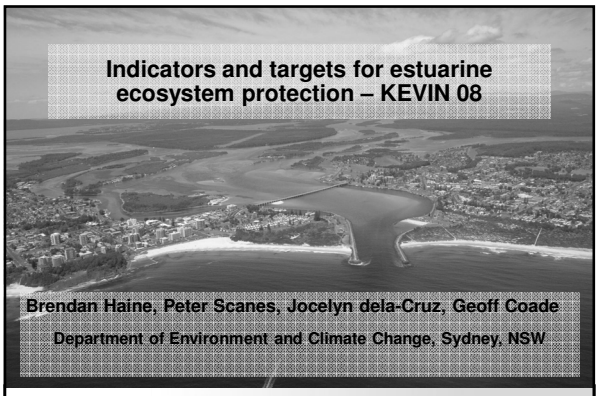

Indicators and targets for estuarine ecosystem protection – KEVIN 08

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Finding Order in Apparent Chaos

- Development of NSW Estuarine database
- Uses of the database – trigger values
- How the MER pilot estuaries scored
- Need for local triggers
- Future developments for database

K eeping

E stuarine

V alues

I ntegrated in

N ew South Wales

Estuarine Database - KEVIN

- data for 85 estuaries in NSW
- Over 63,000 discrete sampling periods over 50 years
- Credible sources (DECC, DNR, universities, LGA)
- Quality checked
  - Outliers and non-representative data removed
  - Downstream of tidal limit only
- Catchment data too for 198 NSW estuaries!
  - Includes:
    - geological groupings
    - entrance conditions
    - NLWRA classifications
    - water and catchment areas
    - landuse
    - soil type
    - mean slope
    - macrophyte areas
    - STP and catchment loads
    - catchment population
    - tidal and mangrove limits
    - mean rainfall.

Estuarine MER pilot study data and KEVIN

- Provided data for KEVIN that offered the greatest coverage of different types of estuaries in NSW.
- The MER data was particularly useful in filling the gap in data for reference systems

Deriving the trigger values

- Using the 80th percentile of reference estuaries (as recommended in ANZECC Guidelines) we defined triggers for chlorophyll a and turbidity.
- Our definition of reference: where the ratio of modelled TN load under current landuse:modelled TN load under native vegetation is less than 1.5 – i.e. not much degradation of the catchment
- Trigger values are intended to trigger action, they are not "must not exceed" values

Estuaries used to derive triggers

Lagoons:
- Durras
- Burrill
- Corunna
- Cuttagee
- Smiths
- Swan
- Wallaga
- Wallagoot
- Wallis
- Wapengo

Creeks:
- Congo
- Deep
- Khappinghat
- Termeil
- Wattamolla

Rivers (separated into 3 zones by salinity [>30, 29 –12 and <12ppt]):
- Sandon
- Myall
- Pambula
- Simpson
- Clyde
- Karuah
- Wallingat

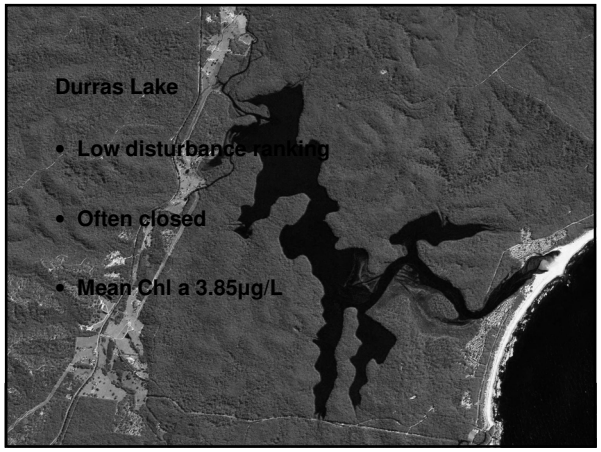
Chlorophyll a

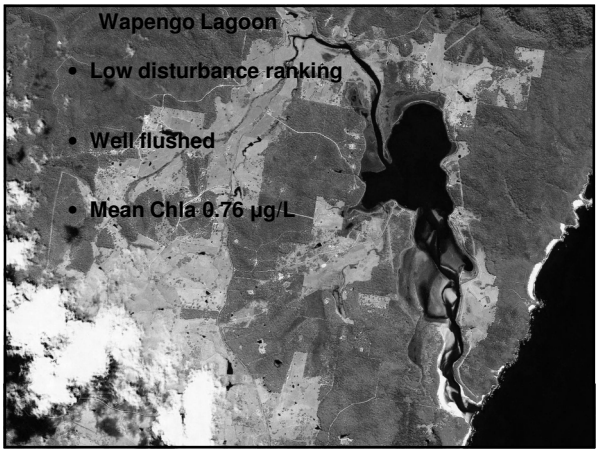
Chlorophyll a (ug/L)	Lagoon	Creek	Up River	Mid River	Low River
KEVIN	3.64	2.00	3.32	2.18	1.79
ANZECC	4	4	4	4	4
GL CCI	1.8	na	5	4.2	2.2
MER sampling	3.8	4.8	2	na	na

Triggers for the MER report cards are dependent on both the quality and quantity of data

Why is the chlorophyll a trigger value relatively high for lagoons?

- Derived from the subset of estuaries where data was available.
- Available data are biased toward systems that are undisturbed but naturally often closed





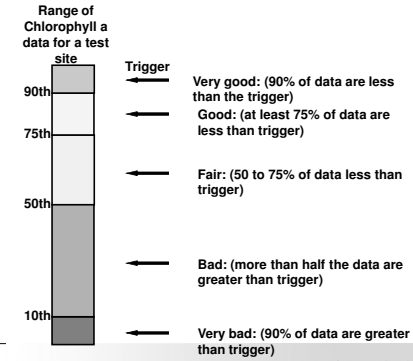
Turbidity

Turbidity (NTU)	Lagoon	Creek	Up River	Mid River	Low River
KEVIN	8.70	3.97	24.90	8.36	8.16
ANZECC	0.5-10	0.5-10	0.5-10	0.5-10	0.5-10
GL CCI	2.6	na	8	7.5	4
MER sampling	3.2	5.8	12.5	na	na

Turbidity

- We have very little confidence in KEVIN's turbidity data
- It does not compare well to either the GL CCI or the MER data
- We will use the turbidity triggers derived from the MER data until we have a much larger dataset

Using the triggers



Estuarine MER - Lagoons

Estuary	Disturbance Rank	10th percentile	median	75th percentile	90th percentile	Chlorophyll a Trigger (µg/L)	Condition
Wallis Lake	L	0.37	1.00	1.80	2.48	3.64	very good
Cuttagee Lake	L	0.71	1.71	2.86	3.35	3.64	very good
Coila Lake	L	0.98	2.30	4.32	6.86	3.64	fair
Lake Illawarra	M	1.57	2.56	7.52	10.87	3.64	fair
Tuggerah Lakes	H	1.84	2.97	3.98	11.48	3.64	fair
Durras Lake	L	1.70	3.19	4.30	4.90	3.64	fair
Wamberal Lagoon	H	1.13	3.34	5.70	12.20	3.64	fair
Burrill Lake	M	2.06	4.64	6.60	8.40	3.64	bad
Corunna Lake	M	1.66	5.72	14.38	16.96	3.64	bad

Estuarine MER - Creeks

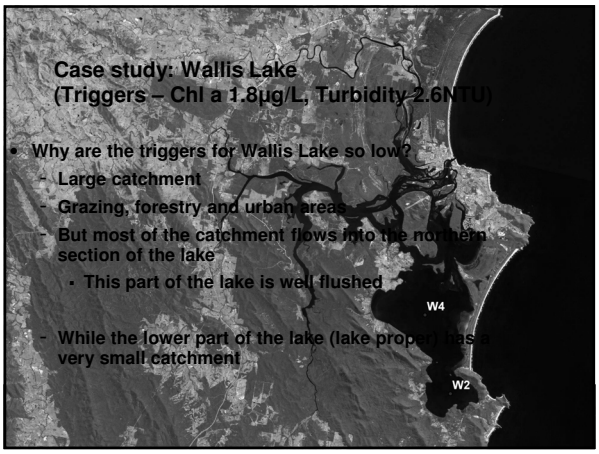
Estuary	Disturbance Rank	10th percentile	median	75th percentile	90th percentile	Chlorophyll a Trigger (µg/L)	Condition
Wattamolla Lagoon	L	0.28	0.85	1.37	2.33	2	good
Khappinghat Creek	M	0.93	2.08	2.79	4.48	2	bad
Termeil Lake	L	1.28	3.15	8.01	14.75	2	bad
Avoca Lake	H	1.58	3.57	4.47	5.29	2	bad
Towradgi Creek	H	1.01	4.47	7.12	8.74	2	bad
Fairy Creek	H	1.43	7.59	12.57	14.75	2	bad
Manly Lagoon	H	6.50	13.90	17.13	18.54	2	very bad
Congo Creek	M	2.67	4.38	6.57	8.48	2	very bad

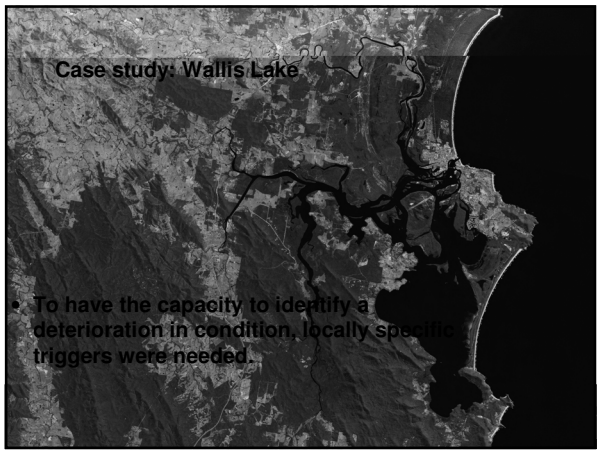
Estuarine MER – Rivers (Upper)

Estuary	Disturbance Rank	10th percentile	median	75th percentile	90th percentile	Chlorophyll a Trigger (µg/L)	Condition
Sandon River	L	0.14	0.36	0.63	1.18	3.32	very good
Clyde River	L	0.00	1.40	2.23	3.06	3.32	very good
Shoalhaven River	M	0.94	2.11	2.49	3.32	3.32	good
Hastings River	M	0.27	1.07	1.62	3.88	3.32	good
Karuah River	L	0.50	2.08	2.99	12.56	3.32	good
Georges River	H	1.37	3.32	4.80	10.37	3.32	fair
Minnamurra River	M	1.07	3.35	10.54	34.13	3.32	bad
Brunswick River	H	2.25	7.07	10.96	20.10	3.32	bad
Parramatta River	H	1.82	7.42	23.94	29.34	3.32	bad
Evans River	M	7.52	9.90	19.34	27.77	3.32	very bad

Local Triggers Case study: Wallis Lake

- Great Lakes Coastal Catchments Initiative:
  - generated one of the largest data sets for a NSW coastal lake
  - sampled representatively
    - incorporating temporal (seasonal and rainfall) and spatial variability
  - derived locally specific trigger values (80th percentile)





Should you develop locally specific triggers for an estuary near you?

- Do you have the data needed to derive these?
- How does your system compare to the relevant statewide trigger value?
- If you do have the data and your system is coming in well below the trigger/s then it may be appropriate to derive locally specific trigger/s as state triggers may not be relevant

Future for KEVIN

- KEVIN is hungry. He needs more data.
- Given a larger, more representative, dataset (ie. With the help of councils + DECC MER monitoring) we will be able to:
  - develop different state wide triggers for lagoons with different hydrologies
  - Assist in developing locally specific triggers for some systems, where appropriate
- KEVIN will be placed on OZCOAST website to facilitate access, along with Eutrophication Risk Assessments for NSW Estuaries