

Pasture recovery from flooding

Summary

- Pasture species vary in their tolerance to flooding. Buffel is the most common sown grass and is susceptible to death from flooding
- Complete inundation for 2 days or more will result in some plant deaths, particularly with buffel
- Having pastures in good condition before flooding maximises their chances of recovery
- Wait at least 2 to 3 weeks to see how pastures recover before considering re-seeding
- Spell pastures to allow new shoots to grow, replenish plant root reserves, set seed and for seedlings to establish
- If large areas of pasture have been killed concentrate stock on sacrifice areas to spell other pastures or sow forages such as silk sorghum in designated areas.

Introduction

Large areas of pastures in Queensland experience periodic flooding which can have severe impacts on pasture condition, forage supply, animal performance and cash flow. The impact of flooding on pasture survival and production varies depending on the degree of flooding and pasture species present. Depth and duration of flooding are generally the most important factors determining the effects on pastures; however turbidity, flow rates and temperature can also have an impact.

Silt deposition on pasture plants as floodwaters recede can reduce recovery. The silt forms a physical barrier to air and sunlight which stops photosynthesis and plant growth. Falls of rain greater than 20 mm should cleanse the leaves and stems and hopefully plant growth will resume.

Flood tolerance of pastures

Many pastures can tolerate shallow flooding where part of the plant remains out of water for several days to weeks, however relatively few pasture plants can survive deeper flooding where the whole plant is submerged for more than a few days. For example, buffel grass can only tolerate a few days of complete inundation; whereas flood tolerant grasses such as Bambatsi and Floren bluegrass can cope with a few weeks of being completely submerged (tables 1 and 2).

Pasture recovery from flooding

Pastures are generally resilient and will recover from flooding eventually – however there are a number of strategies graziers can use to speed the recovery of their pastures and ultimately animal production and business performance.

Pasture recovery from flooding depends on both the survival and growth of adult plants and seedlings establishing from the soil seed bank. For this reason, pastures often recover quicker during warm weather in summer than from floods late in the growing season or during winter. Pastures in good condition prior to flooding generally recover more quickly due to a larger seed-bank, and possibly, fewer plants completely submerged.

Management options

Pasture and stock management to speed recovery will vary depending on the degree of flood damage, the percentage of the property affected and individual property circumstances (e.g. access to machinery or pasture seed).

The main options for encouraging pasture recovery are pasture spelling, controlling weeds, reseeding

Table 1: Flood tolerance of some common pasture grasses in Queensland. (Tolerance ratings are estimates from anecdotal evidence as there is very little published information available)

High flood tolerance	Medium flood tolerance	Low flood tolerance
Bambatsi panic	Purple pigeon grass	Buffel
Floren bluegrass	Hoop Mitchell grass	Bisset
Bull Mitchell	Queensland bluegrass	Digit grass (Premier)
	Forest bluegrass	Tall finger grass (Strickland)
		Gatton and Green panic



Grass seedlings emerging after a flood event (top) and regrowth from flood damaged grass tussock

pasture and using forage crops or sacrifice areas to allow spelling of other areas. It is important to check the recovery of pastures closely for the first 2–3 weeks to decide whether potentially costly rehabilitation is necessary. In many instances some shoots will appear in apparently dead tussocks and some seedlings will emerge in pastures that initially look dead.

Burning is not recommended for removing silt from pasture plants or for stimulating pasture growth. Burning adds further stress to the plant as it removes and damages any shoots that are still alive and starting to regrow. Growing points in the crown may also be further damaged by burning. Removal of ground cover leaves the soil subject to runoff and erosion. Maintenance of ground cover, even though it is dead, provides suppression of weed establishment (e.g. parthenium). Burning also reduces the amount of grass seed available for regeneration.

Pasture spelling – to allow pasture plants to recover and regrow leaves as well as seedlings to establish. Flooding places a lot of stress on the pasture – it needs some time to recover before grazing.

If large percentages of the property have been flooded, graziers face a ‘feed drought’ where there is insufficient forage to support stock numbers. In these instances graziers should lighten grazing pressure (that is; sell, agist or feed stock),

otherwise stock performance will be affected from feed shortage, pastures will deteriorate and pasture recovery will take longer. Forage cropping or sacrifice areas can be used to lighten the load on recovering pastures in the short to medium term.

Control weeds – large populations of weeds often establish after floods due to reduced competition from the pasture. The weeds can severely compete with the recovering pasture plants and establishing seedlings. Herbicides and crash grazing can be used depending on weed species. In many instances the use of a selective herbicide (e.g. Ally) can be more effective than re-seeding in promoting pasture recovery, especially in areas with parthenium. Pastures with less weed competition will also produce more seed which will aid recovery in the following seasons.

Re-seeding pasture – wait for a few weeks to see whether seedlings of grasses emerge before considering re-seeding a paddock. Re-seeding is expensive, especially if there is already sufficient seed in the soil to replace ‘drowned’ plants and there may be enough existing plants to set more seed than can be sown economically. Additionally, flooded soils are often not good seedbeds as there is a lot of decaying debris and grass tussocks to catch broadcast seed, with the surface often crusting and then cracking providing poor soil-seed contact.

For example, in a pot trial, seed germination after ten days inundation for different buffel varieties varied from 0.04% to 25% of sown seed. So even after ten days inundation there was some seed remaining to germinate and re-establish. Also, buffel grass stands produce 100–500 kg/ha/year of seed compared with a recommended seeding rate of 2 kg/ha. Therefore, even if only a few buffel tussocks survive and only scattered seedlings establish, there will be far more seed produced in the paddock than what can be spread.

However, if there is less than one grass plant per 5 m² and there are no seedlings emerging then re-



Parthenium emerging in bare areas after floods

planting the pasture may be required. Ensure you include flood tolerant varieties such as Bambatsi, Floren bluegrass or even natives such as curly Mitchell grass if there is seed available. Avoid planting silk or forage sorghums in a mix as they will compete strongly with establishing grasses and slow the recovery process even at low seeding rates. For example, silk sorghum has approximately 150,000 seeds/kg, therefore a seeding rate of 1 kg/ha equates to 15 seeds/m²; so even if only a third germinate there are still five establishing sorghum plants/m². If including silk, use less than 0.3 kg of seed/ha to reduce competition with establishing pastures which you want there long-term.

If reseeding is the best option, consider including a summer growing legume with the grasses in suitable areas to reduce the effects of productivity decline with time (rundown) that is experienced with grass only pastures. If the flooding occurs late in the growing season tropical grasses may not have sufficient time to establish before the first frost, however winter growing legumes such as medics will be an option in southern Queensland.

When purchasing pasture seed ensure the germination is good and there are no weed seeds

present, particularly weeds like parthenium. Don't purchase seed from unknown sources without a germination certificate and seed analysis report.

Forage crops or sacrifice areas – can be used to provide short-term feed and to allow spelling of other permanent pasture to encourage recovery. Forage or silk sorghum established on part of a property can reduce grazing pressure on recovering pastures where graziers have arable land and machinery. Herbicides and zero till planters make it possible to plant sorghum as soon as the ground is dry enough.

Recovering buffel grass pastures from flooding

Buffel grass is the most widely planted pasture species in Queensland and has low tolerance of flooding; however it has established on large areas of alluvial plains that experience periodic flooding. During periods of extensive flooding, large areas of buffel grass can be severely damaged or die. Some areas will become dominated by more flood tolerant grasses during wet years. Management options for different degrees of flooding and damage are described in table 2.

Table 2: Management options for rehabilitating flood affected buffel grass pastures.

Buffel condition	Flooding period		Management options
	Shallow	Fully submerged	
Widespread death of buffel tussocks. Few grass seedlings	> 2–3 weeks	> 5 days	<ul style="list-style-type: none"> ● Check pasture for establishing grass seedlings. ● Spell pasture. If a large area of the property has been flooded reduce grazing pressure. ● Reseed with permanent pasture species. Include flood tolerant grasses. ● Where suitable country is available, forage cropping to provide short term forage. ● Weed control (e.g. selective residual herbicide) to reduce competition with establishing pasture (especially for aggressive colonising weeds like parthenium).
Some buffel tussocks surviving. Grass seedlings establishing	1–2 weeks	2–5 days	<ul style="list-style-type: none"> ● Check pasture for recovery of grass tussocks and establishing grass seedlings. ● Spell pasture. ● Herbicide to control weeds to reduce competition to establishing grass (e.g. Ally to control parthenium). ● Re-seeding with buffel of questionable benefit as existing tussocks and establishing seedlings likely to produce much more seed per hectare than from sowing. If re-seeding use flood tolerant species.
Death of some tussocks. Grass seedlings establishing	< 1 week	< 2 days	<ul style="list-style-type: none"> ● Short term spell (6–8 weeks) until adult plants have reshot and produced new leaves. Stock normally afterwards. ● Herbicides to control weeds.

A grazier's experience – Bruce Cobb from *Mellaluka* on the Belyando River, Clermont

Bruce has experienced several floods at *Mellaluka*. He says 'floods and buffel death hits you hard – both emotionally and financially. You need to assess your priorities and focus on re-establishing the buffel pasture. That's your bread and butter!'

Bruce's experiences suggest that three days of inundation seems to be the critical time period for buffel. If the inundation is longer, then there is a significant mortality of buffel. The health and vigour of the buffel prior to flooding has an affect on post flood recovery so Bruce recommends conservative grazing to give a strong pasture with good ground cover.

The 1990 and 2008 floods were in autumn and summer, both with a resultant high mortality, so time of the year did not appear to have an impact on mortality rates. A reasonable growing season prior to 2008 meant the pasture was healthy, and after the flood, recovery was enhanced.

One week after the 2008 flood, 50 mm rain fell and there was good growth of Flinders grass and hoop Mitchell grass. These native grasses assisted with maintaining good ground cover and providing competition to reduce parthenium growth and population. The buffel grass had good ground cover prior to the flood, and contributed to a viable seedbank. It was not necessary to reseed with buffel. Bruce seeded a paddock with silk sorghum and some persisted for two years, however he would not recommend silk because of its competition with buffel grass for re-establishment.

In the spring following the January 2008 flood, Bruce controlled parthenium seedlings with a chemical application. Bruce thought that this was one of the most effective management strategies for enhancing the pasture recovery. The big benefit was prevention of competition for establishing buffel.

Bruce manages with a conservative stocking rate to ensure a good body of feed, seed set and ground cover, that is, good land condition, to enhance recovery of pastures after a flood.

Bruce Cobb is happy to be contacted to talk about his experiences with flood damaged buffel pastures. He can be contacted on 4983 5149.

The photos below show a flood site on Medway Creek, one month and 18 months after the 2008 flood. The period of inundation is unknown. Good land condition and grazing management have contributed to a good recovery of the buffel pasture.



For pasture species to sow on regularly flooded country, refer to these farm notes available from the DEEDI web site, or call the DEEDI Information Centre on 13 25 23

Pastures information in general. http://www.dpi.qld.gov.au/26_11438.htm

Floren bluegrass. http://www.dpi.qld.gov.au/26_18054.htm

Bambatsi. http://www.dpi.qld.gov.au/26_18054.htm

Recovery of mitchell grass after drought. http://www.dpi.qld.gov.au/26_18169.htm