Reef Water Quality Protection Plan

Reef Plan Paddock to Reef Grazing Water Quality Risk Framework

Soil erosion and water quality risk associated with grazing land management		Very low risk	Low risk	Low to moderate risk	Moderate to high risk
Performance Indicator:	**1. Average stocking rates imposed on paddocks are consistent with district long-term carrying capacity benchmarks for comparable land types, current land condition, and level of property development[i].**				
High-level actions	There are realistic expectations of the average stocking rate each paddock will likely carry over a number of years (long-term carrying capacity or LTCC).	Estimates consistent with district benchmarks, and any that are significantly above have a solid rationale for being so[ii]. Estimates account for key factors (as in GLM[iii]), or an equivalent process. Reviewed anytime there is a change in either land condition, subdivisional fencing, or location of water points.	Estimates generally consistent with district benchmarks, and any that are significantly above have a solid rationale. Estimates account for key factors or an equivalent process, **or** have reliable estimates based on long-term experience, paddock records, and **observed trend in condition of land.** Good understanding of key factors affecting LTCC. May, or may not, be routinely reviewed.	Estimates tend to be above district benchmarks for some or all land types, and rationale for this is unclear. Estimates typically based on personal experience and/or limited records. Some understanding of key factors affecting LTCC. Not reviewed.	Estimates are clearly above district benchmarks for some or all land types, with no solid rationale. Estimates typically based on personal experience. Limited understanding of key factors affecting LTCC, and these are not accounted for in any fashion. Not reviewed.

Soil erosion and water quality risk associated with grazing land management		**Very low risk**	**Low risk**	**Low to moderate risk**	**Moderate to high risk**
Supporting actions	Property mapping and inventory of natural resources enables objective assessment of long-term carrying capacity and stocking rate.	Property map (GIS/GPS, sat image, aerial photo, farm map software etc) including: • actual fence line location • actual water point location • land types based on grazing land types for region (or equivalent) • measured paddock areas • measured land type areas • grazing circles around water points • vulnerable/sensitive land types (including frontages and wetlands).	Property map (hard copy, aerial photo, topo map and/or farm map software etc) including: • estimated fence line location • estimated water point location • land types based on grazing land types for region • measured paddock areas • estimated land type areas.	Property map (hard copy, aerial photo, topo map and/or farm map software etc) including: • estimated fence line location • estimated water point location • estimated paddock areas. Some knowledge on paddock land types but no land types mapped or areas estimated.	Limited fence line mapping; rough estimates of paddock areas, little or no information on paddock land types or their areas.
	Records and analysis of stock numbers allow planning and management of stocking rate.	Numbers of cattle in each paddock during the year are recorded every time there is a change in cattle number in a paddock; digitally or in paddock book. Adult Equivalents (AE) or Livestock Units (LSU) used to account for effects of animal class and size/age when comparing stocking rates for different mobs or different paddocks.	Numbers of cattle in each paddock during the year are recorded at each major muster; digitally or in paddock book. Use Adult Equivalents (AE) or Livestock Units (LSU) to account for effects of animal class and size/age when comparing stocking rates for different mobs or different paddocks.	Numbers of cattle in each paddock during the year are recorded annually; digitally or in paddock book. Use common sense and rules of thumb to account for effects of animal class and size/age.	Numbers of cattle in each paddock during the year are recorded annually; in diary. Effects of animal class and size/age accounted for by rough guess or not at all.
	Land condition is assessed and taken into account when estimating LTCC and when planning grazing management.	Condition assessed by ABCD land condition. Pasture growth potential related to pasture condition (ABCD) as done in GLM (or equivalent process).	Condition assessed by density or abundance of desirable perennial grasses. Pasture growth potential related to pasture condition through long-term experience of the country, its response to grazing and stocking records.	Condition not assessed, with focus mainly on bulk of pasture and cattle condition. Pasture growth potential not related to 'pasture condition'. Grazing management modified in response to bulk of pasture, but not its condition.	Condition not assessed, limited attention to bulk of pasture. Decisions based mainly on cattle condition. Pasture growth potential not related to 'pasture condition'. Grazing management not generally modified over time.

Soil erosion and water quality risk associated with grazing land management		**Very low risk**	**Low risk**	**Low to moderate risk**	**Moderate to high risk**
Performance Indicator:		**2. Retention of adequate pasture and groundcover at the end of the dry season, informed by (1) knowledge of groundcover needs and (2) by deliberate assessment of pasture availability in relation to stocking rates in each paddock during the latter half of the growing season or early dry season[iv].**			
High-level actions	Balance between stocking rate and pasture quantity in each paddock, and implications for groundcover, are objectively evaluated.	Routinely use forage budgets for each paddock as done in GLM and StockTake, or with Grazing Charts, or with other equivalent process; do this before dry season starts or soon after. Cattle numbers in paddocks adjusted to ensure adequate residual pasture and groundcover.	Routinely do a broad quantitative assessment (by eye and long-term experience, may use note book), for each paddock, of the pasture available, number and classes of animals present, and the implications for residual levels of pasture and groundcover at the end of the dry season; do this before dry season starts or soon after. Cattle numbers in paddocks adjusted to ensure adequate residual pasture and groundcover.	Usually do a very broad qualitative assessment for whole property of the pasture available and number and classes of animals present, and the implications for pasture supply to animals; do this before dry season starts or soon after. May or may not adjust animal numbers to ensure adequate pasture for stock.	Sometimes do a broad qualitative assessment for whole property of the pasture available and the number and classes of animals present, but don't project implications for future pasture supply. Usually do an assessment only when a significant problem with pasture supply emerges during the dry season.
Supporting actions	Pasture attributes managed to ensure erosion risk is low.	Assess or observe groundcover and either density of perennial grasses or land condition	Assess or observe groundcover or density of perennial grasses or land condition	Assess or observe amount of pasture	None
	Groundcover monitoring.	Deliberately observe several times during year at monitoring sites and/or during bore runs, combined with analysis of ground cover trends via VegMachine or similar.	Deliberately observe several times during year at monitoring sites and/or during bore runs	No real assessment of groundcover during the year. Only observe ground cover near, or at the end, of the dry season.	Don't worry about groundcover
	Groundcover[v] thresholds inform paddock management.	Management aims to maintain high levels of organic groundcover consistent with good soil condition (eg, above 50-60% on most land types in the Burdekin).	Management aims to maintain levels of organic groundcover above the erosion threshold (eg, above 30-40% for most land types in the Burdekin).	Try to keep enough residual pasture for stock but no explicit, routine consideration of groundcover levels	No groundcover consideration/unsure

Soil erosion and water quality risk associated with grazing land management		Very low risk	Low risk	Low to moderate risk	Moderate to high risk
	Planned burning, where practiced, is done in a way that reduces risk of poor pasture regrowth and associated slow recovery of groundcover.	Use burning in a planned manner and only (1) when the seasonal forecast is neutral or positive and (2) when able to spell the paddock post-burning for several months if required.		Burn opportunistically. Will usually ensure that fires are conducted in years when the seasonal forecast is neutral or positive. May not have planned for any necessary spelling of paddock post-burning.	Burn opportunistically with little or no regard for seasonal forecasts - hope there will be adequate follow-up rain. No planning for any necessary spelling post-burning.
Performance Indicator: 3. Strategies implemented to recover any land in poor or very poor condition (C or D condition)[vi].					
High-level actions	Management is tailored to encourage recovery of land in declining or poor (C) condition.	Reassessing and adjusting stocking rates in relation to long-term carrying capacity, sub-dividing areas for improved management, and a planned program of wet season spelling for all affected land.	Reassessing and adjusting stocking rates in relation to carrying capacity, sub-dividing areas for improved management, and a planned program of wet season spelling for affected land of highest priority (relative to productivity and erosion hazard).	Stocking rates not reassessed and readjusted in line with LTCC. Occasional or opportunistic wet season spelling for highest priority areas.	Little or no change in management.
	Management is tailored to encourage recovery of areas in very poor (D) condition.	Review grazing management of whole paddock; fence to control grazing; establish diversion banks upslope if safe to do so; break surface of scalded areas and sow grass seed; allow litter and other organic material to accumulate.	Recovery actions underway in the highest priority areas, including fencing to enable managed stock access to affected areas.	Recovery actions identified and some efforts made to minimise stock impact on affected areas.	Little or no change in management to date.

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Performance Indicator: 4. The condition of selectively-grazed land types is effectively managed[vii].					
High-level actions	Where there has been, or is, strongly selective grazing of land types within a paddock, management actions are in place to maintain/recover land condition of those land types.	Selectively-grazed land types fenced from other country where practical and cost-effective; Elsewhere, use regular wet season spelling, with or without fire, to help preferred areas recover; also consider other means (eg, supplement feeding sites, water points locations) to even out grazing.	In process of fencing selectively-grazed land types from other country where practical and cost-effective; Elsewhere, use regular wet season spelling, with or without fire, to help preferred areas recover; also use other means (eg, supplement feeding sites, water point locations) to even out grazing.	Spell country if get the chance; may practice occasional burning.	No specific actions to manage land condition of selectively-grazed land types.
Performance Indicator: 5. Timing and intensity of grazing is managed in frontages of rivers and major streams (including associated riparian areas) and wetland areas.					
High-level actions	Grazing pressure on frontage country and wetlands is able to be effectively managed.	Fencing as much as is practical and cost-effective; off-stream water points through-out; seeking assistance with areas which cannot be justified by benefit:cost alone.	Fencing as much as is practical and cost-effective; off-stream water points or other measures (supplementary feed/shade for camps) installed to attract cattle away from riparian and wetland areas.	Limited fencing; limited off-stream watering.	Generally no fencing or off-stream waters.
	Grazing pressure on frontage country and wetlands is managed carefully to maintain or improve the condition of these vulnerable land types.	Moderate stocking pressure; regular wet season spelling; weed control through fire or other means; feral pig control program.	Moderate stocking pressure; occasional wet season spelling and weed/pest control.	Some spelling but unplanned and largely incidental.	No specific management applied.

Soil erosion and water quality risk associated with grazing land management		Very low risk	Low risk	Low to moderate risk	Moderate to high risk
Performance Indicator: 6. Strategies implemented, where practical and affordable, to remediate gullied areas[viii].					
High level action	Where possible, remedial actions are taken to facilitate recovery of gullied areas.	Professional advice informs appropriate mix of actions, which may include stock exclusion, mechanical reshaping of gully heads and sides, installation of porous check dams.	Where practical, gullied areas are fenced to exclude stock and encourage revegetation. Grazing, if any, managed to ensure low utilisation rate.	Some efforts made to redistribute grazing pressure away from gullied areas.	Little or no change in management for gullied areas.
Performance Indicator: 7. Linear features (roads, tracks, fences, firebreaks, and water points located and constructed to minimise their risk of initiating erosion[ix].					
High-level actions	Planning.	Property plan accounting for purpose, ease of access, cost, maintenance needs, and erosion risk (sodic or dispersive soils, for example).		Plan on the run with most emphasis on cost and convenience.	
	Managing risk of erosion associated with roads and tracks.	Roads and tracks planned and built with due attention to erosion risk. Where there are significant risks, an appropriate mix of actions has already been undertaken. Actions will include: locating tracks on contour where possible; **avoiding disturbance of sodic subsoils**, whoa boys or similar means to allow run-off to cross the road; table drains where required; outfalls for low usage, cross-slope roads on steep country; using invert, floodway, causeway, culvert or bridge when track crosses drainage line or creeks.	Roads and tracks planned and built with due attention to erosion risk. Areas with known sodic subsoils are avoided where possible. Creek crossings built at bed level to avoid changes to hydrology. Where there are significant risks, an appropriate mix of actions is in process of being completed.	Roads and tracks not routinely planned or built with due attention to erosion risk. Whoa boys or equivalent sometimes used; some stream crossings have appropriate works in place.	Little or nothing in terms of planning or precautions for erosion risk.
	Managing risk of erosion associated with fences.	Fences follow contour lines where possible, or ridge lines in steep country. Where fence line is not on the contour, and slope is steep, whoa-boys are used as required.		Fencelines not planned or built with due attention to erosion risk. Generally take the most direct route.	

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Performance Indicator: 8. Use of agricultural chemicals.					
High-level	Use of Tebuthiuron[x] (where used).	Records kept with respect to date of application, location and area of paddock(s) treated, Product trade name, application rate, spray conditions, operator details; includes map details.		Little or no record keeping.	
		Conform to regulations[xi] designed to minimise the run-off of tebuthiuron-based products from grazing properties (Chemical Usage (Agricultural and Veterinary) Control Regulation 1999) in addition to existing label instructions on the product.		Do not conform to regulations and/or label instructions.	
High-level	Application of fertilisers (where used on significant areas of perennial pasture).	Records kept of areas treated, rates applied, and any soil testing done prior to application.		Little or no record keeping.	
	Application of phosphorus (P) fertiliser.	For establishment, applying up to 20 kg P per ha in sub-coastal and drier areas (eg, for stylos), and up to 50 kg P per ha for high-rainfall coastal pastures.		Higher than recommend rates of P applied for establishment of pasture.	
	Application of nitrogen (N) fertiliser.	Apply rates consistent with recommendations from a professional fertiliser advisor; Split applications over the season; Do not apply during main wet season or adjacent to waterways.		Use higher than recommended rates and/or do not spilt applications and/or apply during main wet season and/or apply adjacent to waterways.	

[i] Producers generally have a perception of the long-term carrying capacity of each of their paddocks (LTCC = the average stocking rate that you expect a paddock to be able to run over a 'typical' 10-year period). How this perception of LTCC relates to the realistic LTCC for a paddock, or across a property, is a primary determinant of the likelihood of periods of overgrazing.

[ii] District land type benchmarks for LTCC are based on estimates of pasture growth (driven by land type, land condition and climate) and assumed safe utilisation levels. There will be some degree of uncertainty around these estimates and they should be used as a guide only. In practice, producers may have found from long-term experience that the LTCC for their paddocks is somewhat above or below the benchmark values. Land type benchmarks will improve with additional calibration and ground-truthing involving experienced producers.

[iii] GLM steps for LTCC of a paddock account for area, land types, condition of land, climate, safe utilisation rates and distance to water.

[iv] Retention of adequate residual pasture and associated groundcover at the end of the dry season is a critical driver of erosion risk especially for the high intensity storms typical of the start of the wet. If pastures are in good condition and the paddocks are stocked at (or around) the LTCC, there should be adequate residual pasture to protect and feed the soil in most years. However, minimising erosion risk in every year requires deliberate assessment of the balance between pasture supply and livestock demand, especially when the wet season is well below average (decile 3 or less) or there is a run of below-average wet seasons.

[v] Groundcover thresholds are usually associated with the amount of cover below which the rate and amount of erosion starts to increase greatly; the thresholds (eg, 40% cover) operate primarily by reducing the direct erosive impact of rainfall. However, there are benefits for the overall hydrological condition of the soil from levels of organic

cover above the threshold value for reducing erosion - the more organic matter from herbaceous plants that is protecting and feeding the soil, the better its hydrological condition. The threshold values of cover for soil condition and erosion reduction will obviously vary from land type to land type depending on soil, slope, fertility and pasture type. Regional land type information sheets usually have the erosion thresholds values appropriate for each major land type.

[vi] Paddocks with areas of C condition pasture, or where there is a trend towards C condition, present a major risk of accelerated erosion. These areas will recover significantly with improved grazing management (careful stocking plus frequent wet season spelling) over several years (eg 3-6 years depending on seasons), unlike D condition land which may take decades to recover in the absence of mechanical or other inputs.

[vii] Management of selective grazing of frontage country and associated riparian areas, land types of particular significance to water quality, has been covered above. Here we deal with the situation occurring in nearly all paddocks in which there is a mix of land types which, in some cases, will vary strongly in their attractiveness to cattle. This can induce strongly selective use of one or more land types resulting in loss of land condition and increased erosion risk. Depending on the area involved and its arrangement within the paddock, fencing may be a practical option. Where fencing is not practical, wet season spelling helps overgrazed areas recover; also, targeted and occasional burning can also be used as this attracts grazing pressure on to less preferred land types. Putting supplement feeding points and/or water points on less preferred land types may help but the effect is untested and likely to be of marginal value.

[viii] Paddocks with significant areas of D condition pasture, or where there is a trend towards D condition, present a major risk of ongoing, accelerated erosion. Such areas are typically scalded and are often associated with existing or emerging gully systems. The best bet options for rehabilitation are not always clear. Smaller areas may stabilise somewhat with improved condition in adjacent, upland areas (as they become 'starved' of water). Larger areas of D condition present a major challenge as they may take decades to commence recovery in the absence of mechanical or other inputs. Such intervention will not always be cost-effective, **emphasising the importance of avoiding the development of any additional areas of D condition**.

[ix] Significant erosion can be triggered by inappropriate location or design of roads, tracks, fences and water points.

[x] Tebuthiuron is a substituted urea herbicide used for control of woody regrowth and woody weeds. Tebuthiuron is absorbed by woody plants via the roots and translocated to stems and leaves where it inhibits photosynthesis.

[xi] See http://www.reefwisefarming.qld.gov.au/pdf/tebuthiuron.pdf

Erosion process	Performance indicator		P2R weighting
Hillslope erosion	**1.**	Average stocking rates imposed on paddocks are consistent with district long-term carrying capacity benchmarks for comparable land types, current land condition, and level of property development.	25%
	2.	Retention of adequate pasture and groundcover at the end of the dry season, informed by (1) knowledge of groundcover needs and (2) by deliberate assessment of pasture availability in relation to stocking rates in each paddock during the latter half of the growing season or early dry season.	35%
	3.	Strategies implemented to recover any land in poor or very poor condition (C or D condition).	25%
	4.	The condition of selectively-grazed land types is effectively managed.	15%
		Hillslope erosion assessment	100%
Streambank erosion	**5.**	Timing and intensity of grazing is managed in frontages of rivers and major streams (including associated riparian areas) and wetland areas.	100%
Gully erosion	**6.**	Strategies implemented, where practical and affordable, to remediate gullied areas.	30%
	7.	Linear features (roads, tracks, fences, firebreaks, and water points located and constructed to minimise their risk of initiating erosion.	40%
	1 – 4	Hillslope erosion assessment.	30%
		Gully erosion assessment	100%