Reef Rescue
Research & Development

UNIVERSITY OF TECHNOLOGY SYDNEY

Using biomonitoring to detect impacts of pesticides in rivers draining on to the Reef.

Biomonitoring pesticides in GBR rivers (RRRD058)

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Pesticide data supplied by: Rachael Smith* & Michael Warne*

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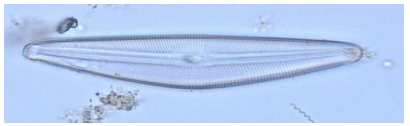
CARING FOR OUR COUNTRY

RELEVANCE OF WORK - BIOMONITORING

- Biomonitoring of pesticides complement chemical monitoring programs to provide confidence
  - Not missing peak concentrations
  - Mixtures & other stressors
  - Detect effects - ecological relevance
- At modest cost, greater spatial coverage – screen many sites
- Re-analysis past biomonitoring data – extend the base-line
- Traits – can now have biomonitoring that can detect effects of specific stressors e.g. pesticides
  - E.g. SPEcies At Risk or SPEAR proven in Victoria & Europe

OBJECTIVES & METHODS

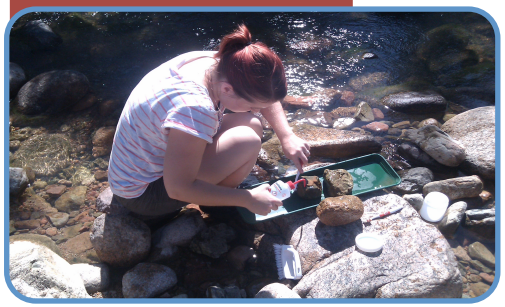
- Adapt the existing (invertebrate based) $SPEAR_{pesticides}$ for north Qld
- Develop a new benthic algae based index to better detect herbicide toxicity
- HOW
  - Sampling invertebrates & diatoms at Reef Rescue's (11) pesticide monitoring sites + reference sites
  - Conduct toxicity testing of benthic algae to determine physiological tolerance



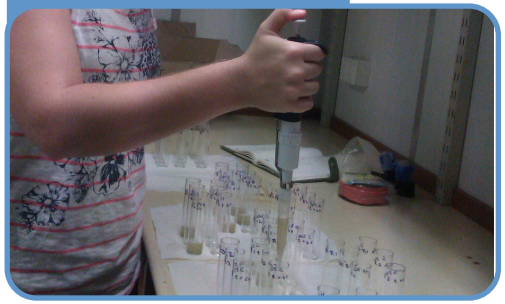
DIATOM BASED SPEAR FOR HERBICIDE

- Determine which diatom taxa are sensitive/tolerant of herbicides

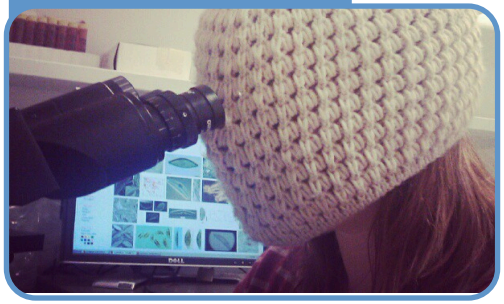
Algae collection



Herbicide treatments

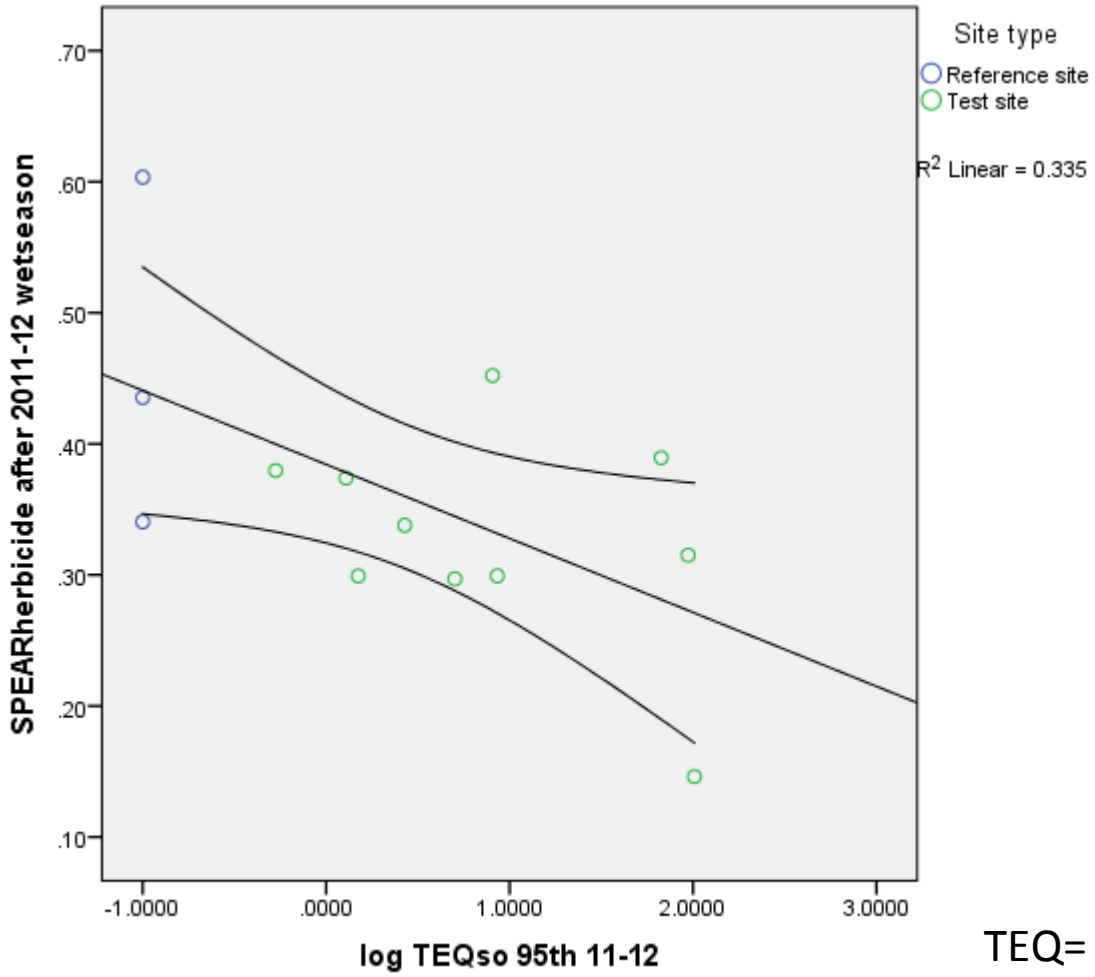


Microscope analysis



- Preliminary ranked for 239 diatom species collected from our monitoring
  - Extrapolation from related taxa
- Relative ranking - independent of herbicide, light level & nutrients

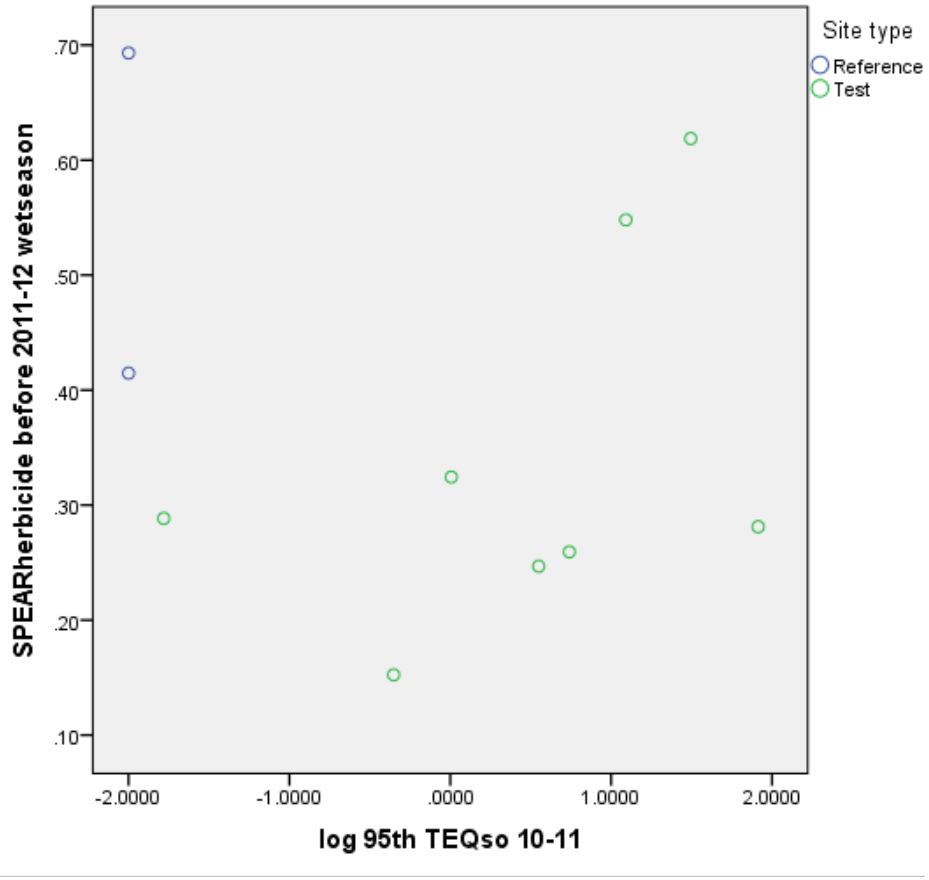
RESULTS – DIATOM AFTER 2010/11 WET SEASON

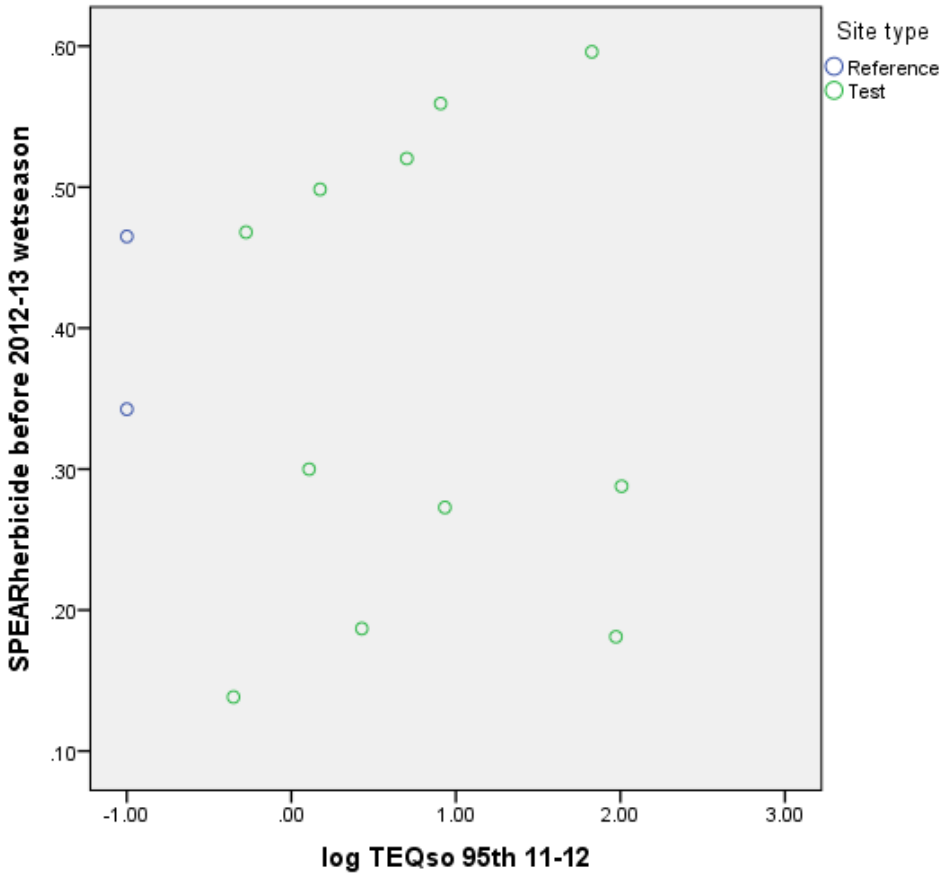


TEQ= atrazine Toxic EQuivalent

- After wet season can detect level of herbicide via the diatoms

RESULTS – DIATOM BEFORE WET SEASONS





- Diatom community is recovering over the dry season
- Impacts of herbicides only apparent after wet season

APPLICATION OF WORK

- Changes in SPEAR linked to ecosystem functions
  - Functioning freshwater systems connected to health of marine systems

- Complement chemical monitoring programs to provide confidence
  - Not missing peak concentrations
  - Mixtures & other stressors
  - Detect effects - ecological relevance
- Screen many sites
- Extend the base-line
- Not an argument to reduce chemical monitoring

FUTURE DIRECTIONS

- 2013/14 + implement $SPEAR_{pesticides}$ (invertebrate) & $SPEAR_{herbicides}$ (algae) indexes
  - At current pesticide monitoring sites
  - At more sites for finer scale coverage
  - Upstream + downstream & before + after specific management interventions
- Research opportunities
  - Similar bioindexes in estuarine & marine
  - Increase confidence in link between SPEAR & pesticides

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THANK YOU

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