



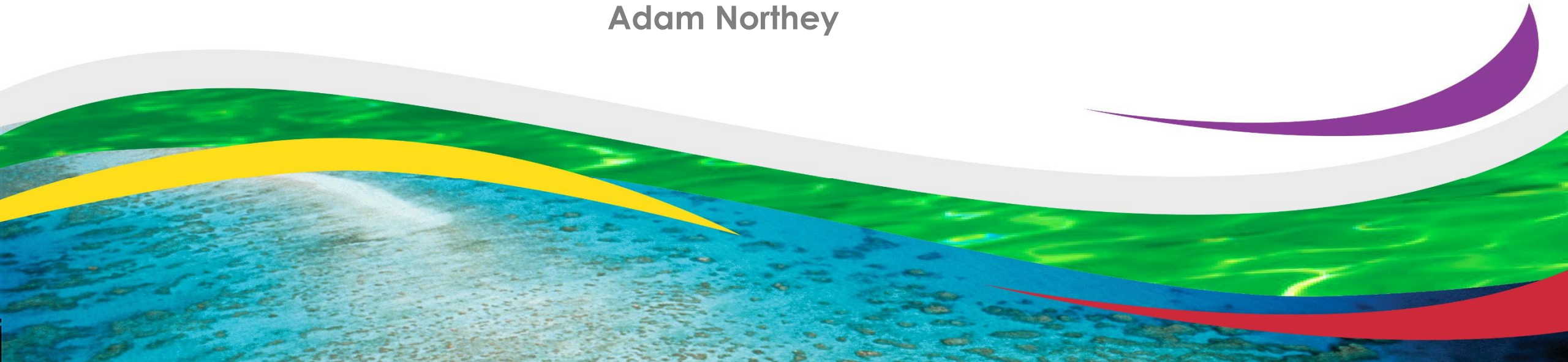
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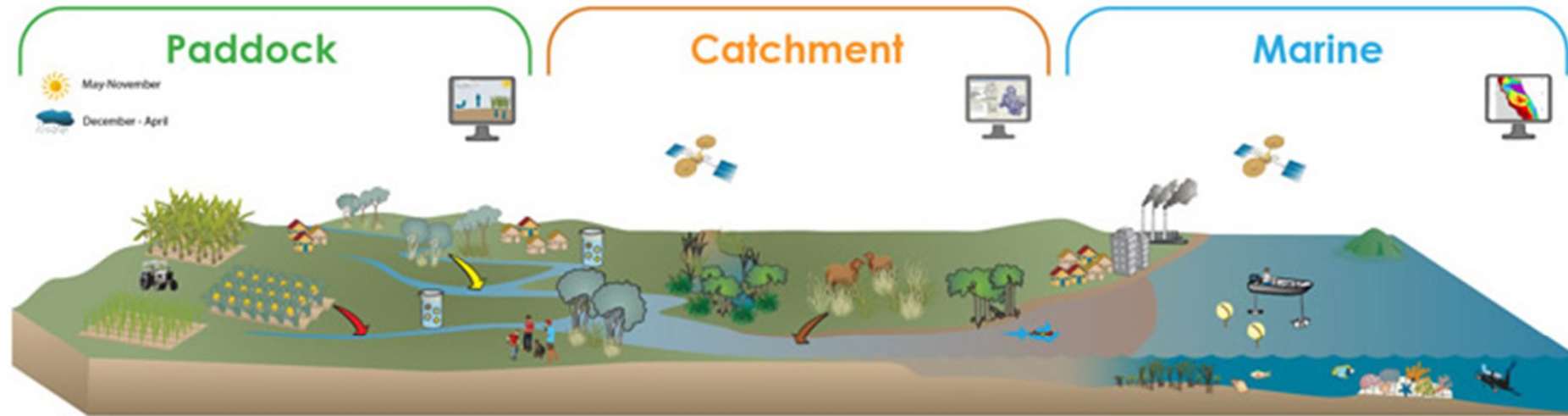
Queensland Government

Paddock to Reef Management practices

Adam Northey



Paddock to Reef Program



Agriculture

- Paddock monitoring
- Paddock modelling

Catchment monitoring

Catchment modelling

Catchment indicators

- Riparian extent
- Wetland condition
- Wetland extent
- Ground cover

Seagrass monitoring

Water quality monitoring

Coral monitoring

eReefs marine modelling

Stewardship

- Agriculture
- Urban
- Industrial
- Public lands

WHY?

- \$900 million total Government investment in improving Reef water quality from 2013 to 2024
- ~\$1.4 Billion over the next 10yrs

The Reef Trust



October Budget 2022-23

The Government is investing a record \$1.2 billion to protect and restore our iconic Great Barrier Reef.

For more information: [2022-23 October Budget fact sheets](#)

Land Management Targets where did it all start?

By 2013:

- 80 per cent of landholders in agricultural enterprises (sugarcane, horticulture, dairy, cotton and grains) will have adopted improved soil, nutrient and chemical management practices

By 2013 there will be:

- a minimum 50 per cent reduction in nitrogen and phosphorus loads at the end of catchments
- a minimum 50 per cent reduction in pesticides at the end of catchments
- a minimum of 50 per cent late dry season groundcover on dry tropical grazing land.

By 2020 there will be:

- a minimum 20 per cent reduction in sediment load at the end of catchments.

Reef Water Quality Protection Plan 2009

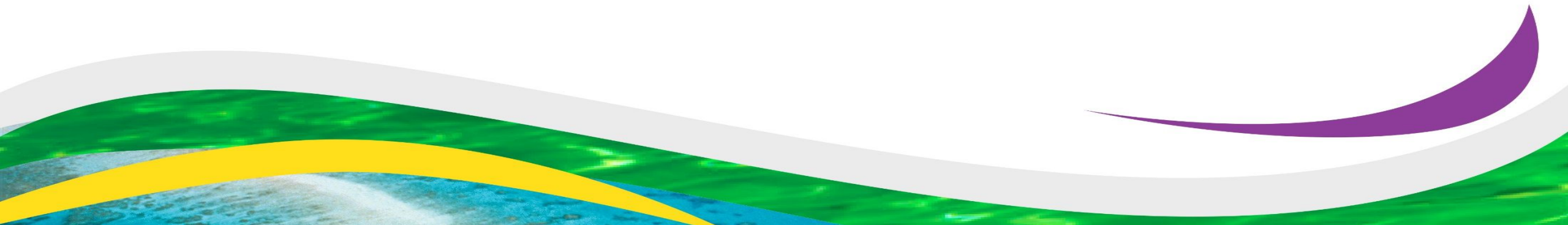
For the Great Barrier Reef World Heritage Area
and adjacent catchments

REPORTING

- Not spatial reported based on number of landholder not area.
- All about engagement how many landholders
- Focus on getting new landholders into the program.

By 2013:

- 80 per cent of landholders in agricultural enterprises (sugarcane, horticulture, dairy, cotton and grains) will have adopted improved soil, nutrient and chemical management practices



Project Number	Unique Farmer Id	Industry	Project Area (Ha)	Property Area	Catchment	Reef Rescue Funding (\$) (GST Excl.)	Landholder Cash (\$) (GST Excl.)	Landholder In-kind (\$) (GST Excl.)	Total Project Cost (\$)	Project Activity Description (Max. 30 words)
Project 1	LH 1	Sugar	215	215	lower Burdekin river	\$ 19,491.00	\$ 44,491.00	\$ -	\$ 63,982.00	Purchase and use a variable rate controller and GPS equipment with EC mapping.
Project 2	LH 2	Sugar	42	43	barratta creek, lower Burdekin river	\$ 9,964.00	\$ 14,123.00	\$ -	\$ 24,087.00	Purchase and use a spray rig
Project 3	LH 3	Sugar	123	123	don river	\$ 8,169.00	\$ 12,253.00	\$ -	\$ 20,422.00	Purchase and use a spray rig.
Project 4	LH 4	Sugar	101	222	barratta creek	\$ 305.00	\$ 458.00	\$ -	\$ 764.00	Purchase and use herbicide dose controller.
Project 5	LH 5	Sugar	197	197	lower Burdekin river	\$ 18,800.00	\$ 18,800.00	\$ -	\$ 37,600.00	Purchase and use a variable rate liquid fertiliser controller with GPS.
Project 6	LH 6	Sugar	25	61	barratta creek	\$ 13,000.00	\$ 13,000.00	\$ -	\$ 26,000.00	Purchase and use Wavy Disk Coulter.
Project 7	LH 7	Sugar	6	41	barratta creek	\$ 10,750.00	\$ 10,750.00	\$ -	\$ 21,500.00	Purchase and use bed former.
Project 8	LH 8	Sugar	66	106	Haughton river	\$ 2,464.00	\$ 2,464.00	\$ -	\$ 4,928.00	Modify an existing zonal harrow to become one pass fallow implement

Sugarcane



30%
Good

Target: 80 per cent by 2013.

From 2009 to 2011, 30 per cent of sugarcane growers (418) adopted improved land management practices.

Grazing

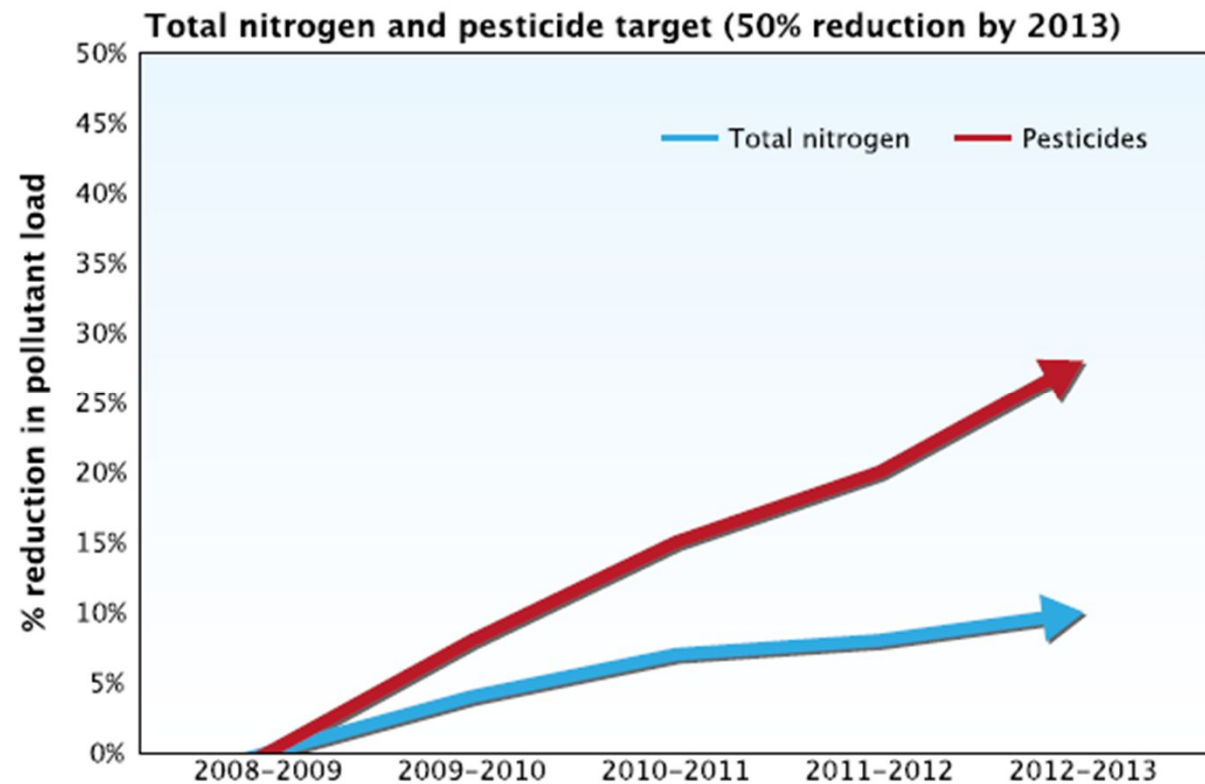
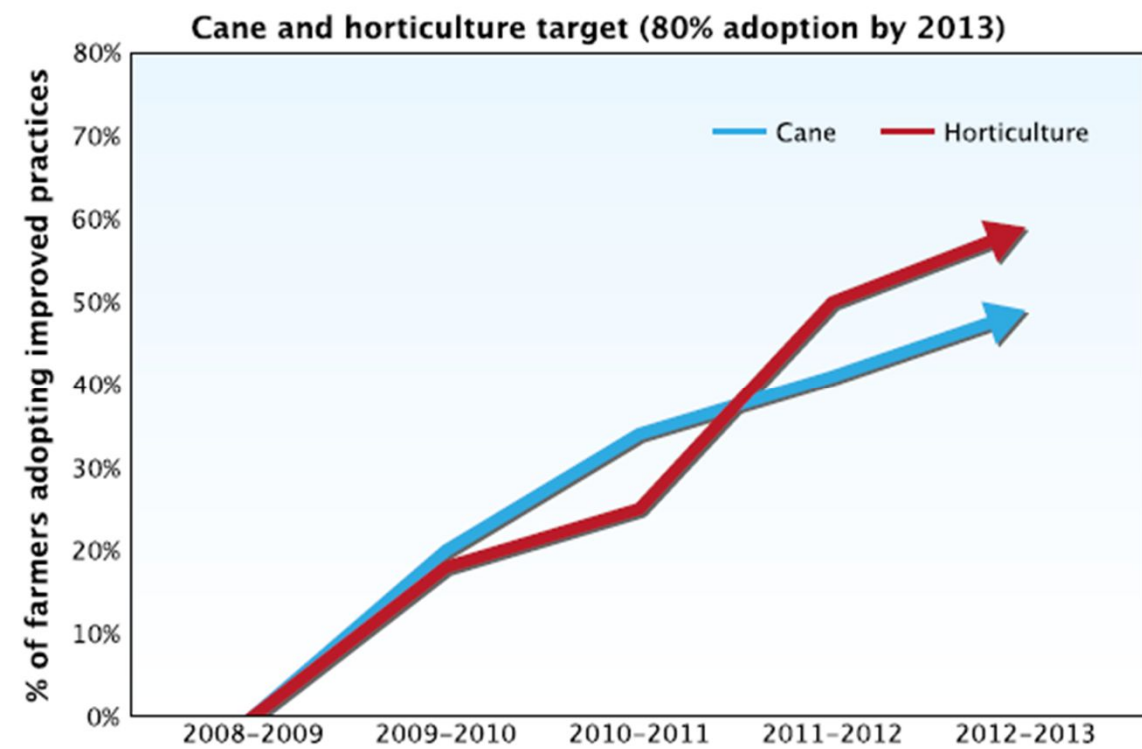


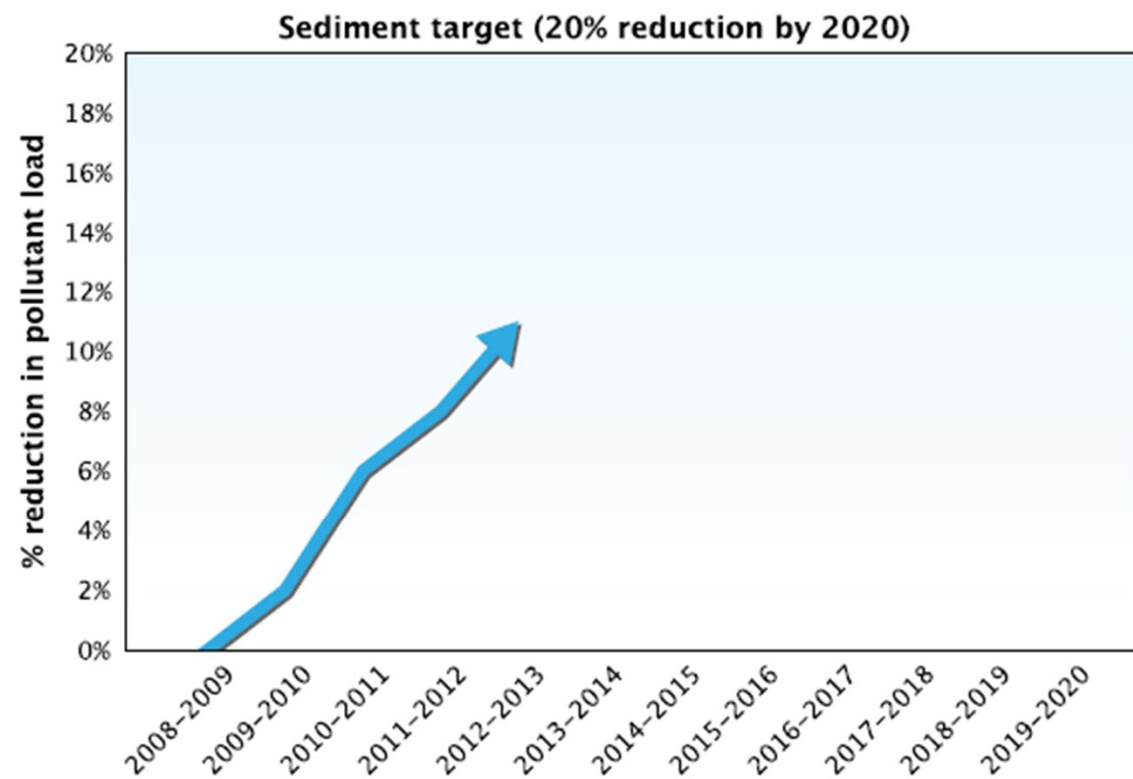
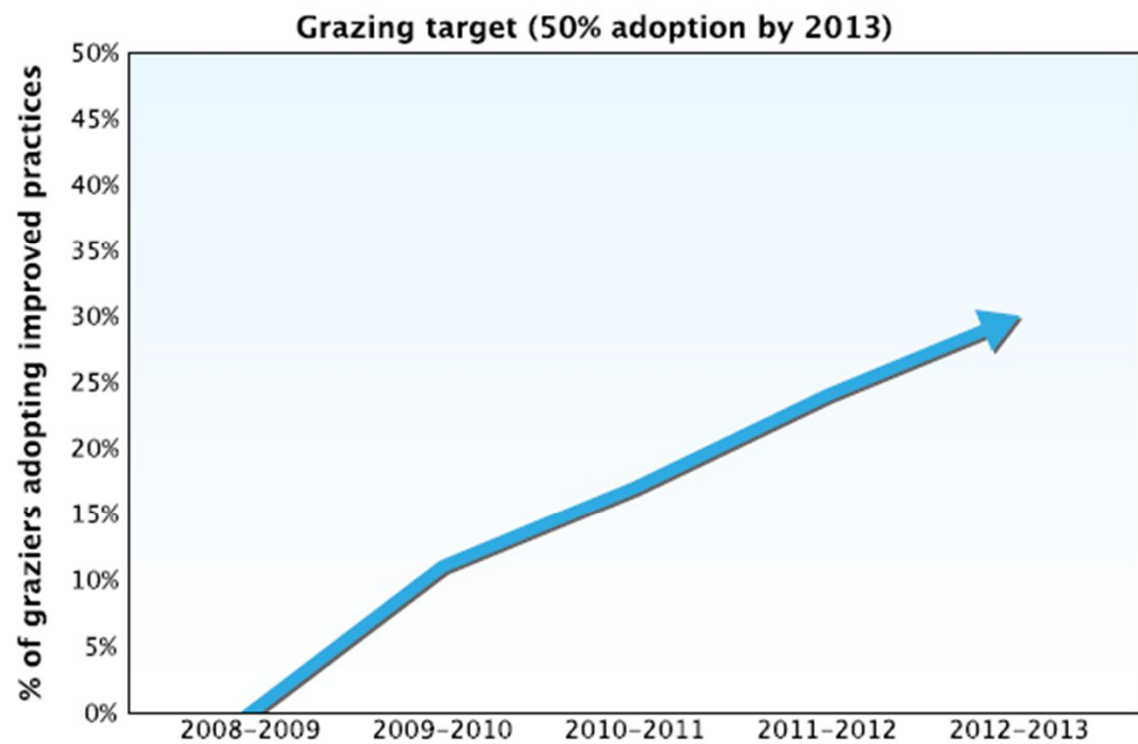
36%
Very good

Target: 50 per cent by 2013.

From 2009 to 2011, 36 per cent of graziers (148) adopted improved land management practices.

There are 416 graziers managing 3038 square kilometres of land in the Mackay Whitsunday region.





Land Management Target

90 per cent of sugarcane, horticulture, cropping and grazing lands are managed using best management practice systems (soil, nutrient and pesticides) in priority areas.

At least a 50 per cent reduction in anthropogenic end-of-catchment dissolved inorganic nitrogen loads in priority areas.

At least a 20 per cent reduction in anthropogenic end-of-catchment loads of sediment and particulate nutrients in priority areas.

At least a 60 per cent reduction in end-of-catchment pesticide loads in priority areas.



Reef Water Quality Protection Plan 2013

Securing the health and resilience of the Great Barrier Reef World Heritage Area and adjacent catchments

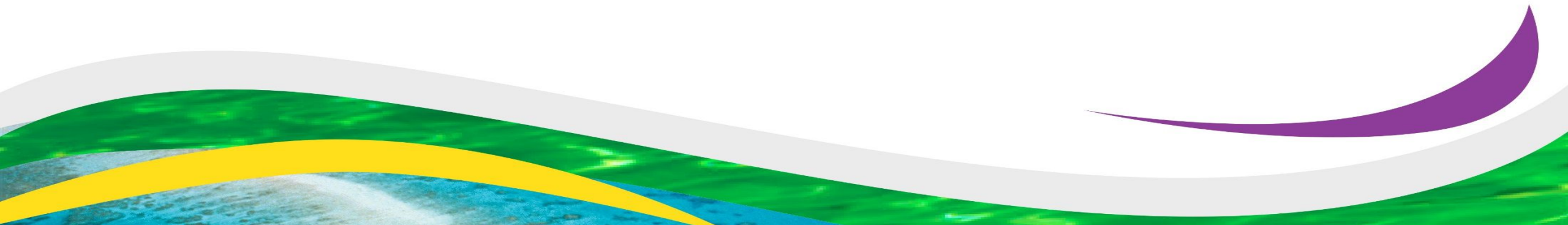


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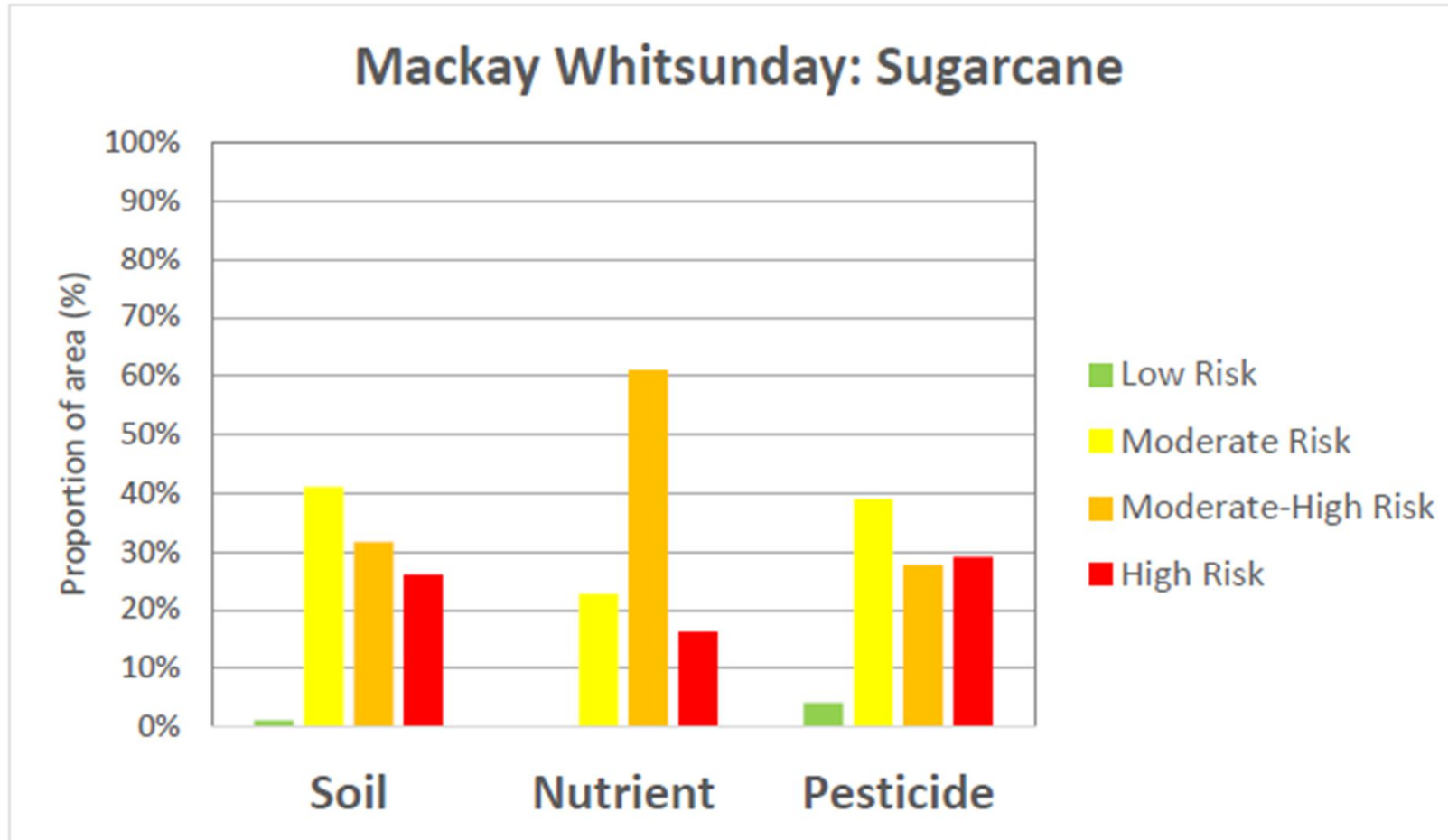
90 per cent of sugarcane, horticulture, cropping and grazing lands are managed using best management practice systems (soil, nutrient and pesticides) in priority areas.



WATER QUALITY RISK FRAMEWORKS

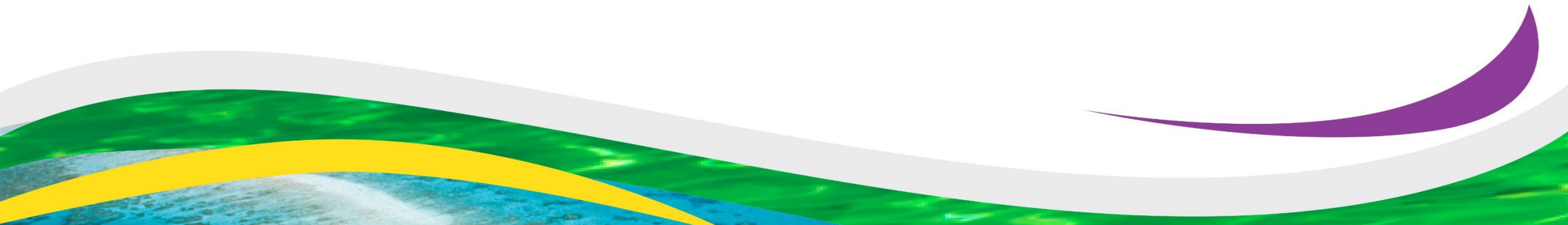
Priority	Management tactic	Weighting (Water quality assessment)	Indicative Practice Levels 2013			
			High Risk	Moderate Risk	Moderate - Low Risk	Lowest WQ Risk, commercial feasibility may be unproven
			Superseded	Minimum	Best Practice	Innovative
Soil Management						
1	Crop residue cover	25%	No Green Cane Trash Blanket	Often burn fallow blocks, maintain trash on ratoons.	Green Cane Trash Blankets maintained in all blocks.	
2	Controlled Traffic	25%	Old industry standard row spacing. Farm equipment not on matching wheel centres.	Matching wheel centres on equipment used for all land prep and pre-harvest operations. Harvester and haul-out wheel spacing not matched to other farm equipment	Permanent wheel tracks. Row spacing at 1.8m or more . ALL equipment including harvesters and haul-outs utilising same wheel spacing. DGPS guidance for bed forming/planting operations as a minimum.	Permanent wheel tracks. Row spacing at 1.8m or more. ALL equipment including harvesters and haul-outs utilising same wheel spacing. DGPS guidance for all operations.
3	Land management during cane fallow	20%	Plough Out, Replant (PORP) OR No rotational crop. Bare or “weedy” fallow maintained with cultivation and/or herbicides.	Legume rotational crop grown during cane fallow period. Conventional cultivation to prepare for legume planting. Legume mechanically incorporated. OR Well managed fallow with trash blanket, sprayed out with no tillage.	Legume rotational crop grown during cane fallow period. Min/zonal tillage prior to planting legume. Legume crop harvested for grain. OR Killed with herbicide and residues left intact until necessary pre-plant operations for cane.	Legume rotational crop grown during cane fallow period, with legume direct drilled into previous sprayed out cane. Legume crop residues left intact above ground until necessary pre-plant operations (minimum or zero till) for cane.
4	Tillage in plant cane	20%	Full cultivation (number and nature of cultivations region-specific)	Reduced tillage (number and nature of cultivations region-specific).	Bed renovation and/or zonal tillage, minimum required to be suitable for planting.	Zero tillage plant cane
5	Tillage in ratoon cane	10%	Full cultivation (number and nature of cultivations region-specific)	Minimum tillage (region-specific). Ripping of wheel tracks as necessary	No tillage except as a component of Integrated Weed Mgt planning for avoiding herbicide resistance	
Nutrients						
1	Matching N supply to crop N requirements	60%	District rules of thumb determine applied N rate	Nitrogen budget developed (eg 6ES) with estimated N demand based on a yield expectation of Estimated Highest Average Annual Yield + 20% (district yield potential) for plant or ratoon stage. Final application rates are as per calculated amount.	Nitrogen budget (eg 6ES) developed with estimated N demand based on growers own yield expectations for specific blocks and ratoon numbers and considers seasonal climate predictions. Final application rates are as per calculated amount.	As for Best Practice, but with planning and application targeting yield zones within blocks.
2	Timing of fertiliser application	30%	Weather only impacts upon ability to complete application at that time.	Application occurs with consideration given to short term (<4 days) rainfall forecast.	Application occurs prior to expected wet season commencement and with adequate risk assessment, inc weekly rainfall forecast.	As for Best Practice, plus utilising seasonal climate forecasts.
3	Application method	10%	Surface applied, not incorporated.	Subsurface (including surface applied and watered in)		

BENCHMARKS



REPORTING

- Spatial reporting commences
- Need to report against the water quality risk frameworks using the P2R practice surveys



Identify

Identify from:

<Selectable layers>

FINAL_MERGE_P2Rmodelling_Cane_mid2015

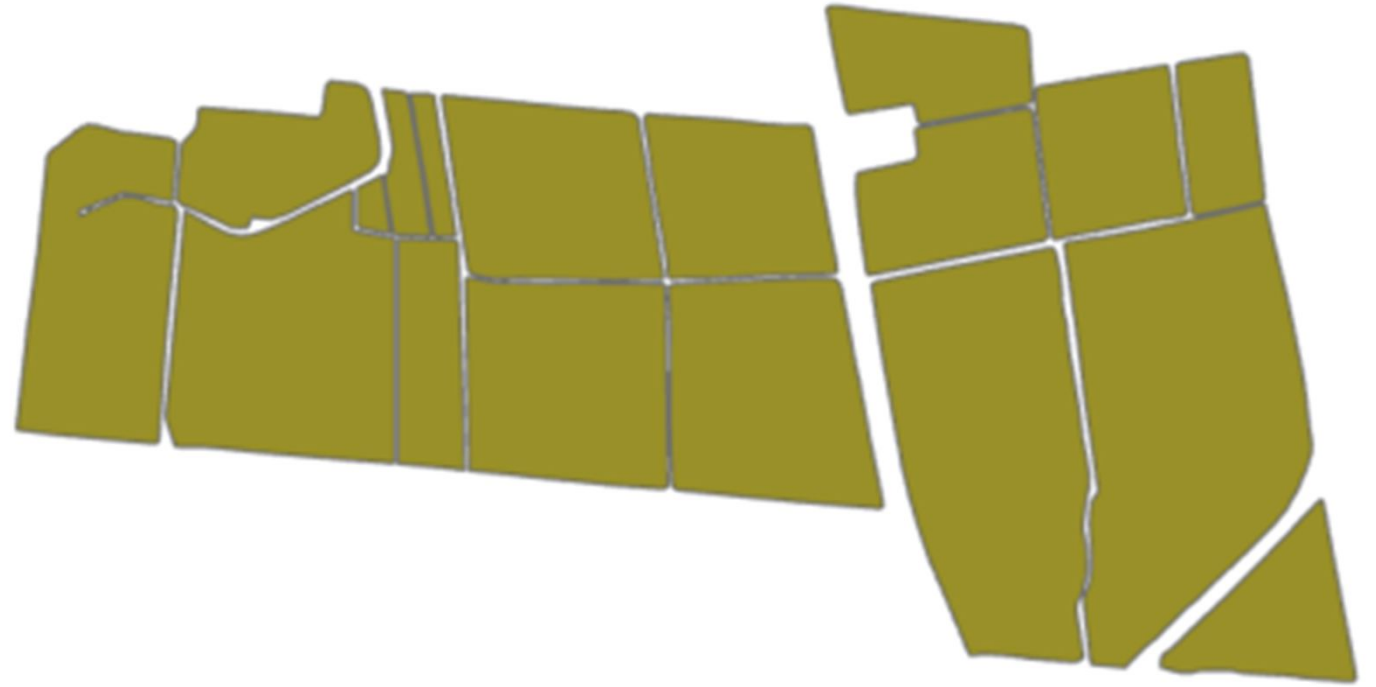
S463

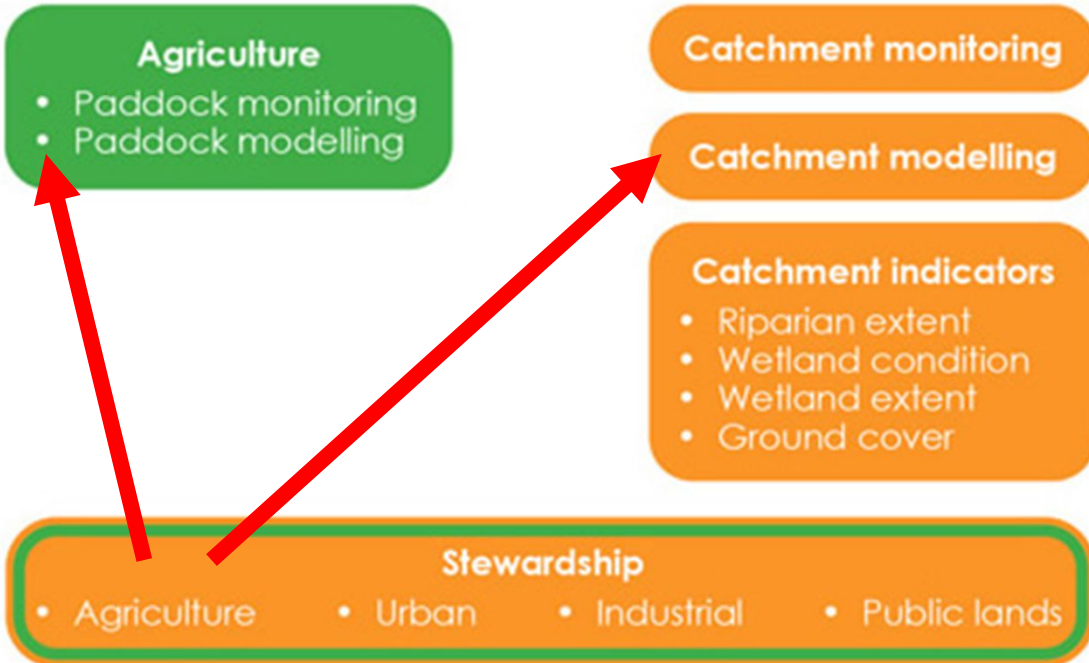
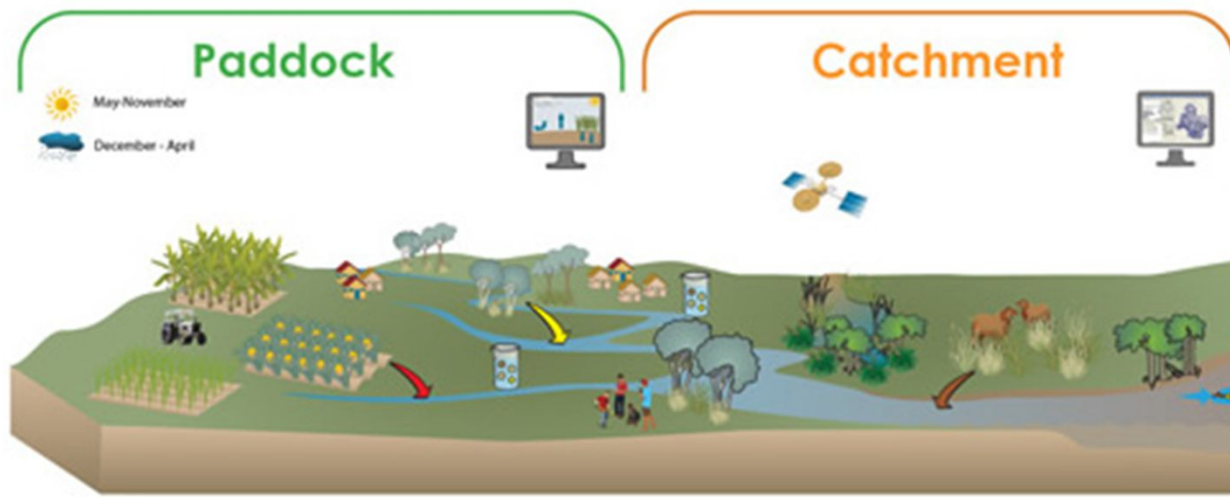
Satellite - Queensland SPOT5 - 250cm (2012)

Location:

716,075.737 7,650,182.631 Meters

Field	Value
FID	446
Shape	Polygon ZM
JobNo	S463
LandManage	442
LMGovtUI	MW284
JobNo_1	
ProjectNo	S463S1
Catchment	Sarina
Subcatchme	Bakers Ck
FundingRow	2014-15
ImpactedAr	222
CaneQ01Cur	3
CaneQ02Cur	2
CaneQ03Cur	2
CaneQ04Cur	2
CaneQ05Cur	3
CaneQ06Cur	2
CaneQ07Cur	2
CaneQ08Cur	2
CaneQ09Cur	2
CaneQ10Cur	2
CaneQ11Cur	1
CaneQ12Cur	2
CaneQ13Cur	3
CaneQ14Cur	2
CaneQ15Cur	1
CaneQ16Cur	3
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CaneQ01Pro	3
CaneQ02Pro	2
CaneQ03Pro	2
CaneQ04Pro	2
CaneQ05Pro	3

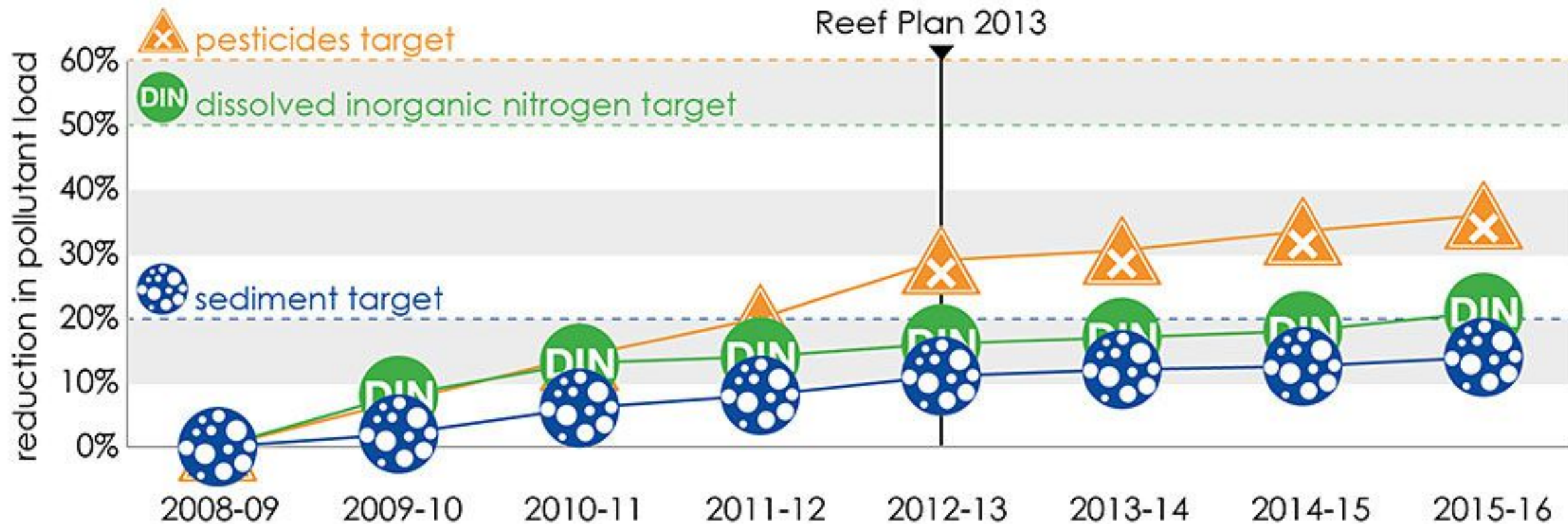




	Area managed under best practice (ha or km streambank)	
	2016 Benchmark	Report Card 2017 and 2018 (%)
Pastures	39.2%	41.5%
Streambanks	18.2%	18.3%
Gullies	37.6%	37.6%

	Area managed under best practice (ha)	
	2016 Benchmark	Report Card 2017 and 2018 (%)
Soil	2.3%	2.3%
Nutrients	7.0%	7.1%
Pesticides	5.1%	6.0%

Long-term progress towards 2018 modelled pollutant load reduction targets





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Reef 2050 Water Quality Improvement Plan

2017–2022

90% of land in priority areas under grazing, horticulture, bananas, sugarcane and other broad-acre cropping are managed using best management practice systems for water quality outcomes (soil, nutrient and pesticides)

Land Management Targets

Region	Catchment/ Basin	Area (ha)	Targets								Pesticide target to protect min 99% of aquatic species at end-of-catchment
			Dissolved inorganic nitrogen		Fine sediment		Particulate phosphorus		Particulate nitrogen		
			tonnes	% reduction	kilo-tonnes	% reduction	tonnes	% reduction	tonnes	% reduction	
Cape York	Jacky Jacky Creek	296,330	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	
	Olive Pascoe River	417,950	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	
	Lockhart River	288,330	MCL	MCL	1	2	2	2	5	2	
	Stewart River	274,280	MCL	MCL	2	6	2	6	7	6	
	Normanby River	2,439,490	MCL	MCL	15	10	5	10	15	10	
	Jeannie River	363,750	MCL	MCL	2	6	2	6	9	6	
	Endeavour River	218,240	MCL	MCL	3	10	3	10	11	10	
Wet Tropics	Daintree River	210,670	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	
	Mossman River	47,240	52	50	MCL	MCL	MCL	MCL	MCL	MCL	
	Barron River	218,880	52	60	MCL	MCL	MCL	MCL	MCL	MCL	
	Mulgrave-Russell River	194,400	300	70	16	10	19	10	53	10	
	Johnstone River	232,390	350	70	100	40	250	40	490	40	
	Tully River	168,350	190	50	17	20	23	20	68	20	
	Murray River	110,840	120	50	8	20	11	20	32	20	
Burdekin	Herbert River	984,590	620	70	99	30	57	30	200	30	
	Black River	105,970	ND	ND	ND	ND	ND	ND	ND	ND	
	Ross River	170,820	74	60	ND	ND	ND	ND	ND	ND	
	Haughton River	405,080	640	70	MCL	MCL	MCL	MCL	MCL	MCL	
	Burdekin River	10,310,940	100	60	840	30	440	30	720	30	
	Don River	373,620	MCL	MCL	55	30	43	30	75	30	
Mackay/ Whitsunday	Proserpine River	249,440	110	70	MCL	MCL	MCL	MCL	MCL	MCL	
	O'Connell River	238,760	130	70	96	40	120	40	250	40	
	Pioneer River	157,360	140	70	35	20	23	20	61	20	
	Plane Creek	253,870	260	70	MCL	MCL	MCL	MCL	MCL	MCL	

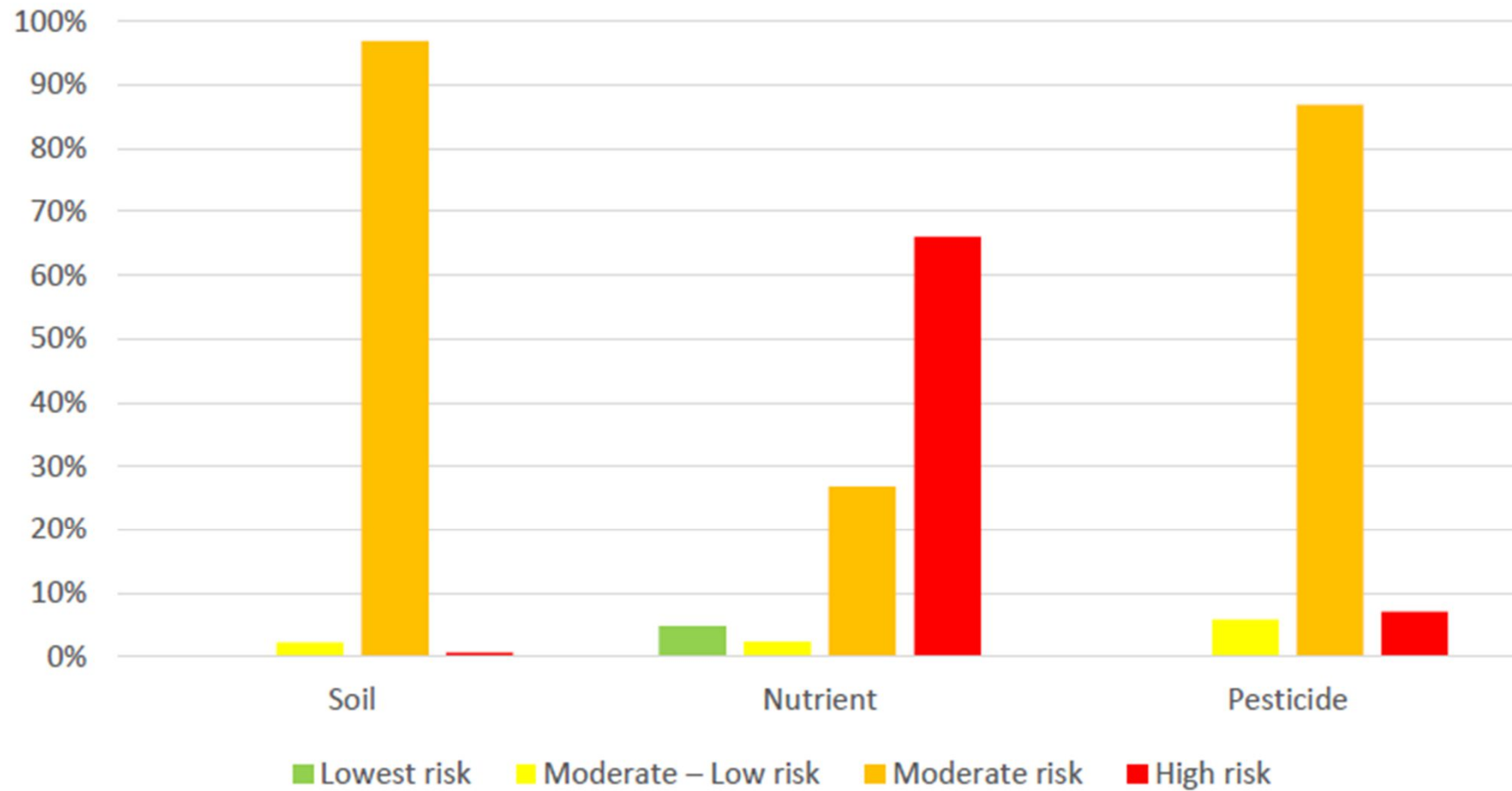
Management priority

	Very high		Moderate		Minimal
	High		Low		Not assessed

SOME REFINEMENT OF THE RISK FRAMEWORKS

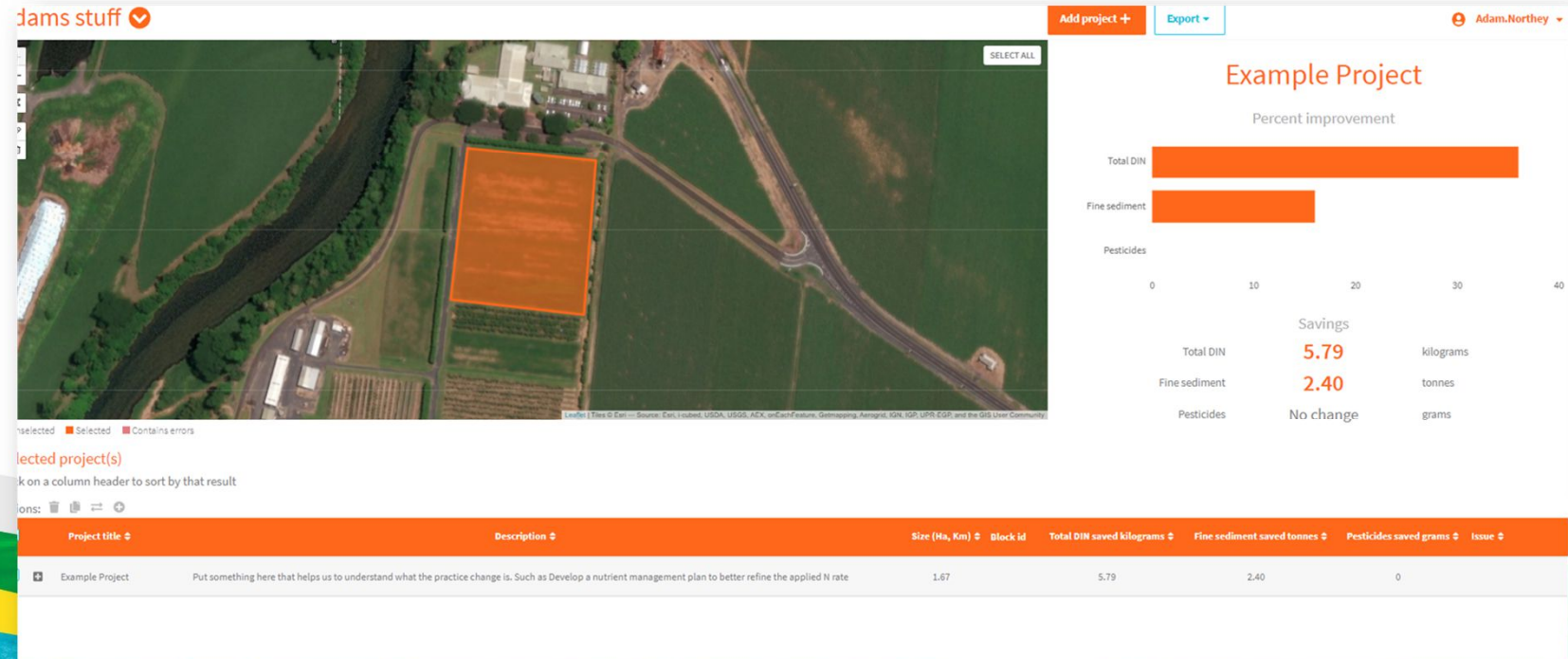
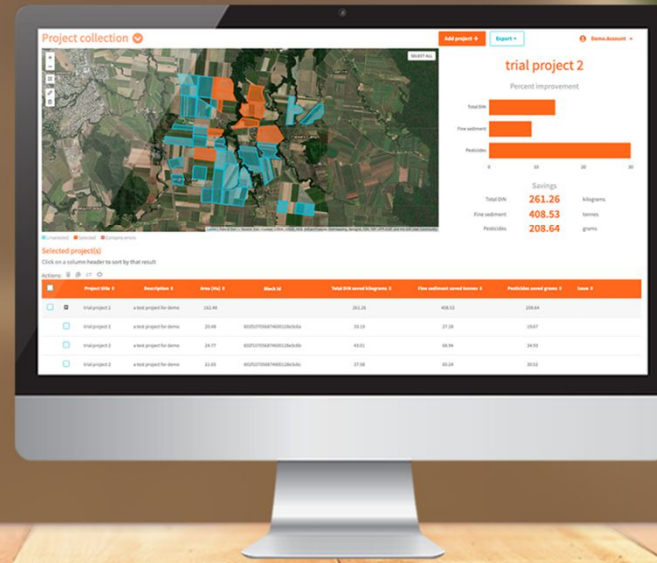
Nutrient management (weighting)	Relative water quality risk			
	Lowest risk (A)	Moderate – Low risk (B)	Moderate risk (C)	High risk (D)
	Innovative	Best practice	Minimum standard	Superseded
Matching nitrogen (N) supply to crop nitrogen requirements (70%)	Six Easy Steps Nutrient Management program is employed, which includes developing a whole farm nutrient management plan. Nutrient management plans include consideration of yield history and trends in order to estimate optimal amounts of nitrogen required for each major soil type and/or management zone.		Nitrogen fertiliser rate for each plant crop and its subsequent ratoons are derived from soil tests and the Six Easy Steps method. Rates are based on district yield potential with adjustments made according to the soil N mineralisation index (based on organic carbon percentage). Deductions are made for other significant sources of N including from irrigation water, mill mud and legumes.	N fertiliser rate typically exceeds the Six Easy Steps baseline application rate. Non-compliant with regulated method for calculating optimum N rate.
Matching phosphorus (P) supply to crop P requirements (15%)	P fertiliser requirements are determined through soil testing and consideration of extractable phosphorus and the P buffer index. P is not applied unless testing indicates it is necessary.		Phosphorus is regularly or routinely applied as part of plant or ratoon cane blends.	
Application of mill mud or mud/ash (15%)	Do not apply mill mud or ash. OR Mill Mud/ash is deep banded at <50 wet tonnes per hectare.	Mill mud is not applied where soil testing indicates P levels are adequate. Mill mud/ash is applied in a band over the crop row at <70 wet tonnes per hectare.	Broadcast application at rates up to 100 wet tonnes per hectare. For fallow applications, mill mud/ash is incorporated soon after application.	Broadcast application at rates over 100 wet tonnes per hectare.

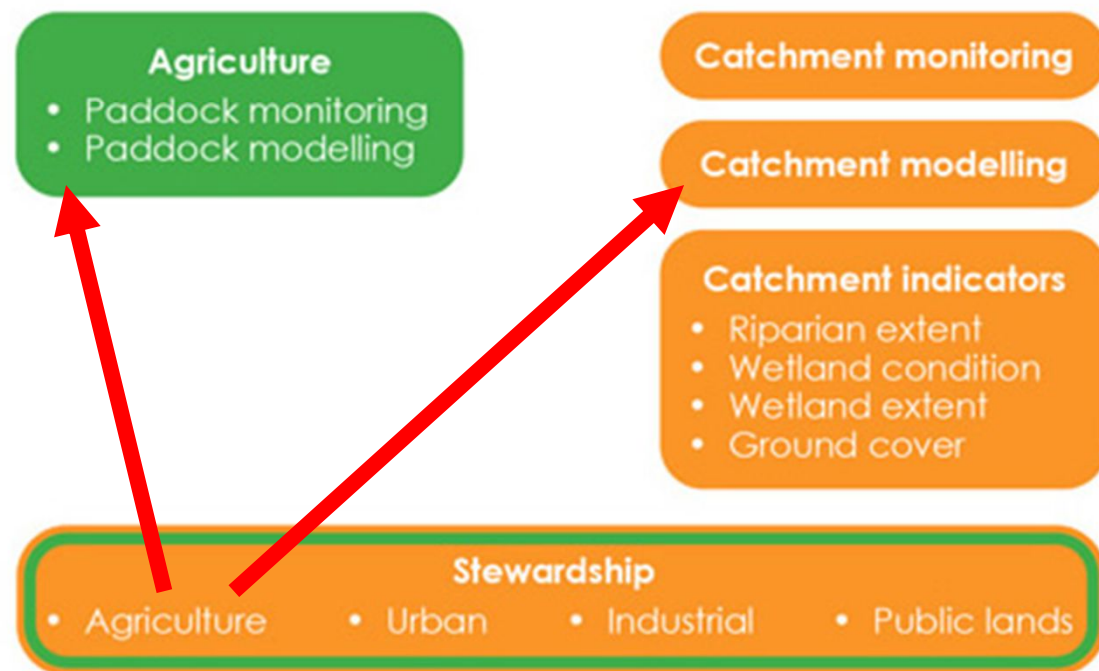
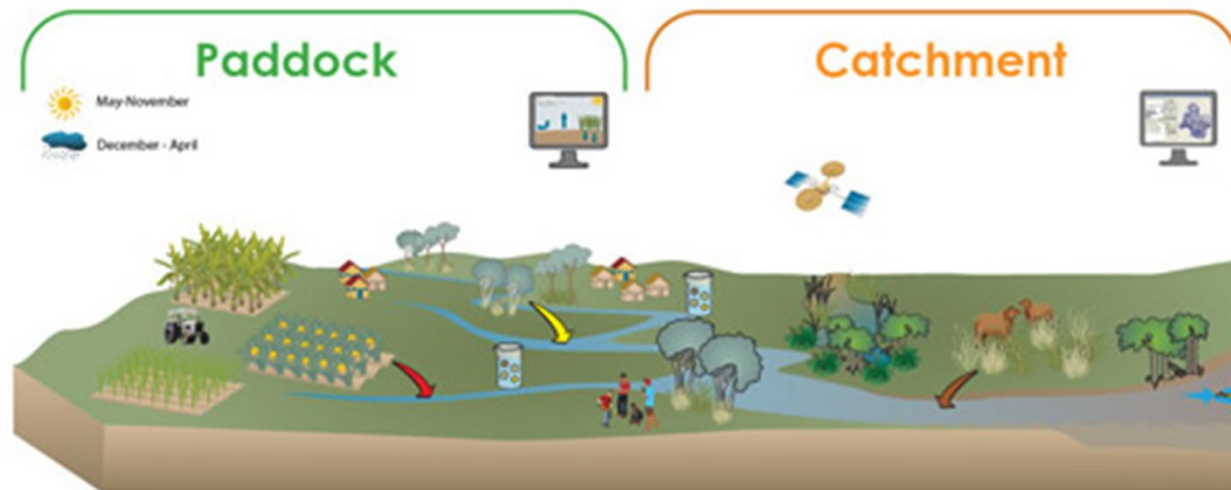
Mackay Whitsundays Sugarcane



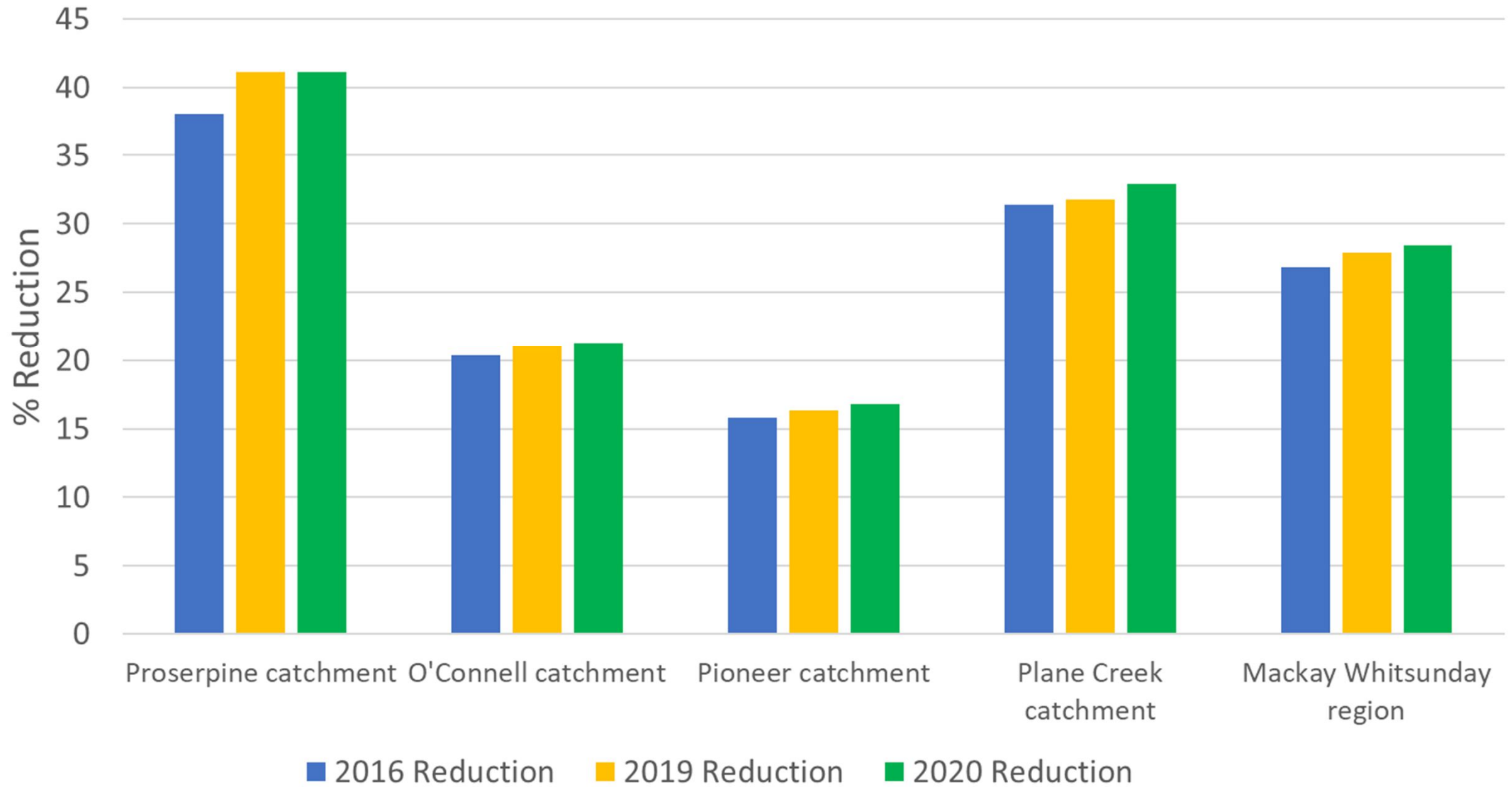
p2rprojector

Estimate the water quality benefits
of farm-scale agricultural
improvement projects
in Great Barrier Reef catchments

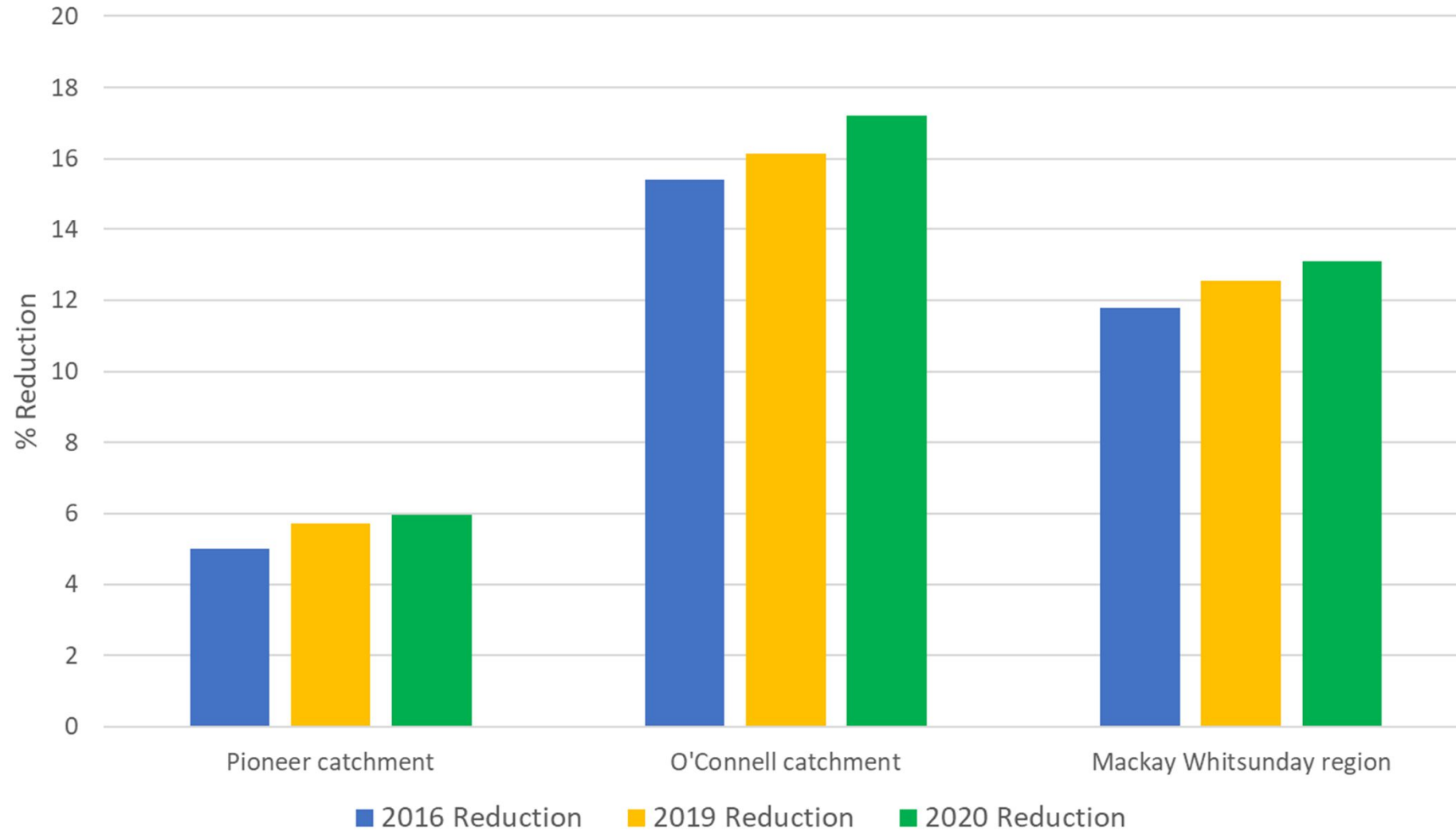




Modelled DIN Reduction Mackay Whitsunday



Modelled Sediment Reduction Mackay Whitsunday





Australian Government



Queensland
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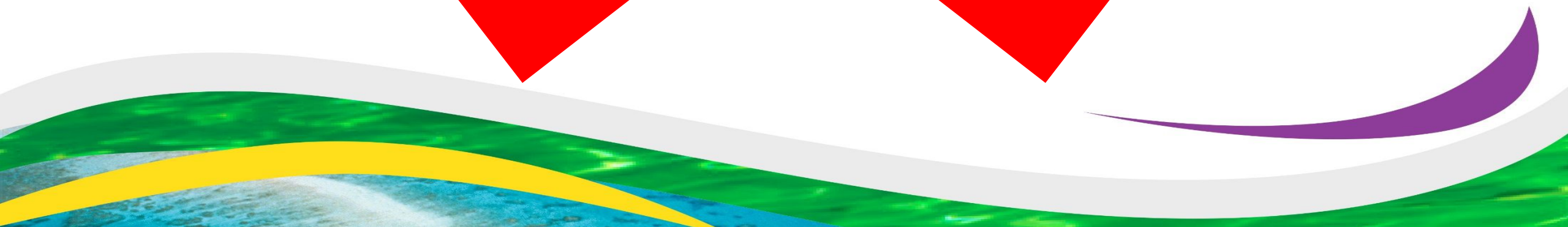
Reef 2050 Water Quality Improvement Plan

2017–2022



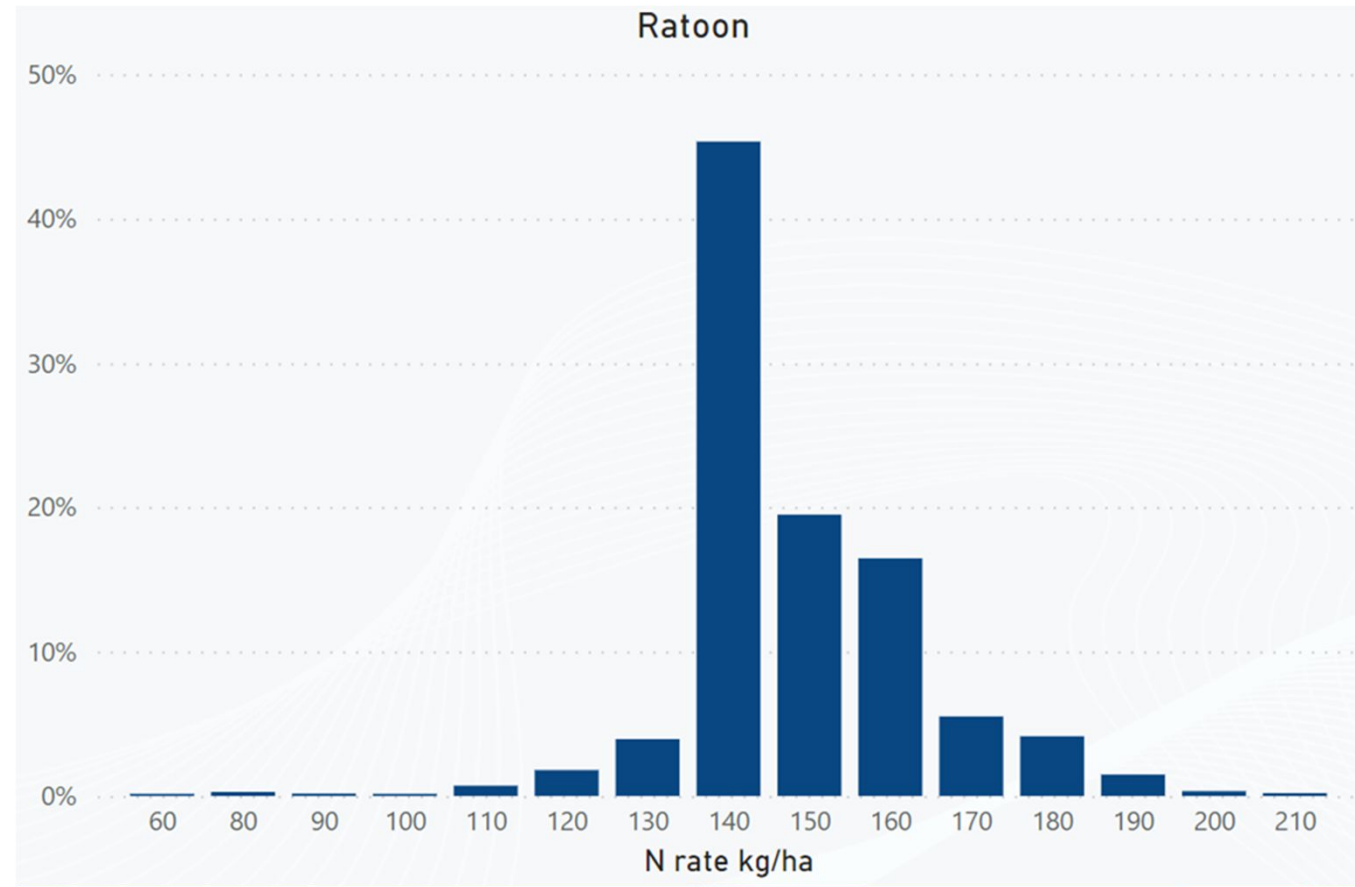
90% of land
in priority areas
under grazing
agriculture

pesticides



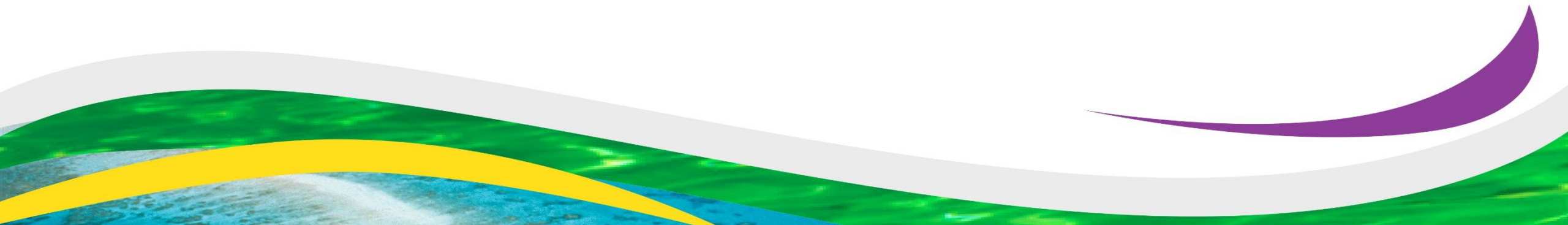
WHAT WE ARE OBSERVING

- Not a lot of scope to continue to reduce N rates
- A lot more projects focusing NUE
- It all about N surplus



P2R'S CHALLENGE

- The outcome of the practice change is the most important thing
 - Less surplus Nitrogen
 - More ground cover
 - Less impact on water critters from pesticides
- Best practice isn't a one size fits all



THANK YOU

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