



# Burdekin Grower Research Update

Marian Davis - Burdekin harvester trials

Ryan Turner - Water quality results from the Burdekin region

Rob Magarey - Pest and disease updates and risks

Julian Connellan - Burdekin nitrogen trial results

George Piperidis - Plant breeding update and research

Barry Salter - Burdekin farming systems research

Andrew Ward - Wrap up and YCS update



# Burdekin Productivity Services



## Harvesting Project Update

# Background

- ▶ 3 year project funded by SRA to examine the effect of harvester speed on subsequent ratooning and yield; also seeing if soil type or variety have any impact
- ▶ Shed meetings in 2013 identified harvester damage as a major constraint to productivity

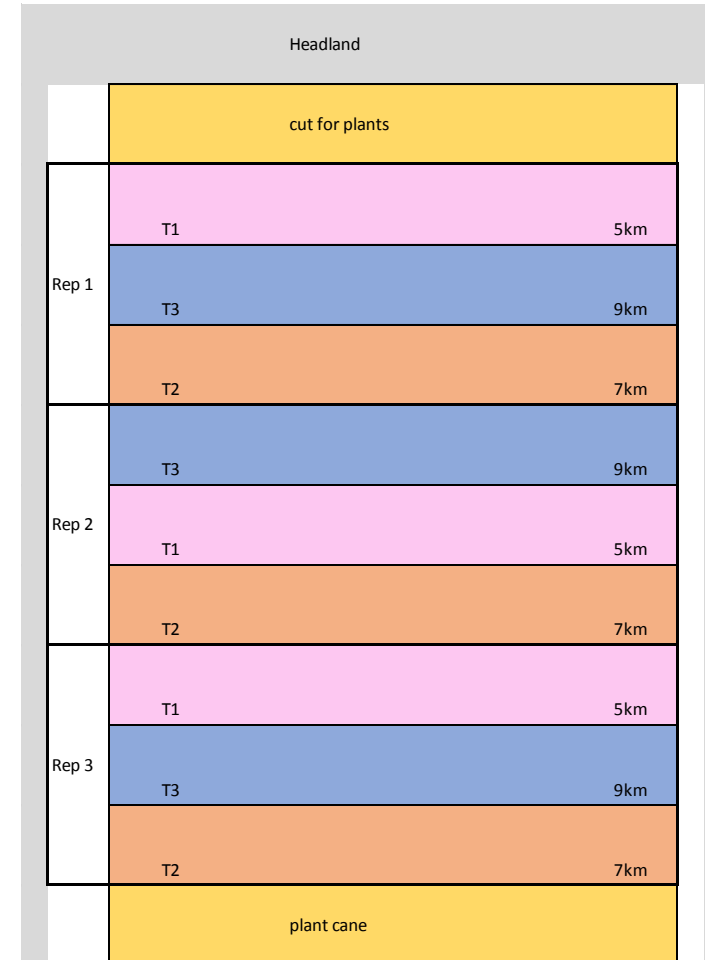


► 6 sites

- BRIA – 2 x Q208, 2 x Q183
- Delta – 1 x Q208, 1 x Q183

► At each site

- 3 harvester speeds; 5–11 km/hr
- Replicated 3 times





# Measurements

## ► Year 1 (2014 harvest, plant)

- At harvest

- Stool and gap counts on 4 x 10m sections per plot
- Mill yield and CCS results per plot
- Data for economic analysis

- After harvest

- Shoot, stool and gap counts at 1, 3 and 6/7 months after harvest

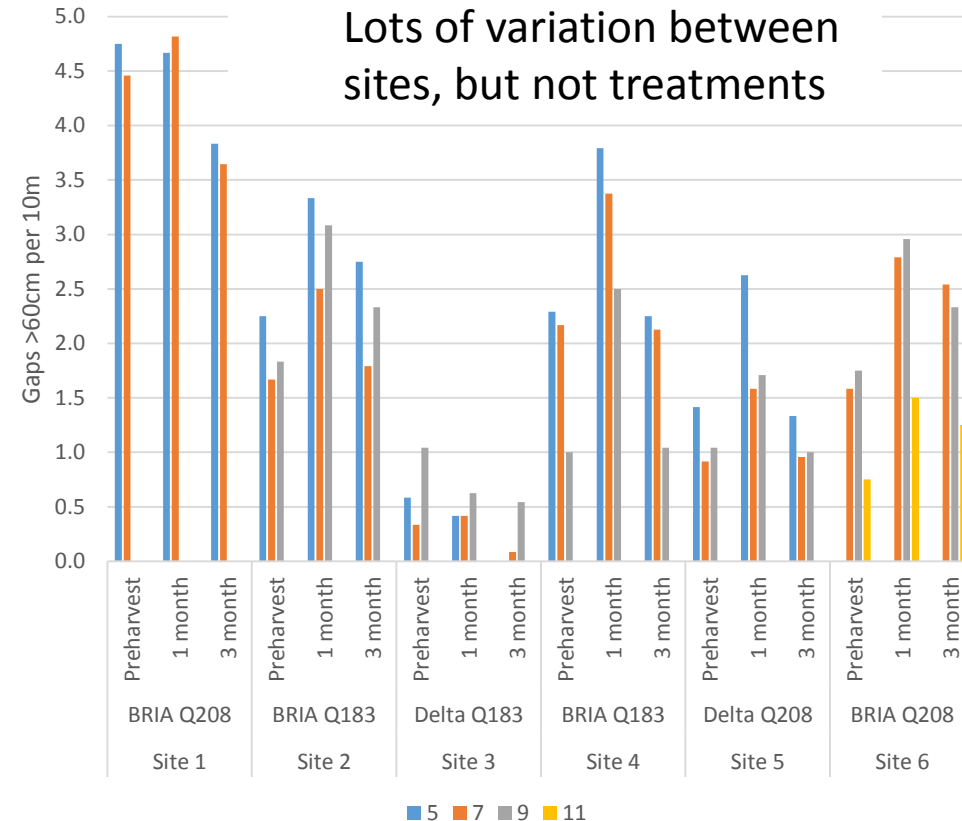
## ► Years 2 and 3

- Mill yield and CCS
- Data for economic analysis
- Shoot, stool and gap counts at 1, 3 and 6/7 months post harvest

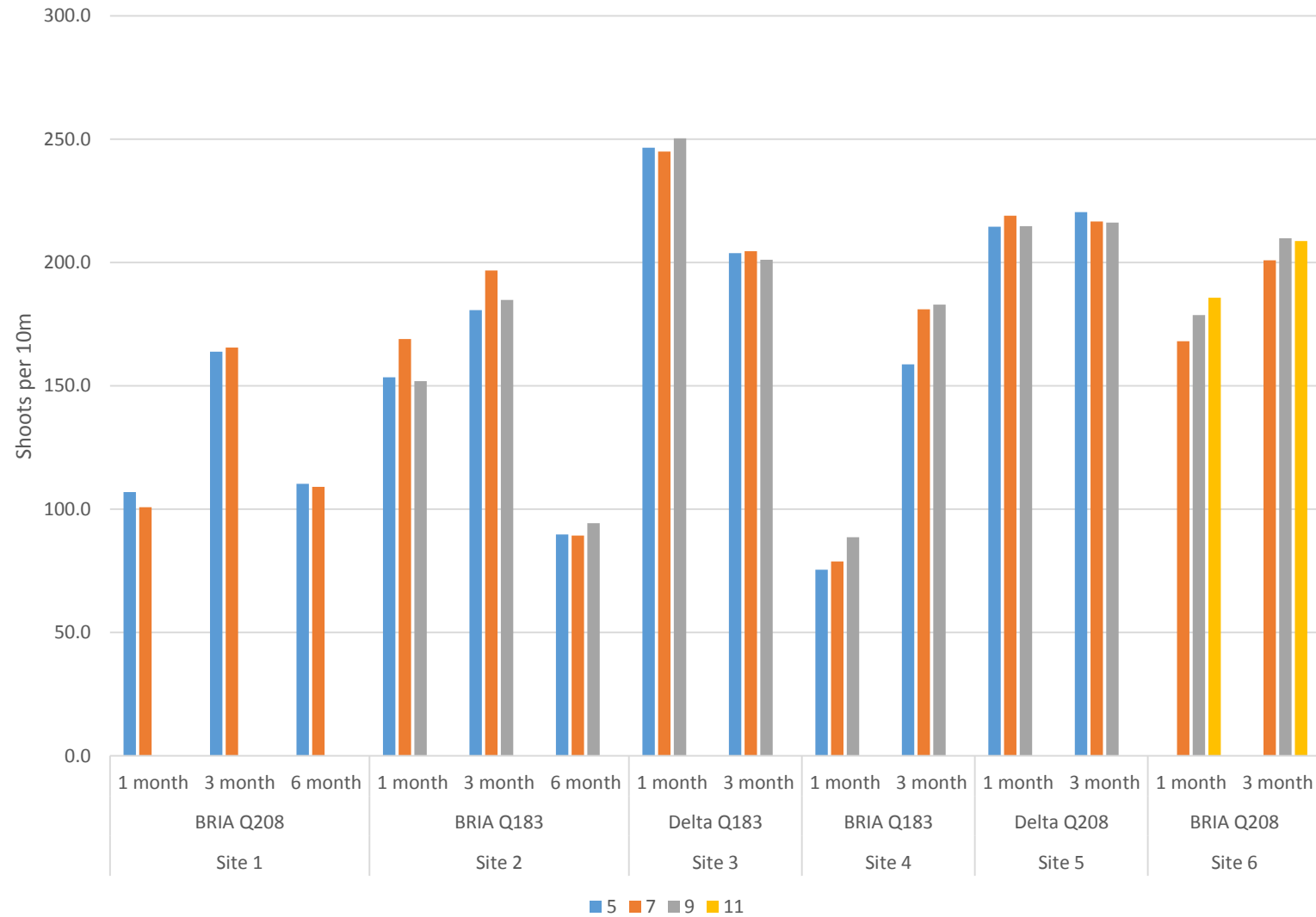


# Results

- ▶ SRA biometricians have analysed the data
- ▶ In this first year harvester speed has had no impact on yield, or shoot, stool and gap counts after harvest
- ▶ Not surprising as fairly conservative speeds were used



## ► Shoot counts

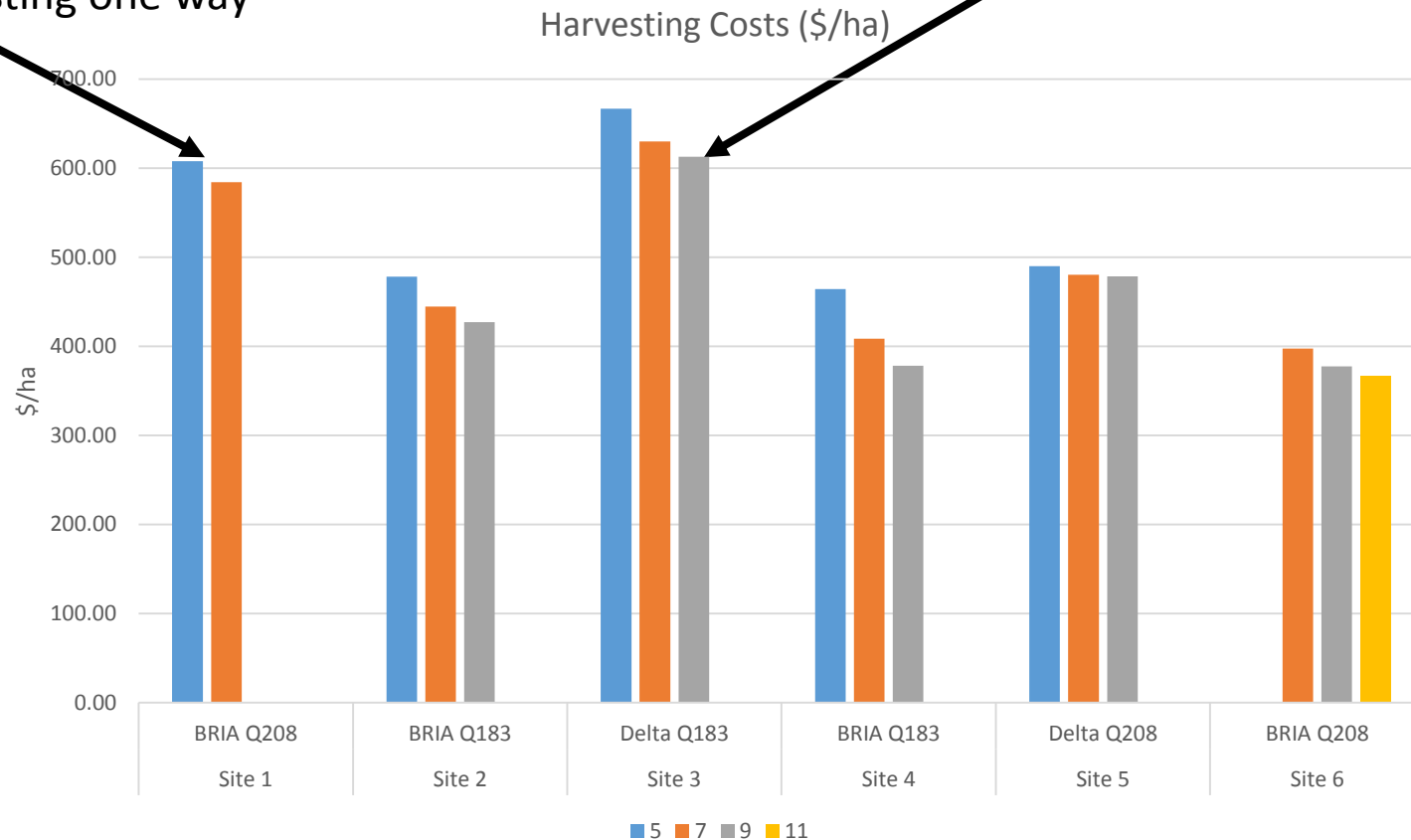




## ► Harvesting costs decrease with speed

Very long rows, 900m,  
harvesting one way

Very short rows, 230m,  
harvesting one way





Thank-you to the  
growers and  
harvesting crews  
who are involved

Questions?



# Water quality results from the Burdekin Basin

## Great Barrier Reef Catchment Loads Monitoring Program (GBRCLMP)

BPS SRA Grower Research Update

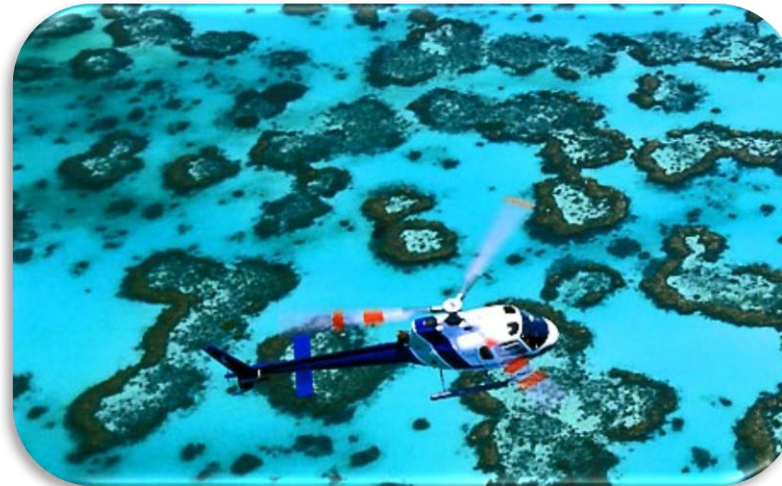
Tuesday 10<sup>th</sup> March 2015

Michael Warne, Ryan Turner, Alexandra Garzon-Garcia, Rachael Smith, Rohan Wallace, Rae Huggins,  
David Orr, Richard Gardiner, Ben Ferguson ; Water Quality and Investigations - DSITI



**World Heritage Area:**

- **2300 km long**
  - Up to 250 km wide
  - 3000 reefs
  - 900 islands
- **Outstanding universal values**



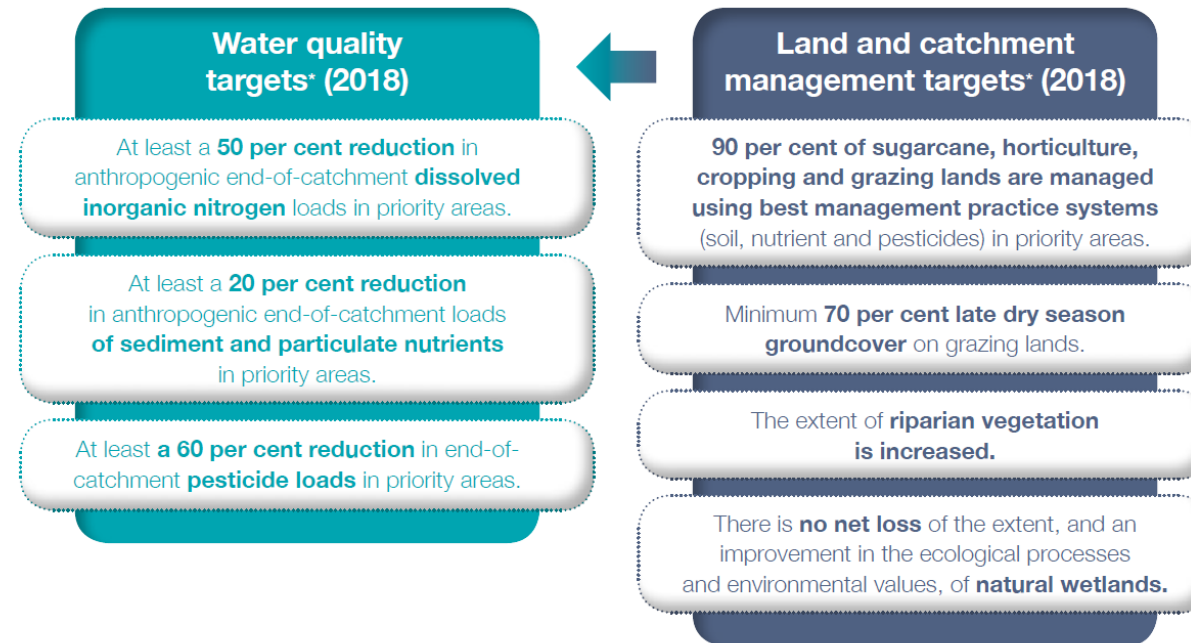
<http://www.smh.com.au>



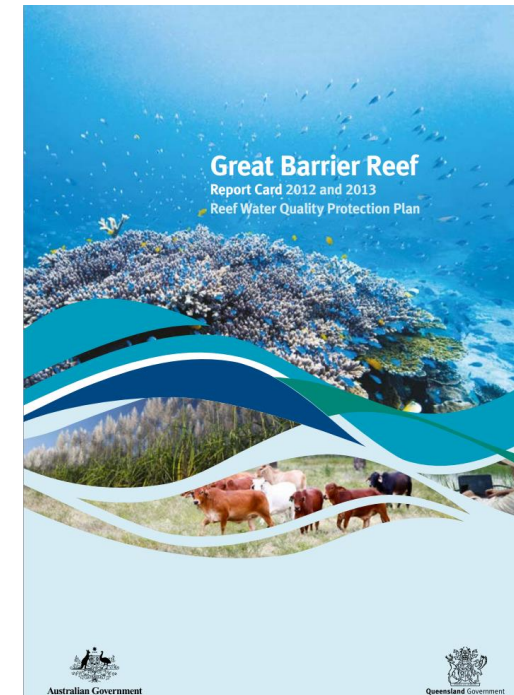
## Long Term Goal

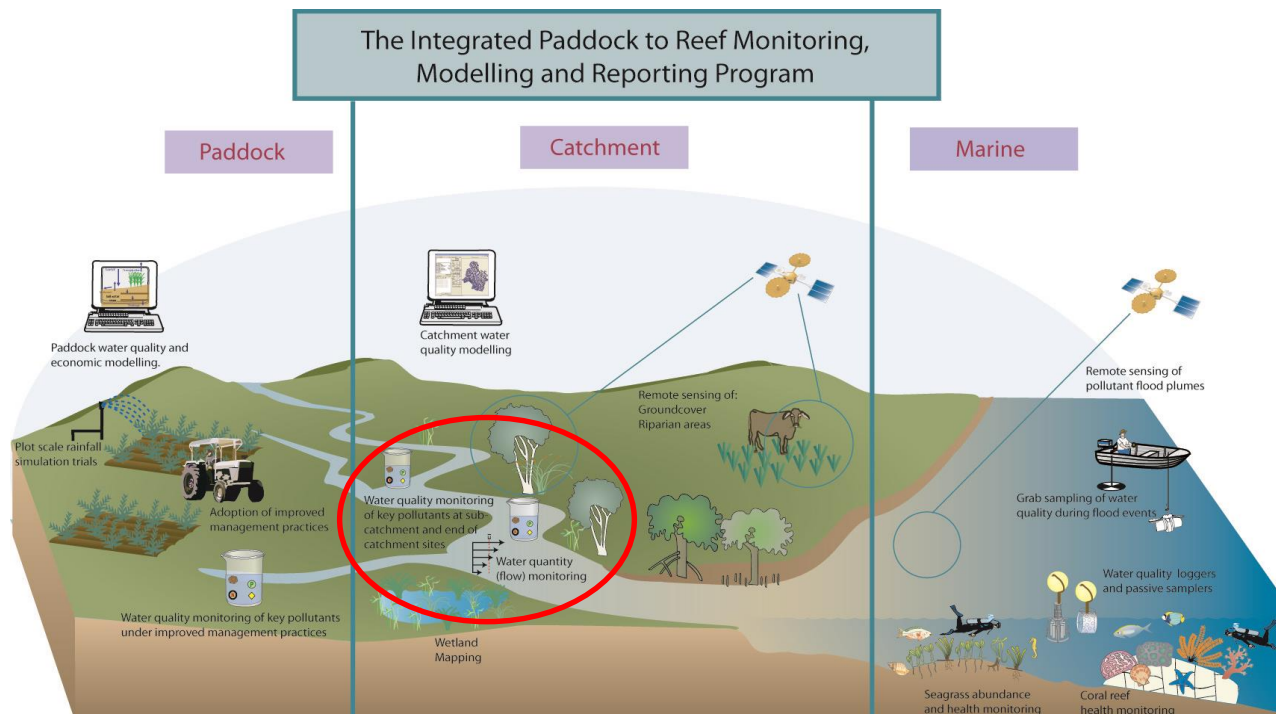
To ensure that **by 2020 the quality of water** entering the reef from broadscale land use **has no detrimental impact** on the **health and resilience** of the **Great Barrier Reef**.





- Objective – To measure progress towards the Reef Plan goals and targets
- A partnership involving over 20 organisations
- Spatial coverage - Over 800,000 km<sup>2</sup>
- The integration of monitoring and modelling from the paddock to reef scales
- Strong policy–science interaction
- Primary output – Great Barrier Reef Report Card.

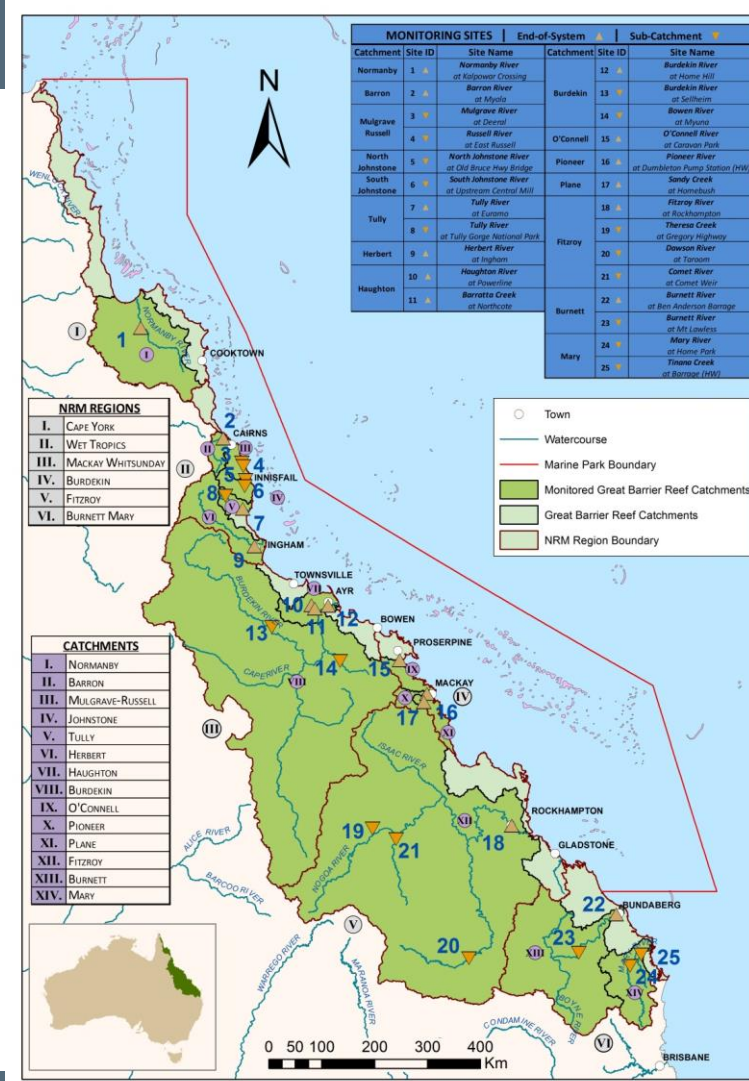




**Monitor and report on water quality constituents and annual loads of nutrients, sediments and pesticides exiting 14 “priority” Great Barrier Reef catchments as part of Reef Plan 2013.**



**Provide high quality data to validate source catchment models that will be used to assess progress towards the Reef Plan water quality targets.**



## Monitoring sites

25 monitoring sites for TSS and nutrients

- 14 catchments
- 11 sub-catchments

15 monitoring sites for pesticides for

- 14 catchments
- 1 sub-catchment



### Monitoring

- Diffuse rural contaminants
- Event conditions
- Ambient conditions

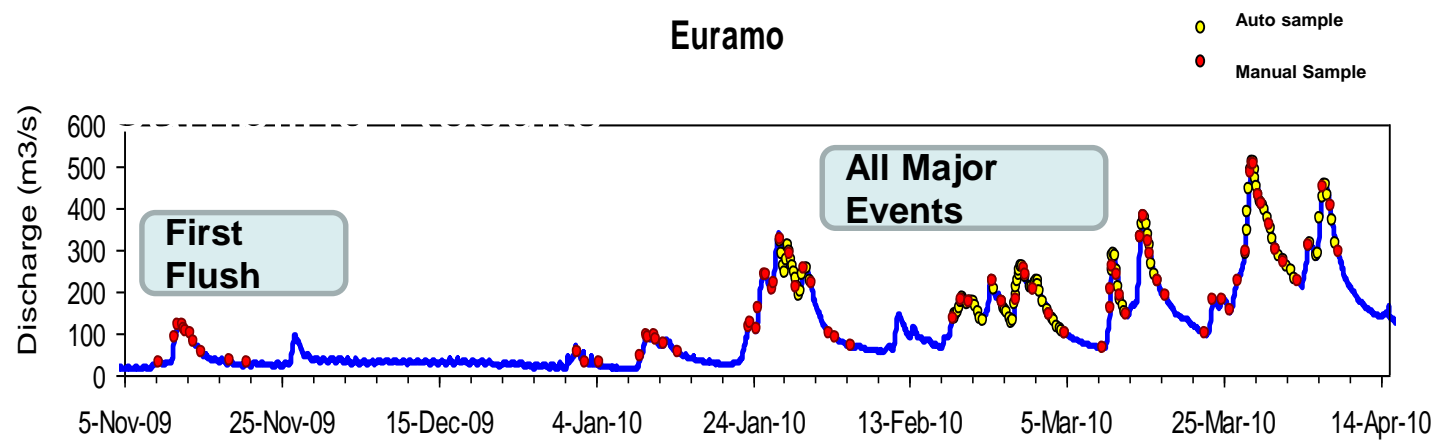
### Samples collected by

- Automated samplers
- Grab sampling
- In-situ turbidity
- Passive samplers





## Example water quality monitoring - Tully



Catchment	Site	Events	Grab Samples	Auto Samples	Total
Tully	Tully R @ Euramo	9	81	129	210

# A simplified load calculation

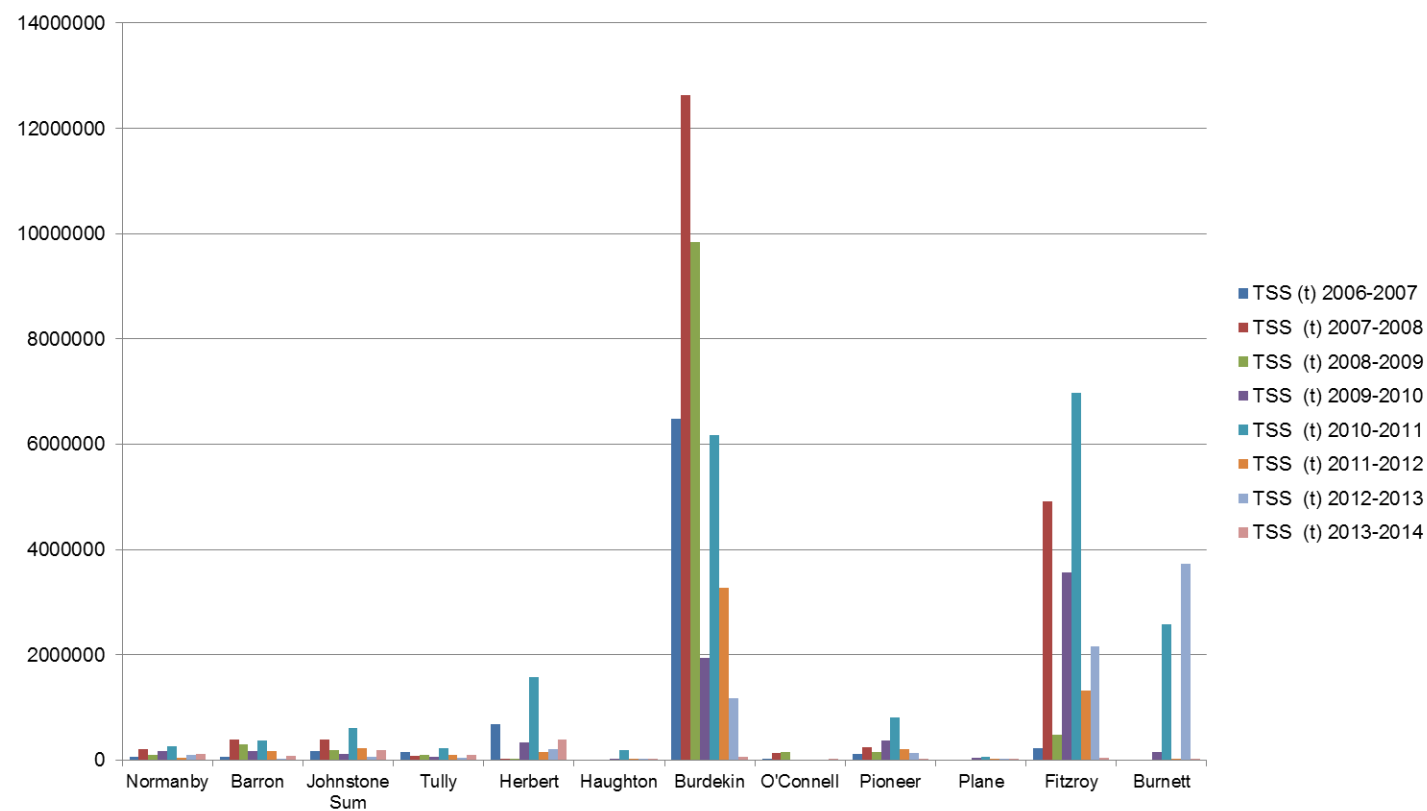
**Water Quality**  
**Sediments, Nutrients, Pesticides**

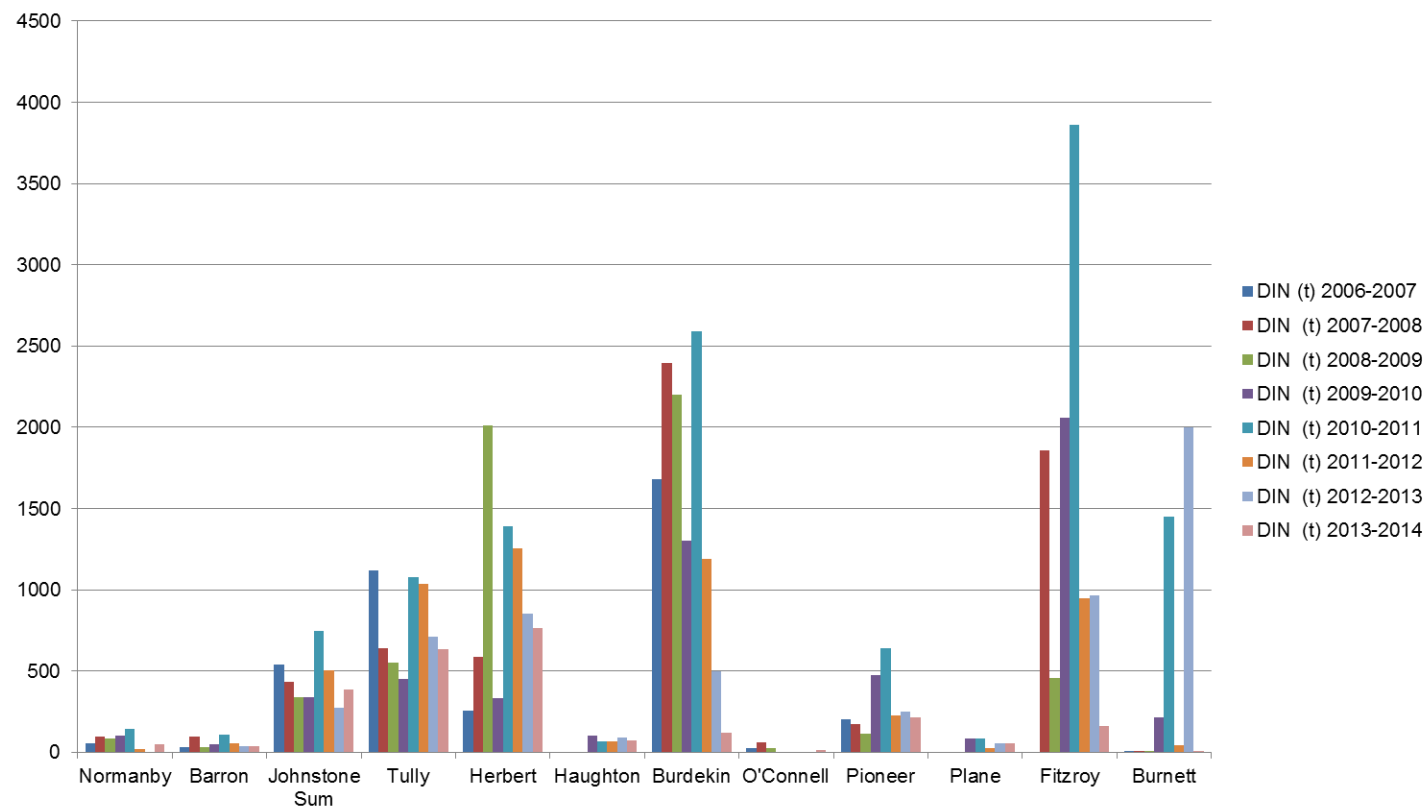


**X**

**River Flow**



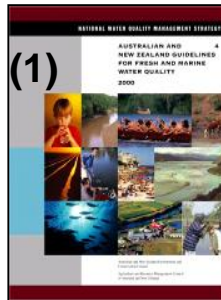




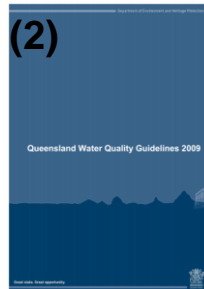
# Managing water quality in Australia

## National Water Quality Management Strategy (NWQMS)

[www.environment.gov.au/topics/water/water-quality/national-water-quality-management-strategy](http://www.environment.gov.au/topics/water/water-quality/national-water-quality-management-strategy)



1. Australian and New Zealand Water Quality Guidelines (WQGs)



2. State WQGs e.g. Queensland



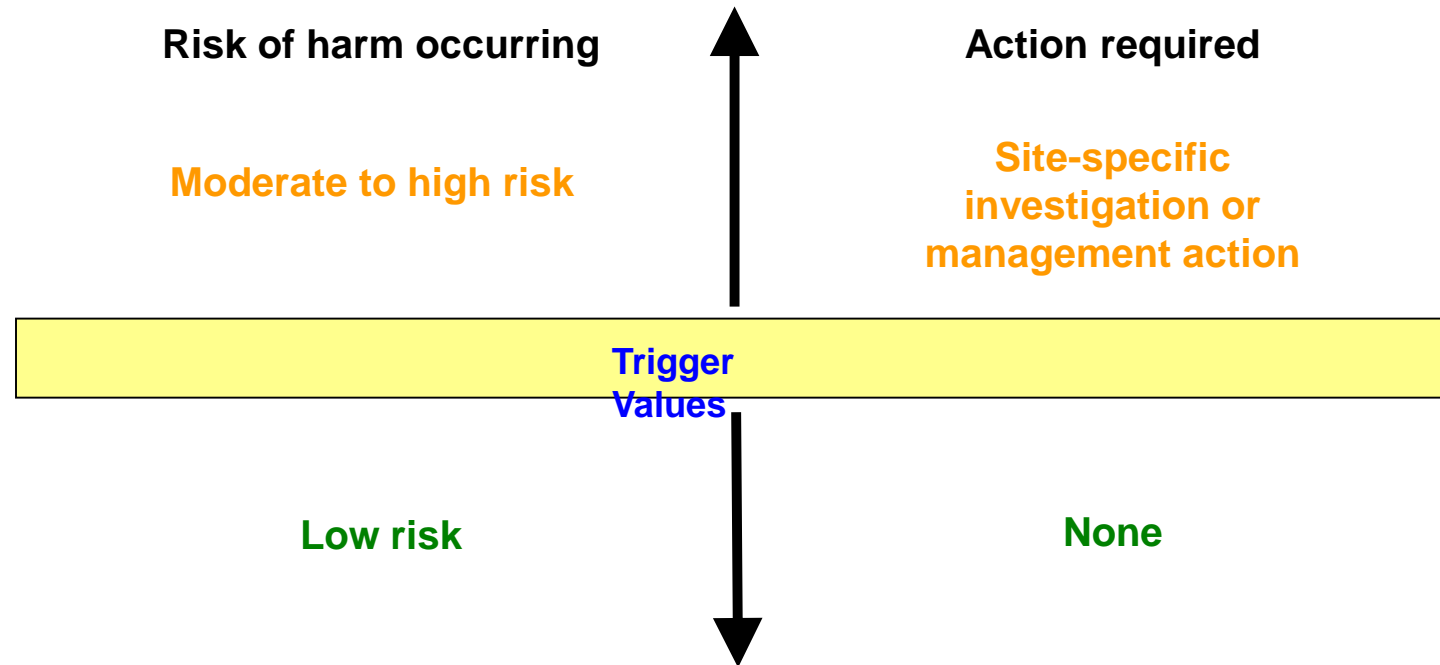
3. Regional WQGs e.g. Great Barrier Reef

# What are trigger values?

**Trigger values are the quantitative limits (concentrations) below which there is a low risk of environmental harm occurring and above which there is a moderate to high risk of environmental risk occurring.**



# What are trigger values (TV)?



# Why do we have multiple TVs?

Water has many potential uses e.g.

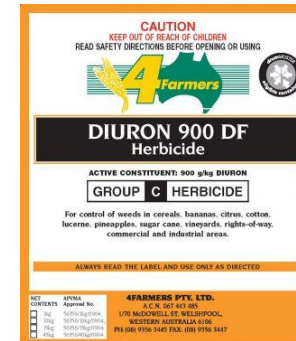
- ecosystem protection;
  - drinking water;
  - recreation;
  - aquaculture;
  - irrigation; and
  - livestock.
- For each use there are TVs
  - TVs for potential uses differ due to variations in organism sensitivities

# Diuron TVs

Drinking water	20 µg/L
Irrigation water	2 µg/L
Ecosystem protection	0.2 µg/L

## Why do levels differ?

- Humans do not photosynthesize – so toxicity is low
- Generally, crops are larger than aquatic plants (algae) and herbicides may bind to the soil.
- Diuron is a herbicide that blocks photosynthesis.

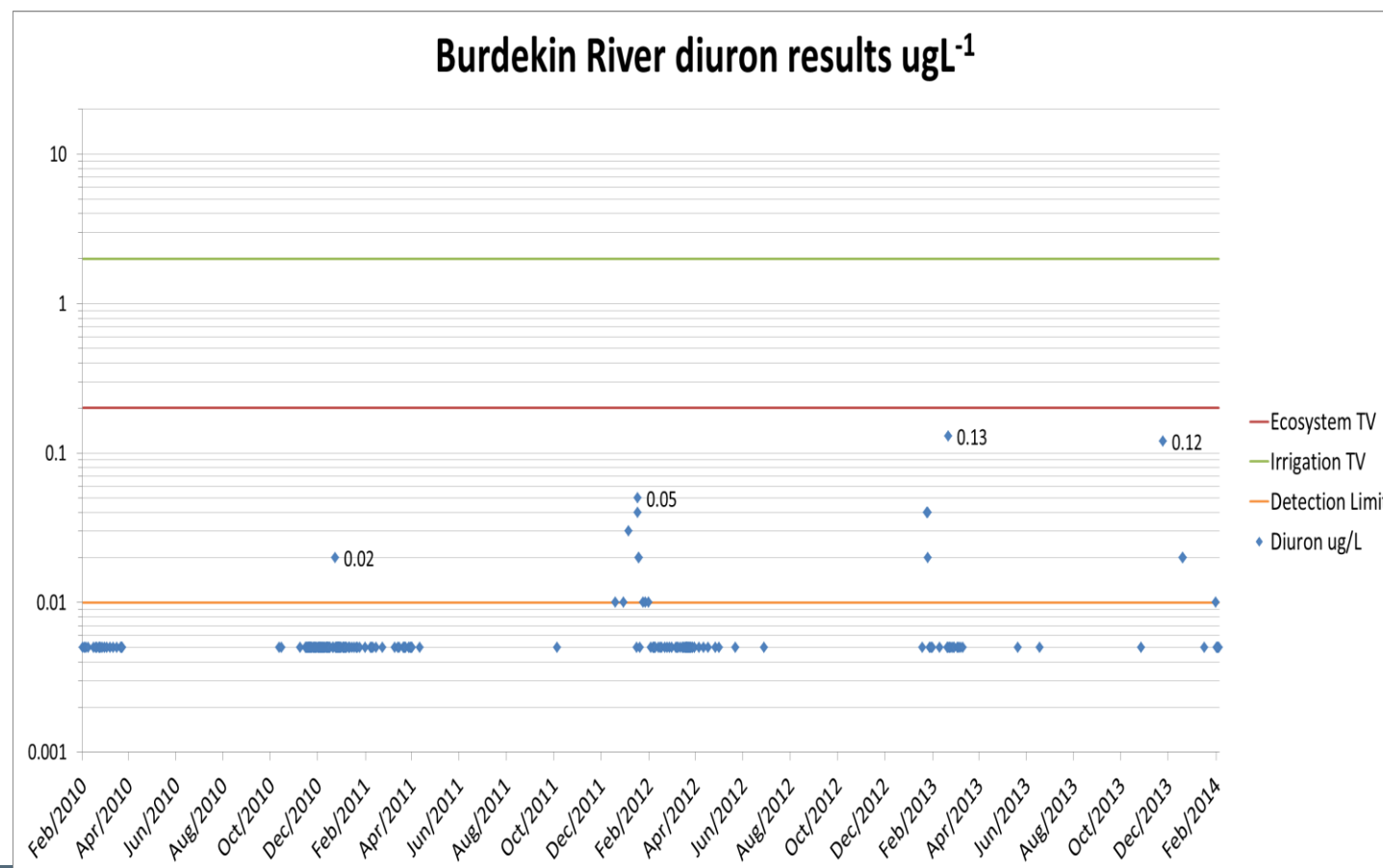


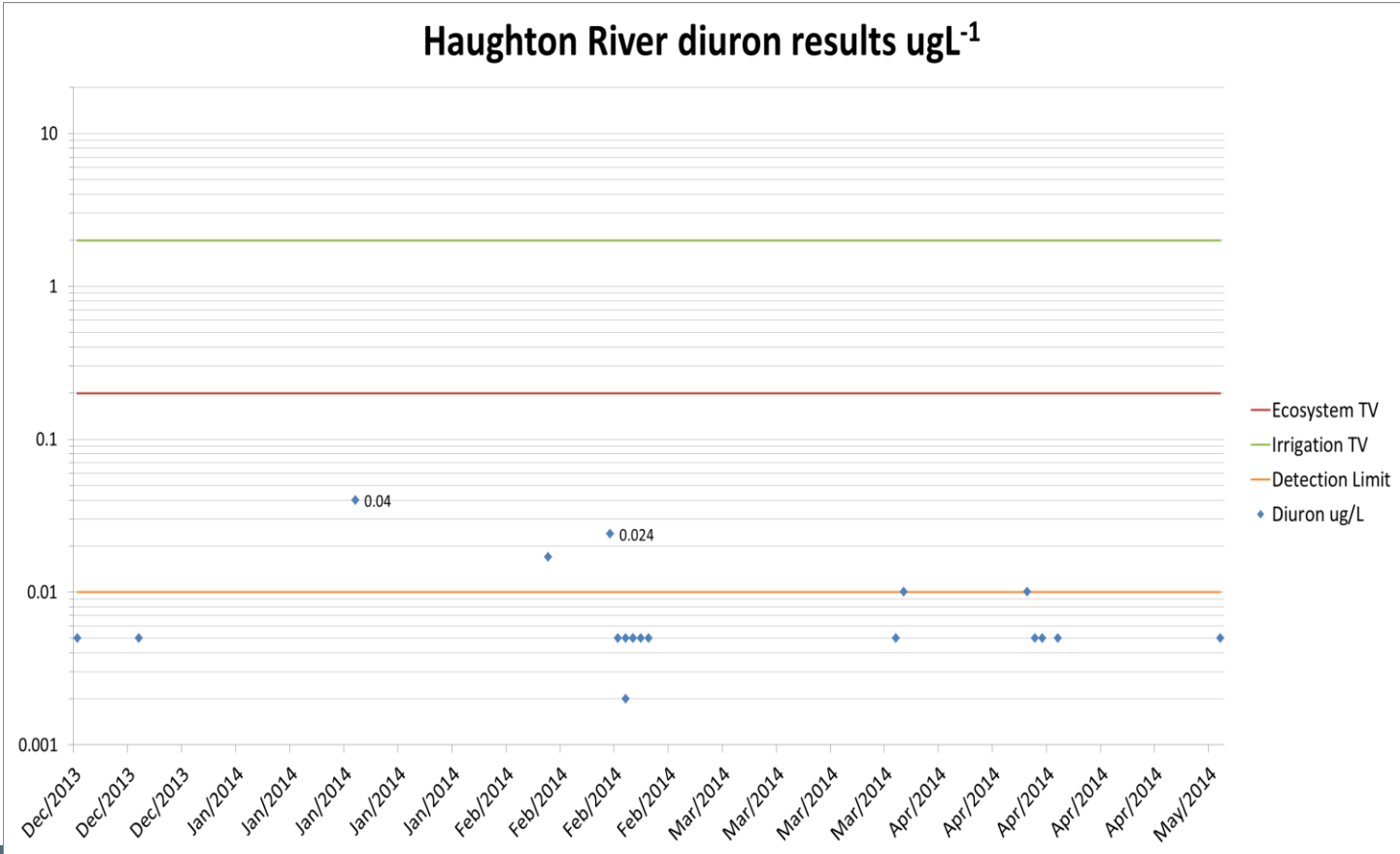
# Consequences of exceedances

- Three rules of thumb
  - the greater the exceedance the more severe the biological effects
  - the longer the duration of consecutive exceedances the more severe the biological effects
  - the more pulses (repeated exposures) the more severe the biological effects

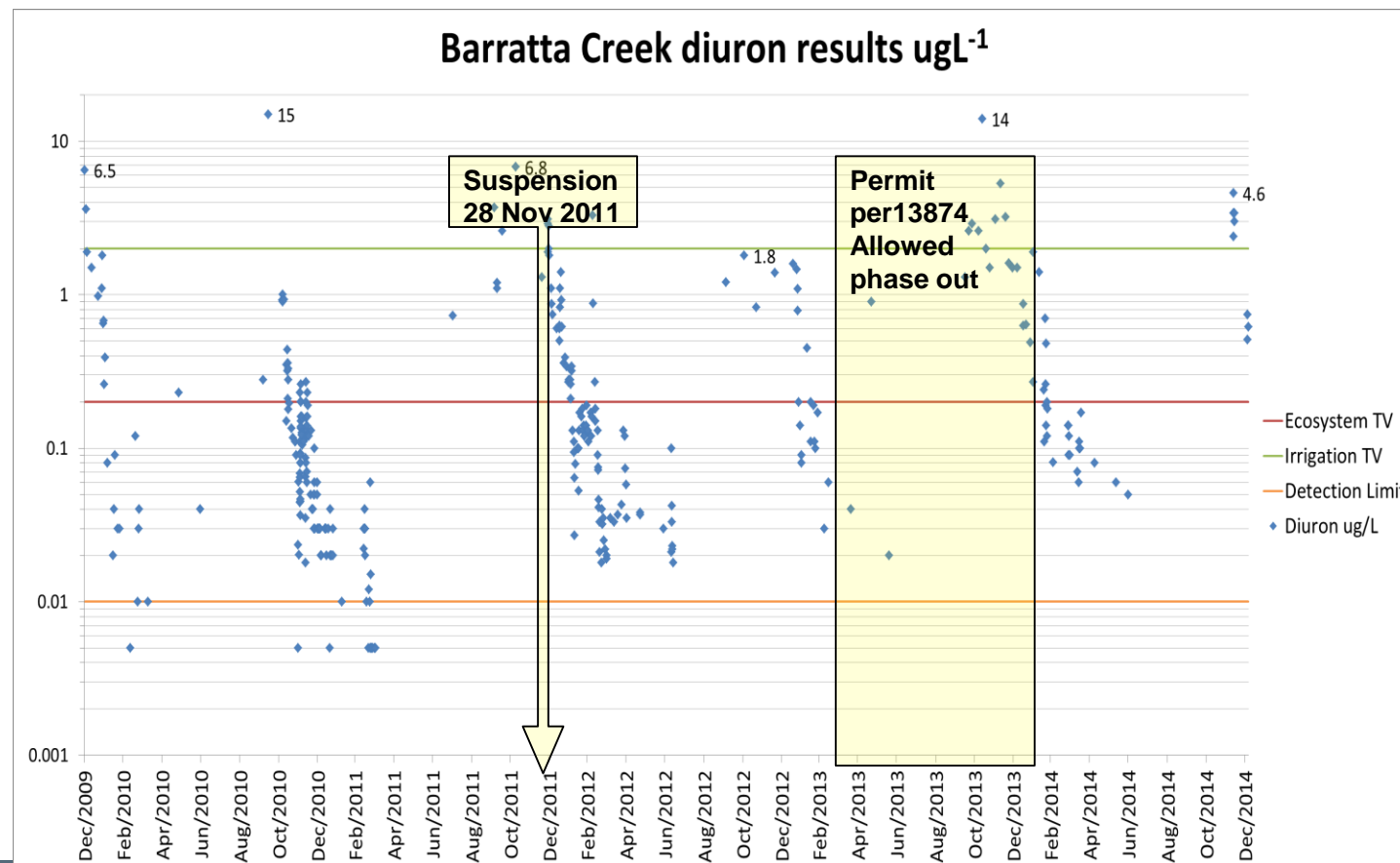


# Diuron concentrations over time Burdekin

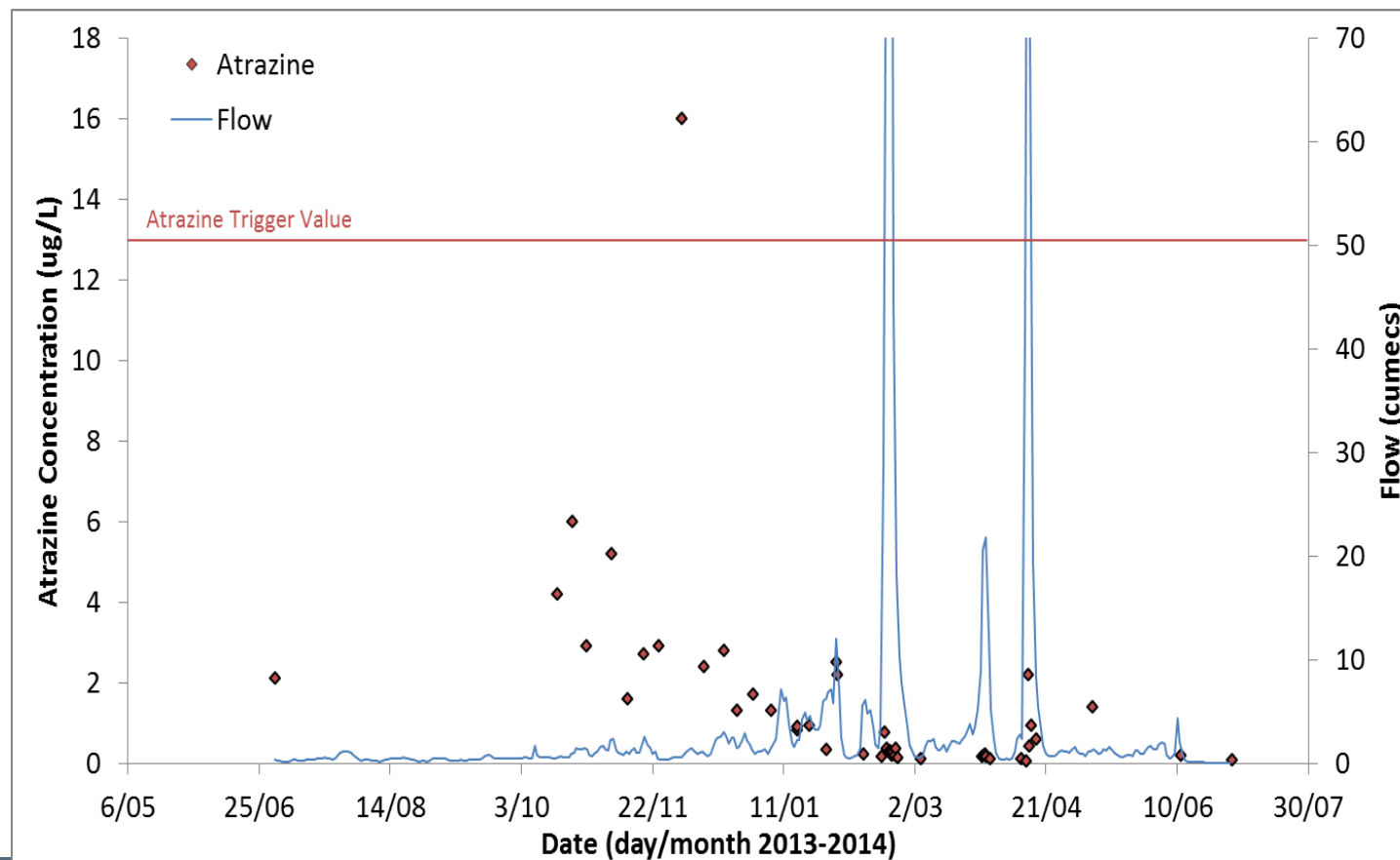




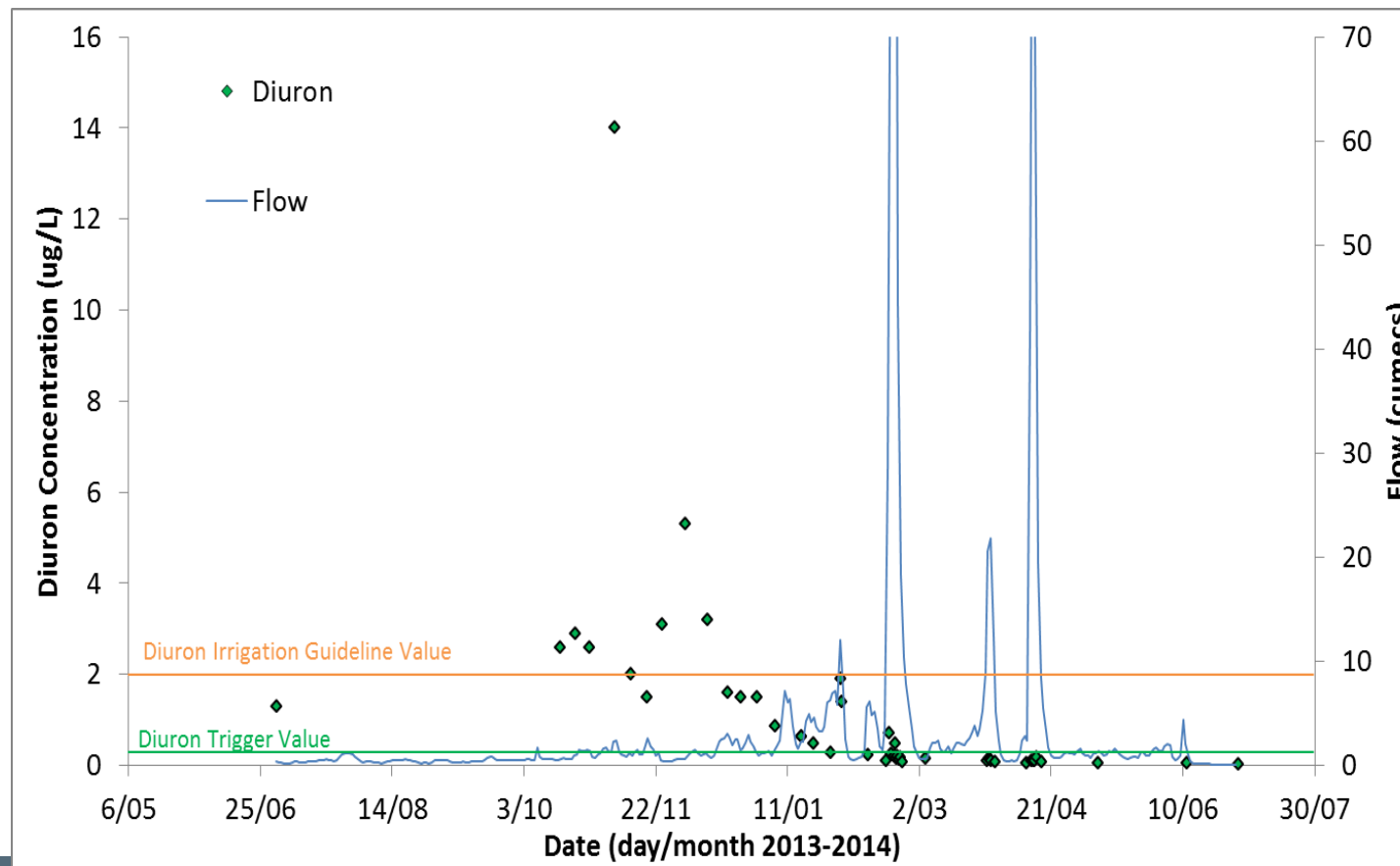




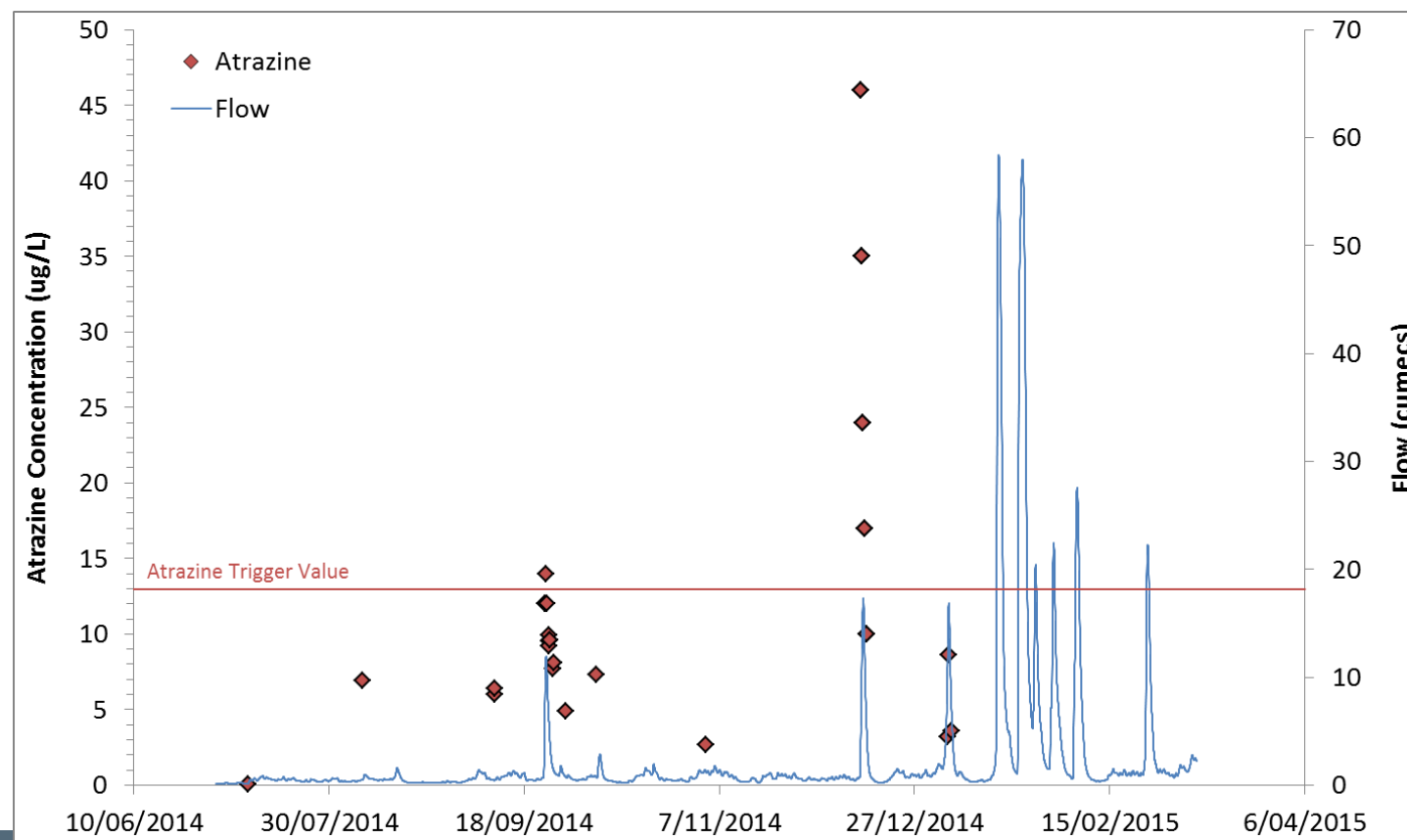
# Atrazine concentrations in Barratta Creek 2013 - 2014



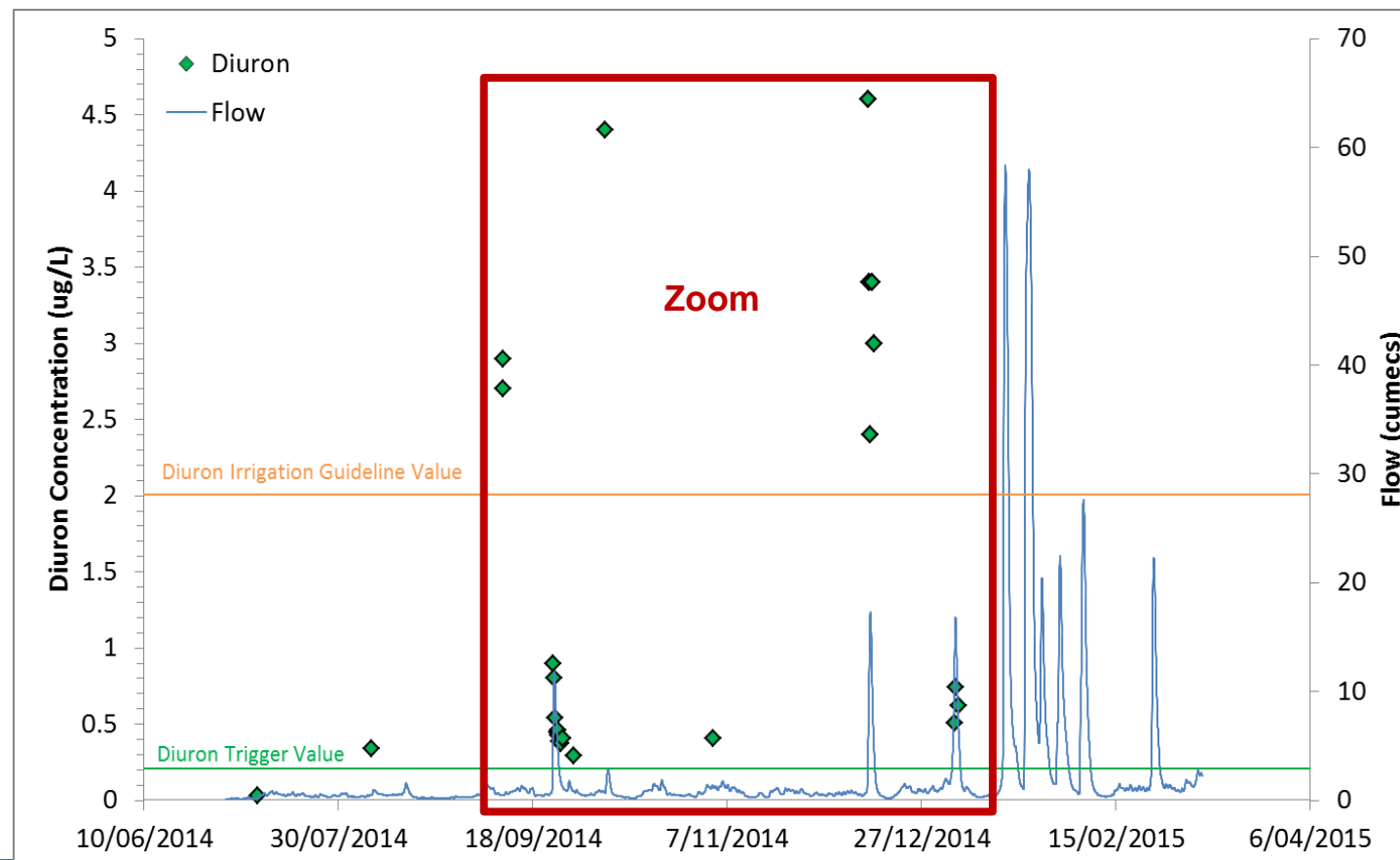
# Diuron concentrations in Barratta Creek 2013 - 2014



# Atrazine concentrations in Barratta Creek 2014 - 2015

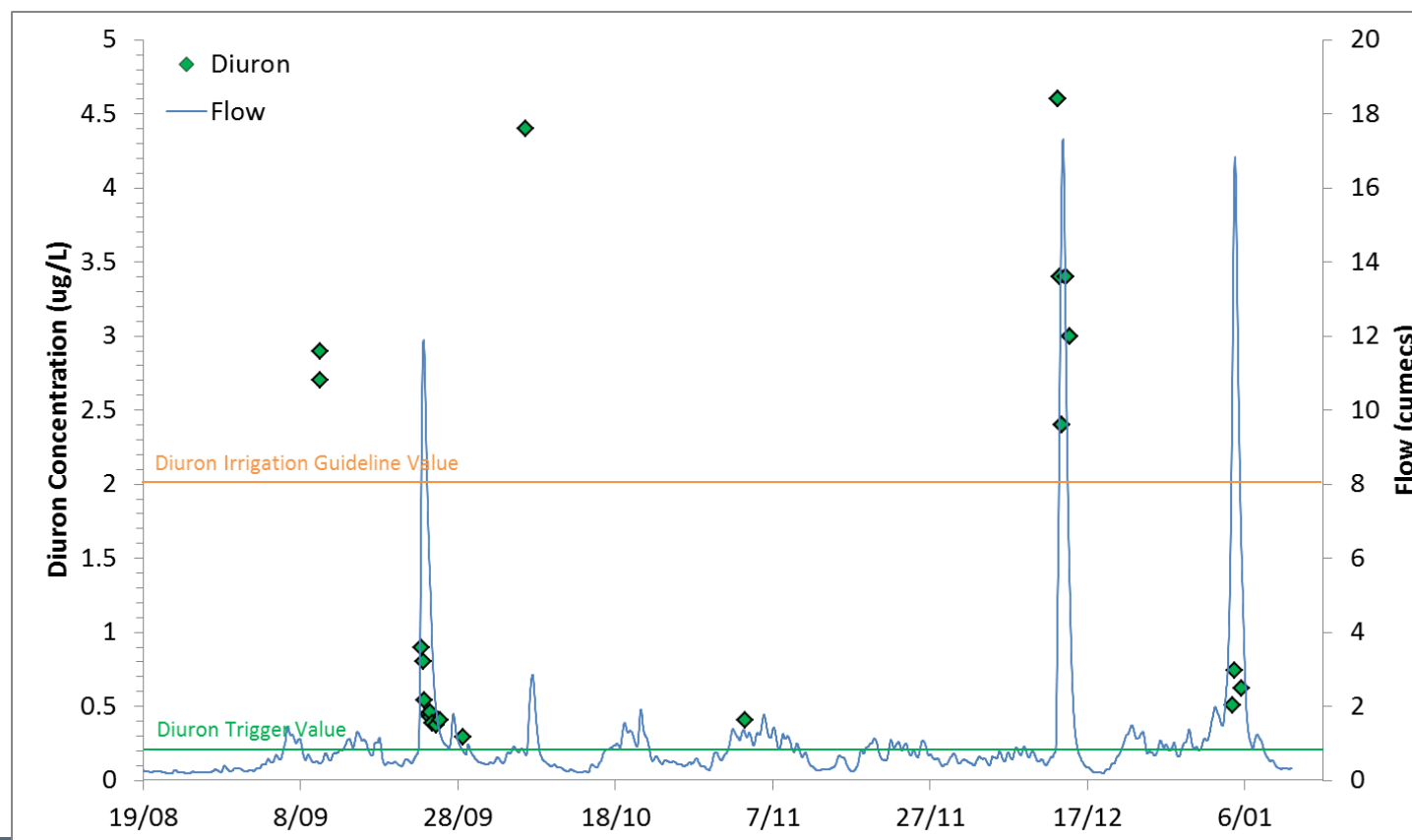


# Diuron concentrations in Barratta Creek 2014 - 2015





# Diuron concentrations in Barratta Creek August 2014 to January 2015



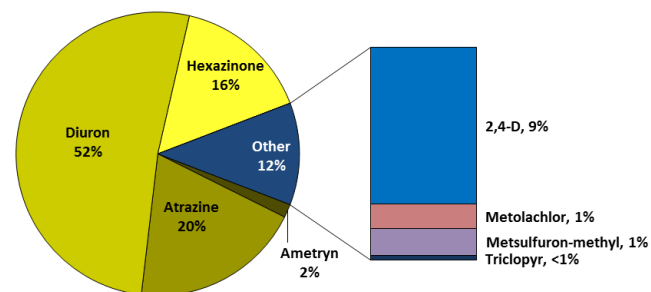
## Herbicide resistance in sugarcane (DRH)

- **Ametryn**
- **Atrazine** and two metabolites - desethyl atrazine + desisopropyl atrazine
- **Diuron**
- **Hexazinone**
- **Tebuthiuron**

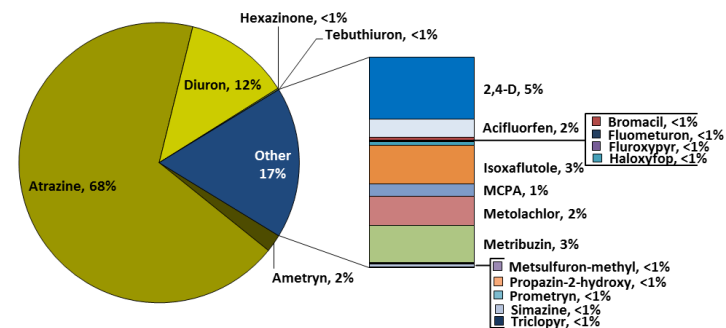


## Loads 2012-13

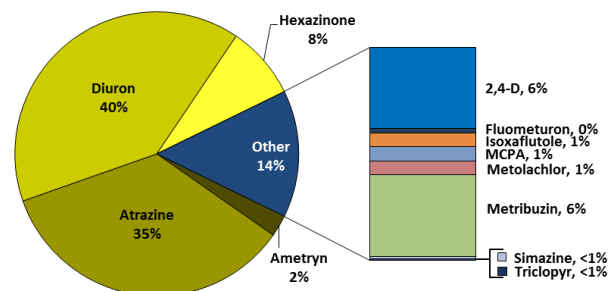
Herbert River



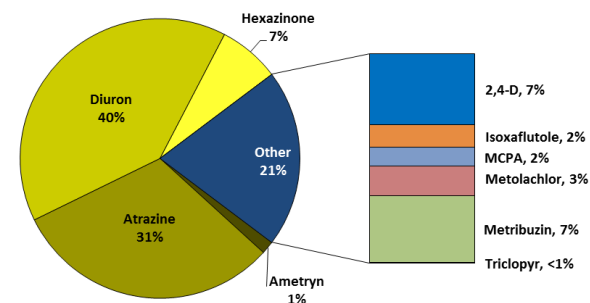
Barratta Creek



Pioneer River



Sandy Creek



# Imidacloprid TVs

Proposed ANZECC ARMCANZ  
2014)

US EPA

Netherlands Environmental Risk Limits

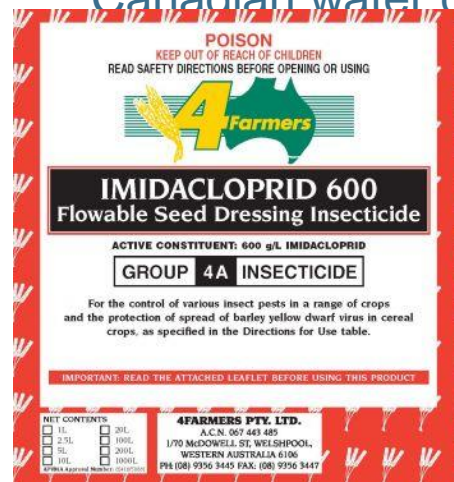
Canadian water quality guidelines

0.1 µg/L (Smith et al

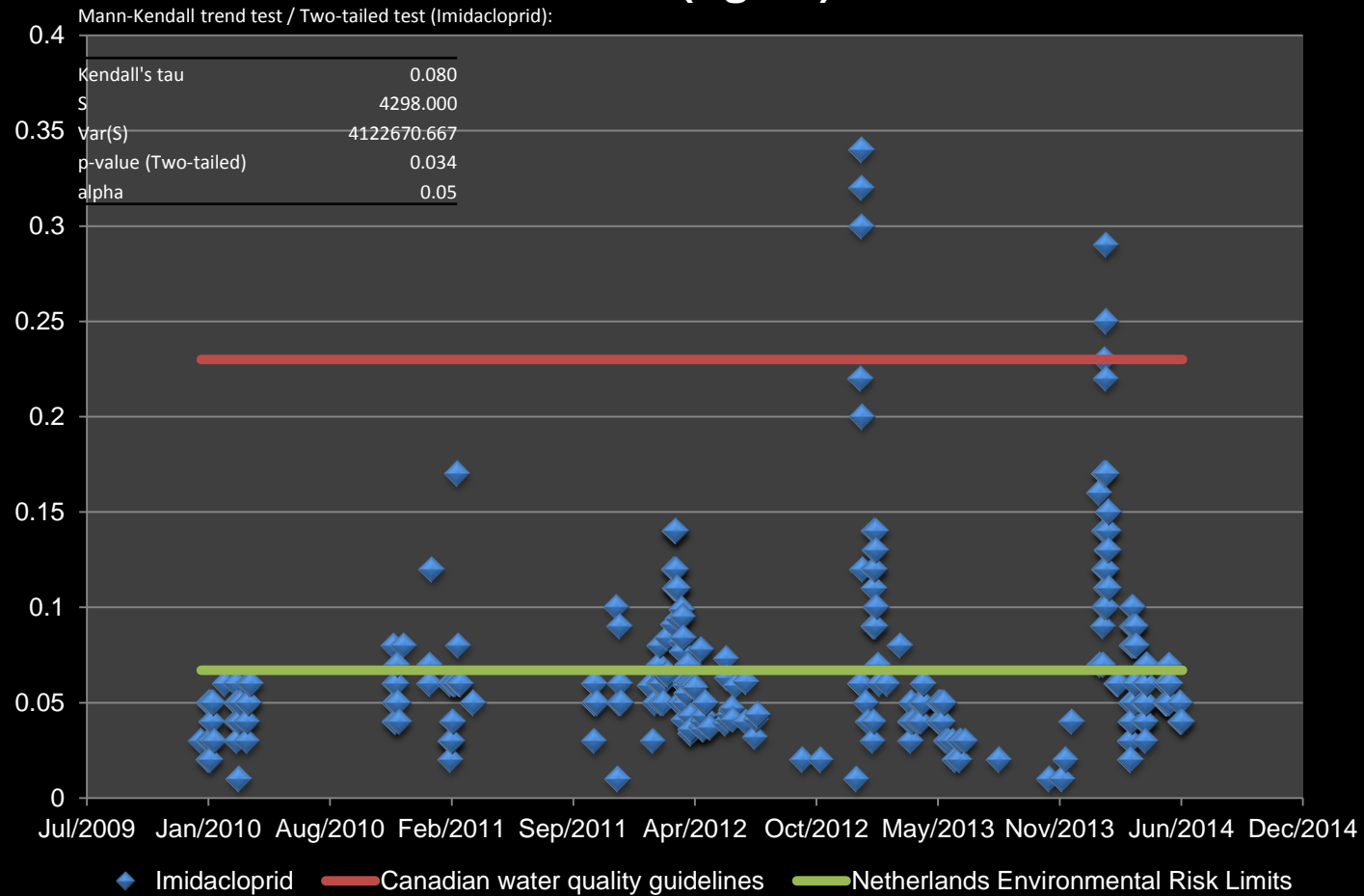
Banned

0.067 µg/L

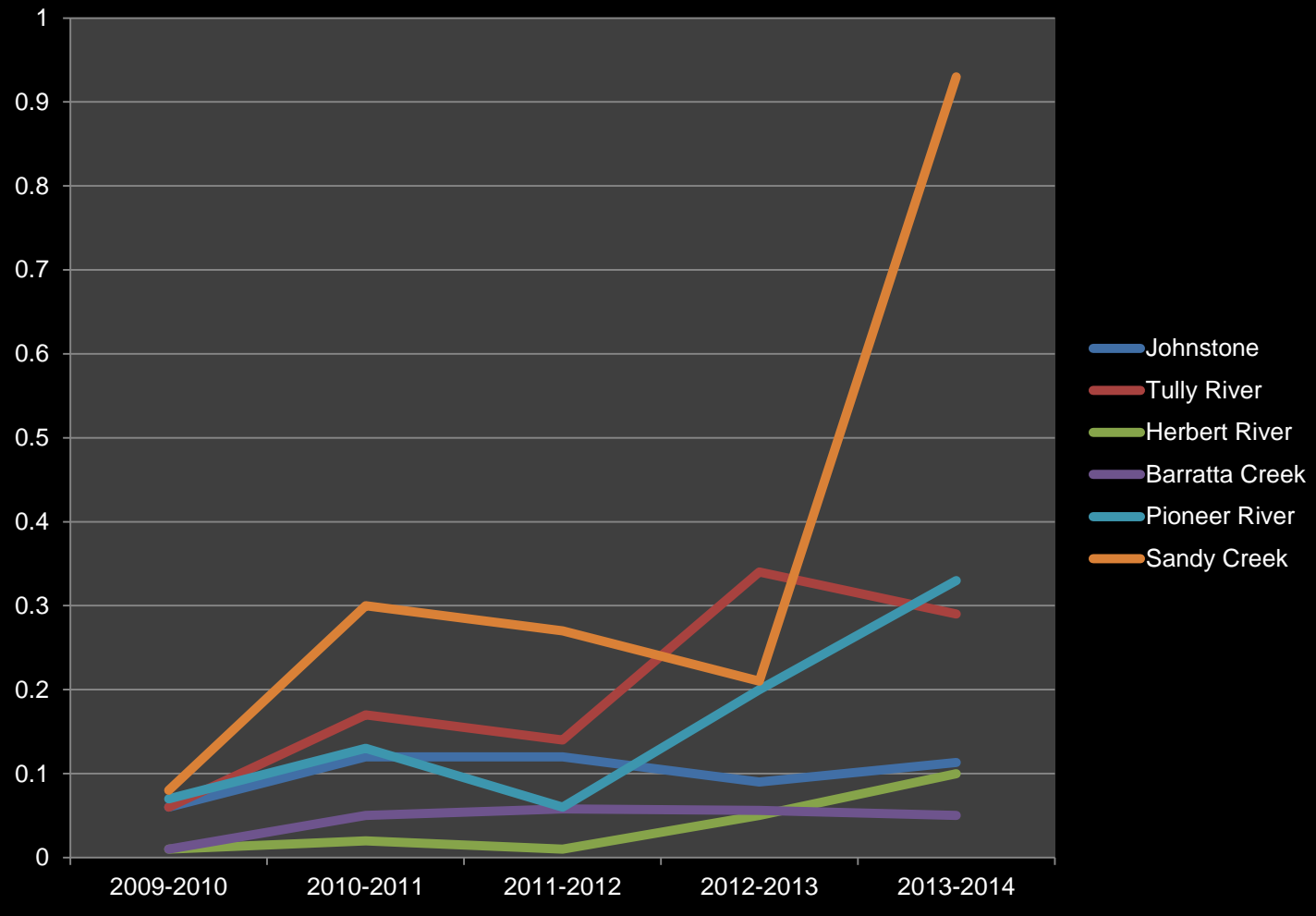
0.23 µg/L



# Imidacloprid concentration (n334) for the Tully River ( $\mu\text{g L}^{-1}$ )

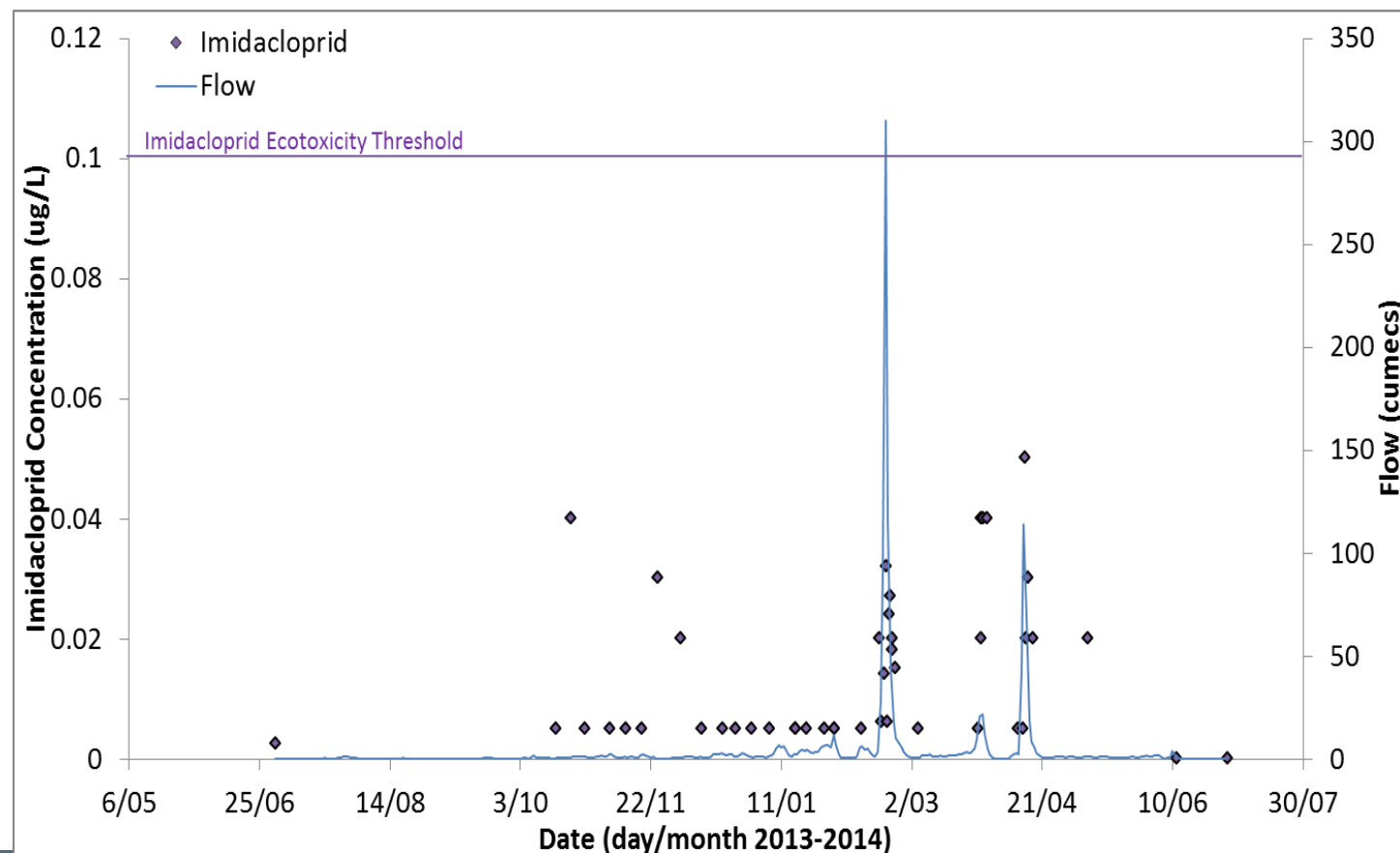


## Maximum Imidacloprid concentration (ug L<sup>-1</sup>)

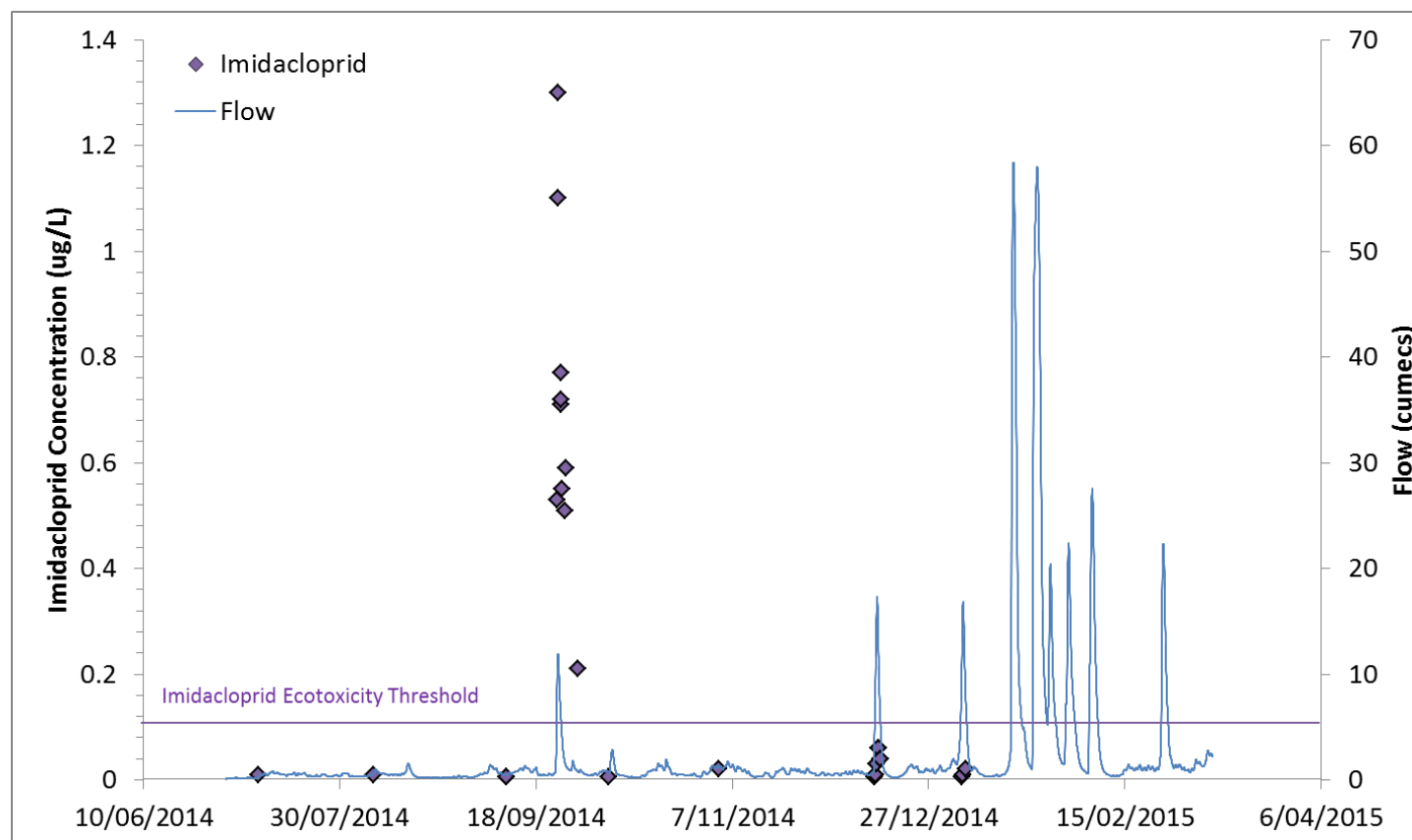




## Imidacloprid concentrations in Barratta Creek 2013 - 2014



# Imidacloprid concentrations in Barratta Creek 2014 - 2015



To support and inform on-farm innovation for improved management we should consider:

- The wet season's rainfall (a wet or dry year) will effect in-stream concentration i.e. toxicity
- Regions and catchments are different in their risk
  - Pesticide management should be region specific
- Application of PSII herbicides and timing with rainfall/irrigation are important
  - Can application windows of PSII herbicides be improved?
- Highest concentrations (most toxic) occur early in the wet season
  - How can pesticide management strategies retain pesticides on the paddock to allow degradation?
- Irrigation is likely to cause high concentration runoff during low-flow periods causing high PSII herbicide concentrations in waterways.
  - What adjustments to irrigation management will allow the retention of pesticides on the paddock?
- The greatest risks have been found in small costal catchments e.g. Pioneer River, Barratta and Sandy creeks.
  - How can tailor pesticide management to best suit these regions?
- Diuron accounts for most of the toxicity
  - How can pesticide management minimize the loss of diuron?

# Thank you

This work was funded by the Queensland Government

Further information: [www.reefplan.qld.gov.au](http://www.reefplan.qld.gov.au)



Slides beyond here are for information only