

MARINE ESTATE MANAGEMENT AUTHORITY

Working together to manage our marine estate

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NSW marine estate management strategy

Monitoring NSW Estuary Health – Towards a More Holistic Approach.

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Presentation summary



Overview of MER program

- Community Values
- Monitoring
- Reporting

Expansion

- Human Health
- Healthy ecosystem




Future...





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Based on community values

3 values recur in all assessed estuaries state-wide

1. Aquatic ecosystems 
2. Aquatic foods (to be cooked before eating) 
3. Primary contact recreation 

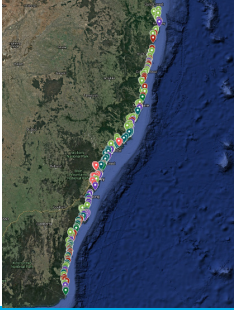



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NSW Estuaries

184 Estuaries, Differing Morphologies

- Creek
- Barrier River
- Lagoon
- Lake
- Back Dune Lagoon
- Flooded River Valley




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Some definitions


Activities, Threats, Stressors and Responses

Activity: imposed event or process occurring in the marine estate Pos. or Neg.
e.g. urban development

Threat: poses a potential risk to an asset or community value
e.g. stormwater runoff

Stressor: The mechanism by which "threats" effect the asset or value.
e.g. elevated nutrient levels

Response: The effects of the stressor on the marine estate.
e.g. increased microalgal growth


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Monitoring

Requires multiple lines of evidence

Use indicators- measurable things that reflect community values

Primarily monitor, stressors and/or responses.

Compare to Guideline (Trigger) values

NSW specific guideline values for 6 major estuary types

Causal Pathway:


Pressure (threat)

↓

Stressor

↓

Ecosystem Receptor


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Variable Degrees of Disturbance





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Sampling Zones


Lake/Lagoon



Creek/River



Fixed zones numbered upstream-downstream
Transects from ~25ppt~10ppt
Transect zones set by identifying Chlorophyll a Max.



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Field Sampling








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Current Primary Indicators

Stressors

Physico-chemical water quality:
DO
pH
Temp.
Salinity
Nutrients


Ecosystem Receptors

Chlorophyll a
(Microalgae) **Turbidity**
(Water Clarity)



Assign grade based on NSW estuary type guideline values


Grade	Result	Definition	Description
A	Excellent	The indicators meet all benchmarks almost all of the year	The best 20% of scores in the state
B	Good	The indicators meet all benchmarks for most of the year	Next 30 % of good scores
C	Fair	The indicators meet some benchmarks for part of the year	Middle 30% of scores
D	Poor	The indicators meet few benchmarks for part of the year	Next 15 % of poorer scores
F	Very Poor	The indicators never meet benchmarks for most of the year	The worst 5 % of scores in the state




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Statewide Estuary Database

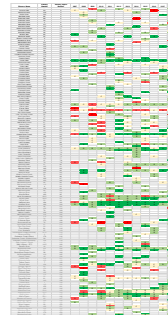
Chlorophyll a




Water Clarity



Overall





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Report Cards

		Water Clarity (turbidity)												
Estuary Name	Estuary Number	Estuary Alpha	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Myall Broadwater	S2.5	96						A	A	B	D	A	A	A
Myall Lakes	S2.2	97						A	A	A	A	A	A	A
Myall River	S2	98						D	C					B

Myall Broadwater A

Algae

Water clarity

Very poor Poor Fair Good Excellent

		Algae (chlorophyll a)												
Estuary Name	Estuary Number	Estuary Alpha	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Myall Broadwater	S2.5	96						B	B	A	B	C	B	A
Myall Lakes	S2.2	97						B	C	A	A	B		
Myall River	S2	98						C	D					B

Myall River B

Algae

Water clarity

Very poor Poor Fair Good Excellent

		Overall												
Estuary Name	Estuary Number	Estuary Alpha	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Myall Broadwater	S2.5	96						B	D	B	B	D	B	A
Myall Lakes	S2.2	97						B	B	B	B	A	A	
Myall River	S2	98						C	D					B

Overall

Algae

Water clarity

Very poor Poor Fair Good Excellent

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New Directions

Requirements for new additions to monitoring program

1. Address community values/ water quality objectives
2. Applicable across all estuaries statewide:
 - Differing morphologies
 - Differing disturbance
3. Allow comparison between estuaries
4. Logistically practical in field as part of combined sampling
5. Established guideline values where available

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New Directions

Coliscan

Relevant community values:

1. Primary Contact Recreation
2. Aquatic Foods

Advantages:

- Results in field
- Guideline values well established

Allows comparative score

➔ trigger to further investigation if required.

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New Directions Coliscan (cont.)

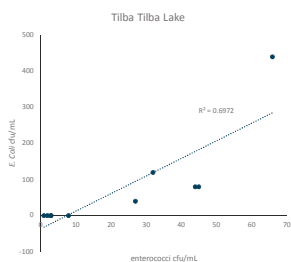
Primary Contact Recreation (ie. Swimming)

Category	95th percentile enterococci (colony forming units per 100ml) (]= E.coli * = food	Basis of derivation
A	<41 (Md<150, 80%<600) (Md<14, 90%<43)*	No illness seen in most epidemiological studies
B	41–200	Upper threshold is above the threshold of illness transmission reported in most studies
C	201–500	Represents a substantial elevation in the probability of adverse health outcomes
D	>500	Above this level there may be a significant risk of high levels of illness transmission

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New Directions- Coliscan (cont.)

Comparison with Laboratory enterococci counts.



Strong +ve correlation between Coliscan™ and enterococci counts

Some variation between scores (~20% at border of best grade)

New portable incubator to remove this discrepancy???



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New Directions

Squidpops

Relevant community values:

1. Aquatic Ecosystems
2. Aquatic Foods

Advantages:

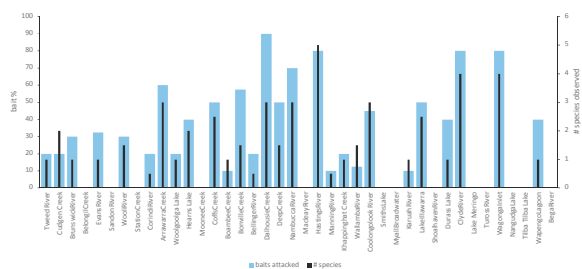
- Fast deployment
- Instant results
- Quantitative and qualitative



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New Directions Squidpops (cont.)

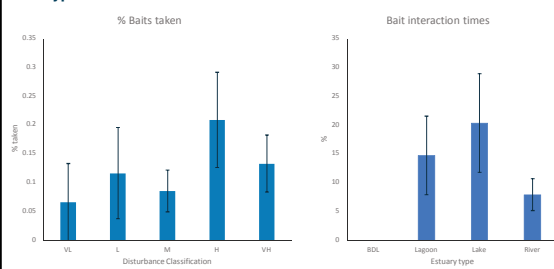
Summer 2018/19, descriptive by estuary



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New Directions Squidpops (cont.)

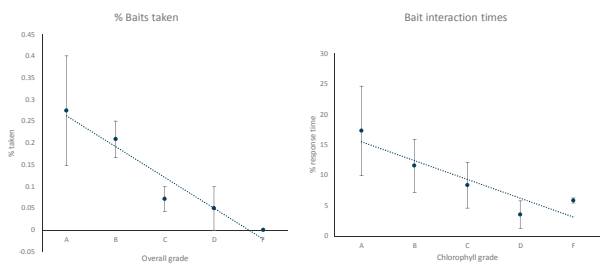
No relationship between baits taken/interaction times and estuary type or disturbance classification



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New Directions Squidpops (cont.)

Negative correlations between metrics and Indicator gradients



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Future

2019/20

eDNA
 Values: Aquatic ecosystems
 Aquatic Foods
 Economic benefits

Use metabarcoding

Provide biodiversity score

Further ahead

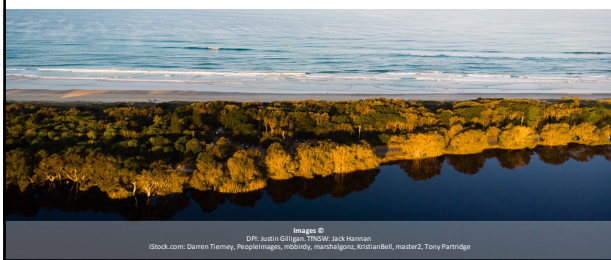
Examine further potential indicators for additional community values

Establish Biological indicators for statewide pressures (e.g. acid runoff)



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Questions?



Images ©

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