots exposure), a full wet-season spell for successive years may be needed to maximise seed setting to rebuild the soil seedbank.
- Grazing over the wet season should only be done in paddocks that have remained minimally effected during the flood
- For country where tussocks are recovering, spell at least until the pasture is “ahead of the cattle”. In other words, the grasses will hold their own when the cattle are introduced.
- Manage and move livestock based on pasture availability.
- Establish pasture monitoring points that are easily accessible and monitor seedling and tussock development regularly.
- Undertake forage budgeting and understand short- and long-term carrying capacities. When stocking rates are too high, animal performance generally declines, and overall production is impacted.
- Leave a minimum of 15-20 cm residual grass stubble height at the end of the dry season for optimum plant health and to enable a quick response following rain.

Useful online resources

- Hall, T. (2019). Pasture recovery, land condition and some other observations after the monsoon flooding, chill event in north-west Queensland in Jan-Mar 2019.
- Hall, T. (2020). Pasture recovery and land condition after flooding, drought, and grazing in north-west Queensland (Winter 2020).
- Phelps (2019). North-west Queensland pasture response and recovery after flooding – recorded webinar.
- FutureBeef (2019). Gulf pastures after the 2019 flood event.

Further information

For further information about this project, please contact Jack Koci: jack.koci1@jcu.edu.au

Acknowledgements

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