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# South East Water Quality Monitoring Project

C/- Eurobodalla Shire Council  
PO Box 99 Moruya NSW 2537  
Phone: 02 4474 1370 Fax: 02 4474 1234

C/- Bega Valley Shire Council  
PO Box 492 Bega NSW 2550  
Phone: 02 6499 2159 Fax: 02 6499 2200

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## Future Directions Forum

NAROOMA GOLF CLUB

31<sup>ST</sup> MARCH 2006

Dear Sir or Madam:

You are cordially invited to attend the forthcoming Future Directions Forum to be held at the Narooma Golf Club's main auditorium. WMB Oceanics, Australia will present their report *FINAL Interpretation of Water Quality Monitoring Program Results*, which has examined some 17,000 water quality samples taken in south east waterways over the past two decades. Following the WMB Oceanics report stakeholders will be encouraged to participate in the *Future Directions Forum*.

This forum is hosted by the Hosted by the South East Water Quality Project Steering Committee, and particularly concerns water quality management in catchments in the Eurobodalla and Bega Shires.

If you intend to come along please RSVP your attendance to Fred Maher via email [Fred.Maher@cma.nsw.gov.au](mailto:Fred.Maher@cma.nsw.gov.au), or via phone to Michelle Tate **6491 6201** by no later than 13<sup>th</sup> March 2006 so that the organisers can assure there is adequate facilities and refreshments/meals for all.

Fergus Thomson  
Chairperson  
South East Water Quality Project Steering Committee



# AGENDA

## *South East Water Quality Project*

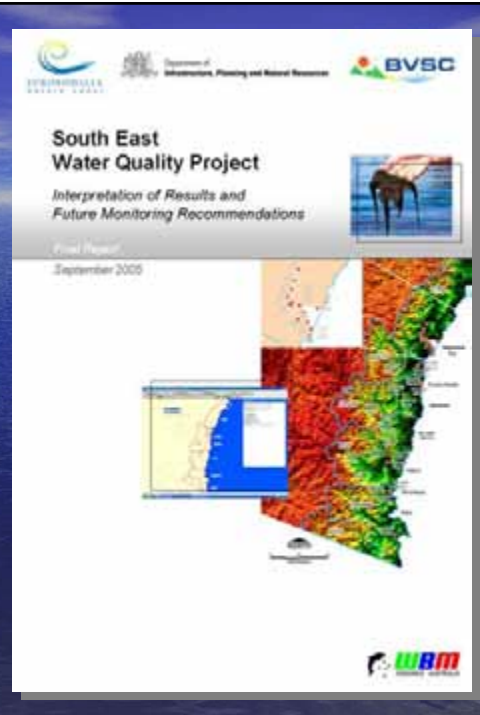
Future Directions Forum  
31<sup>st</sup> March 2006, Narooma Golf Club

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- |                   |  |                          |
|-------------------|--|--------------------------|
| 9.30 am           | Welcome & Project Overview   | Fergus Thomson           |
| 9.50 am           | SEWQP Final Reports Presentation and Discussion  | Phil Haines WBM Oceanics |
| 10.50 am          | <b>MORNING TEA</b>   |                          |
| 11.10 am          | Database Presentation  | Heinz Matti              |
| 11.30 am          | National Water Quality Perspective<br>NSW Rivercare Facilitator, Australian Gov NRM<br>Team, Department of Environment and Heritage  | Sally Hunt               |
| 11.45 am          | State Water Quality Perspective<br>Department of Natural Resource  | Adam Boey                |
| 12.00 am          | Quality Assurance Program – Oyster Farm<br>Perspective, NSW Food Authority   | Anthony Zammit           |
| 12.20 pm          | <b>LUNCH</b>   |                          |
|                   | <b>Workshop</b><br><u>Future directions for water quality for the South East</u>   |                          |
| 1.20 pm - 2.20 pm | Participants break into four discussion groups: <ul style="list-style-type: none"><li>▪ Community Issues</li><li>▪ Scientific issues</li><li>▪ Industry issues</li><li>▪ Government issues</li></ul> |                          |
| 2.20 pm           | <b>AFTERNOON TEA</b>   |                          |
| 3.00 pm - 3.20 pm | Groups will feed back to main forum  |                          |
| 3.20 pm - 4.00 pm | Group discussions and recommendations for future actions   |                          |

# South East Water Quality Project

Analysis  
Outcomes and  
future monitoring  
recommendations



## Summary of presentation

- Overview of data
- Outcomes of data analysis
- Shortcomings of existing programs
- Recommendations for future monitoring
- Prioritisation of on-going monitoring
- Questions



## Programs Assessed

- Upper catchments and source waters
- Bega Brogo swimming hole monitoring
- Bega coastal lakes and ICOLLs
- Bega estuary monitoring
- ESC estuary monitoring
- ESC creekcare
- South Head sewage installation monitoring
- BVSC rainfall event
- Other programs and data sets
- Community data

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## Data Analysis: Upper Catchments and Source Waters Study

- Object: Water supply & catchment mgt, determine nutrient and sediment loads, compare to Stds (DW)
- Most sites met stds, some sites with higher FC, nutrients (Bemboka R) and chl-a (Deep Ck Dam)
- Sampling from riverbank may not be representative of waterway
- Monthly sampling doesn't allow for an assessment of nutrient loads or comparison between wet/dry periods

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## Data Analysis: Bega Brogo Swimming Hole Study

- Object: suitability for swimming & drinking
- Monitoring in 2001 only
- High FC (46 out of 71 occasions), high nutrients ( $\text{NH}_4$ ), and high NOx, TP, TN in Aug
- Bega Brogo confluence not suitable for primary contact for most of 2001
- Dairy activities and agriculture (Beare, 2001) resulting in persistent high concentrations
- Management response to data collection?? – need repeat assessment to determine improvements.

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## Data Analysis: Bega Coastal Lakes and ICOLLs

- Object: backgrd WQ during holiday periods, human impacts & runoff, entrance opening fish kill links
- 5 coastal lakes / ICOLLs – monthly sampling between Feb 2002 and Feb 2003
- Little variation in results between sites and systems
- Monthly sampling doesn't show impacts of runoff, entrance opening or increased human usage over summer
- WQ likely to recover to background levels within days or weeks of runoff, and  $\therefore$  unlikely to be captured by sampling

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## Data Analysis: Bega Estuary Monitoring Program

- Object: not clearly defined – baseline for impacts of sewage effluent (Tathra GC irrigation)
- Intense monitoring at 5 sites between Dec 99 - Feb 00 with closed entrance, then Mar 00 (after entrance breakout) – 18 occasions.
- WO did not decline during 2 month closure
- Some sites had poor WO after rainfall, especially near sewage exfiltration and golf course

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## Data Analysis: ESC Estuary Monitoring Program

- Object: background WO data to assess estuarine health
- 72 sites / 5 estuaries and coastal lakes
- FC = mostly OK, except near Moruya
- Rain events = low DO, low pH, high FC and high nutrients, then return to normal within a few days – little indication of ecosystem response to runoff inputs
- Difficult to compare between estuaries due to differences in data collection (times, parameters)

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## Data Analysis: ESC Creekcure Program

- Object: backgrd WQ, processes, human impacts during peak holiday season
- 9 creeks, Batemans Bay, Moruya
- Contain high FC, nutrients, chlorophyll-a, low DO reflective of eutrophic conditions
- Typically quick response (hrs to days)
- Signif internal processes (due to closed entrance)
  - WL and salinity respond to rainfall and evaporation (with occasional entr breakout)
- Limited data on runoff events or tourist season

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## Data Analysis: South Head Sewage Installation Program

- Object: impacts of sewerage system installation on 2 waterbodies nr South Hd
- Nov 00 to Aug 01 (approx monthly)
- Little variation in WQ throughout period
- Poor WQ in freshwater pond (high FC, nutrients, chl-a, low pH), occasional poor WQ in estuarine creek (esp ammonia)

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## Data Analysis: BVSC Rainfall Event

- Object: WQ during & after signif runoff, and spatial variability assoc. with runoff, compare to ANZECC/HRC
- 9 sites, peak flow on 9<sup>th</sup> March 2000
- Pulse of poor WQ, high in nutrients sediment and FC, returning to lower levels, usually in 24-48 hrs
- Wolumla Ck and Greendale Ck are likely to contribute high loads of sediment and nutrients
- High FC in mid region (Tantawangalo / Candelo) possibly indicative of agriculture, stock access, sewage inputs etc
- Difficult to ascribe differences between subcatchments (diff. rainfall patterns, soil characteristics, landuse)

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## Data Analysis: Other Programs / Data sets

- DIPNR: inland waters at 108 sites (SoE reporting), monthly-3 monthly since 1968 (analysis reports unavailable)
- DEC: 9 coastal lakes (94-96) – some significant differences with comparable Council program in 2 lakes
- ESC: ocean beaches (96-05) – FC only
- UoC: 2 coastal lakes, physio-chem data only

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## Data Analysis: Community data

- Separate database – 5 coastal creeks around Batemans Bay (included as part of ESC Creeks care program)
- Volunteer basis, so inconsistent records – large gaps in data
- Subjective records (except rainfall, WL and turbidity – clearly wrong anyway)
- Shows rainfall results in sudden incr WL, and dry periods results in steady decr WL
- Macroalgae is often recorded, consistent with Creeks care results of eutrophic conditions

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## Synthesis of Data

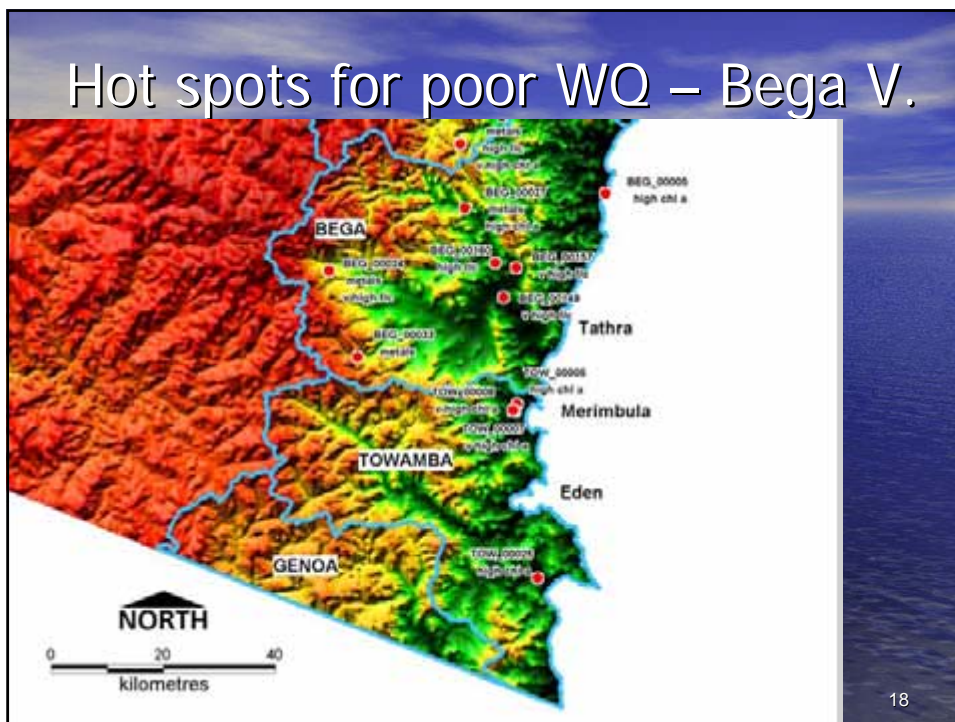
- ANZECC (2000)
- Metals / FC = public health
- DO / Chl-a = ecosystem health (...not nutrients)
- XX = median value exceedence
- X = 80 or 20%ile exceedence

Site no	Location	Program	Metals	FC	DO	Chla
CLY_00022	Clyde R	ESC Estuary			X	
CLY_00023	Clyde R	ESC Estuary				X
CLY_00024	Clyde R	ESC Estuary			X	
CLY_00025	Clyde R	ESC Estuary			X	
CLY_00026	Clyde R	ESC Estuary			X	
CLY_00027	Clyde R	ESC Estuary				X
CLY_00028	Clyde R	ESC Estuary				X
CLY_00029	Clyde R	ESC Estuary				X
CLY_00030	Clyde R	ESC Estuary				X
CLY_00031	Clyde R	ESC Estuary				X
CLY_00064	Deep Ck Dam	Source Waters				XX
CLY_00067	Joos Ck	Creeks care		XX		
CLY_00075	Quilgera Ck	Creeks care			XX	XX
CLY_00076	Quilgera Ck	Creeks care			XX	XX
CLY_00078	Reedy Ck	Creeks care			XX	
CLY_00082	Saltwater Ck	Creeks care				XX
CLY_00083	Saltwater Ck	Creeks care			XX	X
CLY_00088	Wimbie Ck	Creeks care		X	XX	X
CLY_00089	Wimbie Ck	Creeks care		X	XX	XX
MOR_00017	Ryans Ck	ESC Estuary				X
MOR_00021	Moruya R	ESC Estuary				X
MOR_00022	Deua/Moruya R	Source Waters		X		
TUR_00023	Colla L	ESC Estuary		X		
TUR_00025	Colla L	ESC Estuary		X		
TUR_00038	Ilawambra Weir	Source Waters	X	X		XX
TUR_00040	Mellon Ck	Source Waters	X	XX		
TUR_00051	Turoos R	Source Waters		X	X	
TUR_00060	Turoos R	Source Waters		X		
TUR_00085	Wolla Ck	Source Waters	X			
BEG_00005	Baragoot L	Coastal Lakes				X
BEG_00024	Bemboka R	Source Waters	X	XX		
BEG_00027	Brogo R	Source Waters	X			X
BEG_00033	Tartawangello Wr	Source Waters	X			
BEG_00149	Bege R	Swimming Hole		XX		
BEG_00157	Brogo R	Swimming Hole		XX		
BEG_00160	Brogo R	Swimming Hole		X		
BEG_00145	Bege Estuary	Bege Estuary		X		XX
TOW_00005	Merimbula L	Coastal Lakes				X
TOW_00007	Merimbula L	Coastal Lakes				XX
TOW_00008	Merimbula L	Coastal Lakes				XX
TOW_00025	Worboyn L	Coastal Lakes				X

## Hot spots for poor WQ – Eurob.



## Hot spots for poor WQ – Bega V.



## Shortcomings of existing programs

- Inconsistent and poorly defined monitoring objectives, ∴ hard to compare results between progs
- Inconsistent or unknown QA / QC
- Little previous analysis or incorporation of data into management responses
- Monthly monitoring, not reflective of timescales relevant to chemical and biological responses
- Lots of data required to determine long-term trends (to filter natural variability), at which time it may be too late to make mgt decisions to improve WQ
- Elevated concentrations may be 'natural'
- Oversampling in areas showing little variation
- Focus on nutrients – not good indicator of health

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## Recommendations for future monitoring

- Depends on objectives for monitoring, which Councils will need to set.
- Assess suitability for drinking water
- Assess suitability for recreational uses
- Assess Ecological health
- Assessment of management actions
- Community education and awareness
- Must include local knowledge re: issues, areas for development, usage, conservation etc

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## Drinking Water recommendations

- If sites are good, then could reduce # of sites sampled, esp. in Dams away from offtakes
- Sample at depth of offtake, not just surface
- Sample for algae when chlorophyll-a trigger levels reached
- Investigate metals and faecal contamination through more intensive program (including post rainfall event data collection) at hotspots

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Waterway name	Sites	Parameters	Frequency
Buckenbowra River	CLY_00021	PC, <i>E.coli</i> / entero, chla, Alg, Turb	Monthly
		metals and contaminants	6-12 months
Deep Creek Dam	CLY_00064, CLY_00065	PC, <i>E.coli</i> / entero, Turb	Weekly
		chla, Alg	fortnightly to monthly
		metals and contaminants	6-12 months
Deua/Moruya Rivers	MOR_00002 MOR_00022 MOR_00023	PC, <i>E.coli</i> / entero, Turb	Weekly
		chla, Alg	fortnightly to monthly
		metals and contaminants	6-12 months
Tuross River	TUR_00021* TUR_00038* <sup>^</sup> TUR_00040* TUR_00051 TUR_00060 TUR_00085*	PC, <i>E.coli</i> / entero, Turb	Weekly
		chla, Alg	fortnightly to monthly
		metals and contaminants	6-12 months
		*Al, Fe ^Antimony	* <sup>^</sup> monthly and review
Bega River	BEG_00024* BEG_00027* BEG_00033*	PC, <i>E.coli</i> / entero, Turb	Weekly
		chla, Alg	fortnightly to monthly
		metals and contaminants	6-12 months
		*Al, Fe, Cu, Zn	*monthly and review

## Recreational waters recommendations

- Monitor where and when there is risk potential (i.e. spatial-temporal usage patterns)
- For high risk times and areas, need to monitor more frequently, especially after rainfall
- Need to target areas of known potential (eg septic or sewage inflows)
- Algae testing when chlorophyll-a reaches trigger levels
- Target inland sites due to previous poor results
  - need local input to determine 'at risk' sites

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## Aquatic ecosystems recommendations

- Bega Coastal Lakes / ICOLLs; ESC Estuary Program; ESC Creekcare
- Can't just look at nutrient status and determine ecosystem health
- Water quality is a dynamic balance of inputs and ecosystem responses
- Need to examine pollutant loads (event-based)
- Need to examine ecosystem response parameters (i.e. chlorophyll-a, DO, pH & turbidity / secchi depth)
- One or two sites per lake (largely homogenous)
- Sample more during summer / less during winter

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Waterway name	Sites	Parameters	Frequency
Baragoot Nelson Wonboyn Merimbula	BEG_00004 BEG_00031 TOW_00026 TOW_00005	PC, chla, Turb, max/min DO	Fortnightly over summer (Dec-Mar), then every 3 months
		TN, TP	every 3 months
Wallaga Cutagee Wapengo Wallagoot Curalo Nadgee Bega Estuary	One site per lake where well mixed	FC / entero Entrance status, water level, Visual appearance	As required by risk assessment –weekly over summer in swimming areas
Baragoot others were inputs are of concern	As required to sample inputs and 2 sites per lake	FC / entero, PC, chla, turb, Total and dissolved nutrients, TSS,	After rainfall, daily for 2-3 days then every 2 <sup>nd</sup> day for 6 days Prior to entrance opening, twice per week, then twice per week for 2 weeks after opening, and sample twice per week once entrance closes. In lakes where fish kills have been recorded it is especially important to monitor DO and pH at daily intervals once entrance closes following breaching

Waterway name	Sites	Parameters	Frequency
Clyde R	CLY_00027 CLY_00030 CLY_00032	PC, chla, Turb, max/min DO	Fortnightly over summer, then every 2 months
		TN, TP	4 months
		FC / entero	As required by risk assessment
Tomaga R	CLY_00085 one other	As above	As above
Moruya R	MOR_00016 MOR_00017 MOR_00021	As above	As above
Coila L	TUR_00023 TUR_00024	As above	As above
Tuross R/Lake	TUR_00044 TUR_00048 TUR_00049	As above	As above
Wagonga Inlet	TUR_00072 TUR_00076 TUR_00080	As above	As above
Mummuga Corunna Nangudga Tilba Tilba	1-2 sites in each	PC, FC / entero, chla, turb, TN, TP, max/min DO	Fortnightly for 3 months over summer, then every 4 months

## ESC Creekcure

Waterway name	Sites	Parameters	Frequency
Quierga Ck	CLY_00075	PC, chla, Turb, max/min	Weekly - Fortnightly over summer (Dec-Mar), then every 3 months
Wimbie Ck	CLY_00076	DO	
Saltwater Ck	CLY_00088 CLY_00089 CLY_00082 CLY-00083	TN, TP	
		FC / entero	As required by risk assessment – daily to weekly over summer
		Entrance status, water level, Visual appearance	
Joes Ck	One or two per creek	PC, chla, Turb, max/min	Weekly - Fortnightly over summer (Dec-Mar), then every 3 months
Reedy Ck		DO	
Macleods Ck		TN, TP	every 3 months
Candalagan		FC / entero	As required by risk assessment – daily to weekly over summer
Congo/Meringo		Entrance status, water level, Visual appearance	

## Event Monitoring

- Rain event: every 2<sup>nd</sup> day for 10 days or until background conditions return (upper catchments as well as coastal waterbodies)
- Could use autosamplers (expensive)
- Entrance breakout: twice weekly for periods before and after breakout, as well as after entrance re-closes (if susceptible to poor WQ)
- Only need to sample 2 or 3 events to understand processes / inputs, ∴ not on-going commitment – could use mobile autosampler at various locations

## Prioritisation of monitoring programs

- Depends on Council's priorities and overarching commitments / objectives / obligations
- Data is not necessarily current and reflective of today's conditions (catchment or rainfall)
- Drinking water clearly highest risk
- Selected sites for recreational use
- Ecosystem health should be tied to management responses... will Council use the data to make management decisions?
- SoE reporting obligations

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# South East Water Quality Database

Heinz Matti  
IT Manager  
Eurobodalla Shire Council

## Community WQ db

**3500+ Recordings (Joes, Saltwater, Wimbie, Reedy Creeks etc)**

**Rainfall (mm)**

**Water colour (Lookup - Clear, Milky, Grey, Brown, Black, Green, Orange)**

**Odours (Lookup - None, Faint, Noticable, Strong, Very Strong, Unbearable)**

**Surface film/scum (Text)**

**Floating debris (Text)**

**Water level, Gauge reading (m)**

**Bar Status (Lookup - open , closed)**

**Water entry (Lookup - Fresh, Fresh & Marine, Marine)**

**Other observations (Text)**

**Wind (Lookup - Calm, ... Storm)**

**Algae (Lookup)**

**Weather (Lookup - Sunny, Overcast, Rain)**

**Observer (Lookup - Andrew Turner, Brian Cant, Bill Maher, Cathy Ogrady, ...)**

**Turbidity depth of visibility (7..)**

## What does the DB contains ?

- 525 Unique Sites from Eurobodalla and Bega
- 244 possible measures per sample
- 19,000 individual samples
- Quality coded - each measure for each sample
- Updated on a weekly basis
- Records spanning nearly 40 years (1968)

## Site Codes

- Unique Identifier**
- Longitude & Latitude**
- Waterbody description**
- Site description**
- Project Details**

## Sample Measurements

- 244 possible different measurements
- Common description  
(eg Biochemical Oxygen Demand - BOD 5)
- EcoWise Code (eg BOD)
- Unit of measure (eg for BOD mg/L)
- Integrity values (upper / lower) ( eg for BOD 0/50)

## Sample Records

**Site Identifier**

**Date**

**Time**

**Security**

**3 Dimensional Sample Location**

**Latitude**

**Longitude**

**Depth from Water Surface**

## Quality Code

- 1 - Professionally sampled & analysed in accordance with NATA certification and / or field measurement protocol exist
- 2 - Sampled and / or analysed by professional staff without NATA certification using laboratory based method
- 3 - Sampled and /or analysed by Council staff
- 4 - Sampled and /or analysed by community groups using field based kits
- 5 Quality of data unknown.

## Other Features

- Auto data import with integrity checking**
- Efficient manual data entry screens**
- Easy to extract data for a specific site**
- Fast and simple graphical display of site measures**
- Export function to spreadsheets**
- etc**


## Side Benefits from the DB

- **Extensive data checking**
- **A simple data interchange framework**
- **Spatial representation of sample sites and recordings**


## The making of the DB

### **Natural Development:**

- Lots of Spreadsheets
- A simple DB (by ESC)
- WBM re-engineered DB
- Next ?




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# The National Perspective on Water Quality

Presentation by Sally Hunt  
NSW Rivercare Facilitator, Australian Government NRM team, Department of Environment and Heritage  
Narooma Golf Club, 31 March 2006  
Future Directions Forum  
South East Water Quality Monitoring Project



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## Outline of Presentation

- NRM Ministerial Council
- Other relevant Programs & Policies
- NWQMS
- CCI
- Southern Rivers CMA CAP targets
- NSW example
- Where to next?

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## Natural Resource Management Ministerial Council (NRMCC).


- the amalgamation of the previous ministerial councils ([ARMCANZ](#), [ANZECC](#) and [MCFFA](#)).
- **Objective**; “to promote the conservation and sustainable use of Australia’s natural resources”.
- **Terms of reference** include overseeing implementation of National Action Plan for Salinity and Water Quality (NAP), the Natural Heritage Trust (NHT).

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## Australian Government Water Fund

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graph TD
    Fund["Australian Government Water Fund  
$2b over 6 years 2004-05 to 2009-10  
Administered by NWC"] --> WSA["Water Smart Australia  
$1.6b over 6 years 2004-05 to 2009-10  
Administered by NWC"]
    Fund --> RNSP["Raising National Water Standards Programme  
$200m  
Administered by NWC"]
    Fund --> CWGP["Community Water Grants Programme  
$200m  
Administered by DEH/DAFF"]
  
```


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## Matters of National Significance


- EPBC Act
- 17 wetlands listed in the Wetlands of National Significance Directory in Southern Rivers CMA region;
  - Budderoo National Park Heath Swamps, Coomonderry Swamp, Jervis Bay, Killalea Lagoon, Lake Illawarra, Minnamurra River Estuary, St. George Basin, Shoalhaven/Crookhaven Estuary, Woollumboola Lake, Coomaditchy Lagoon, Swan Lagoon, Tabourie Lake, Cormorant Beach, Lagoon Head Lake Termeil Wetland Complex, Meroo Lake Wetland Complex, Beecroft Peninsula
- Many others probably worthy of nomination and investment


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## Waterwatch


- A national community water quality monitoring network.
- Through Regional delivery of NHT/NAP
- National Waterwatch Facilitator
- NSW Waterwatch Facilitator
- CMA's as Waterwatch CSO w/ Partnerships



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## National Water Quality Management Strategy

- The Commonwealth, State and Territories have agreed that the National Water Quality Management Strategy (NWQMS) is the basis for water quality management in Australia.
- The water quality guidelines provided in NWQMS are consistent with the Standards and Targets Framework for the Natural Heritage Trust (NHT) and also with Natural Resources Commission (NSW).





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## Coastal Catchments Initiative

- Part of the 2001 AG election commitment (NHT2).
- Targets estuarine & marine water with high conservation values threatened by pollution for which there is a strong commitment to improve by all parties.




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## CCI framework


- AG Framework for marine and estuarine water quality protection and national Water quality management Strategy
- Key strategy : Water Quality Improvement Plans:
  - Environmental values
  - Setting water quality and river flow objectives
  - Management and regulatory measures,
  - Monitoring and modelling,
  - Pollution loads targets to achieve objectives

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## WQIP's


- individuals/agencies with like objectives
- provide significant start-up resources
- flexible approach to contributions
- building on existing governance arrangements
- Broker projects and leverage investment

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## WQIP major sub projects


- Catchment & Estuary Modelling
- Decision Support System
- BMP for agriculture, urban and others industries & stakeholders
- Water Sensitive Urban Design





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## WQIP Implementation

- WQIP accredited by DEH minister
- Plan a vehicle for investment: Examples of priority areas for investment post accreditation:
  - minimising impacts of planned growth;
  - establishing/implementing MBIs;
  - load targets for point/critical sources;
  - ensuring consistent decision-making; and
  - land use/water quality monitoring.





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## Issues for implementation

- Aligning WQIPs and NRM plans and Regional investment Strategies is a key challenge (MoU with regions)
- Making WQIPs a priority for NRM group and investment (RIS and AG\$\$);

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## Southern Rivers CAP Water Quality Targets


- Water Program Catchment Target:
  - By 2016, all water bodies (inc. gw) and river health are protected, maintained and improved by 2005 benchmark.
    - W1: Water Sharing/Mgt plans for all sources
    - W2: Improving Water Quality over 2005
    - W3: Improving mgt water supply and wastewater
    - W4: Water Conservation & Efficiency; reduced consumption, irrigation water savings,
    - W5: River & Wetland Protection & Rehabilitation; 2000 ha riparian veg., 150 km streambed/bank stability, remove 15 barriers, enhance 60 sig wetlands, LEPs include veg buffers for waterways.



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## Coastal & Marine Program

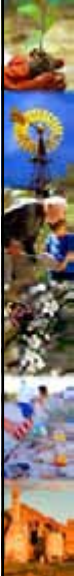
- Catchment Target; By 2016, the condition of coasts, estuaries and the marine environment will be improved on 2005 levels through active management (including partnerships) involving local and state governments, industry and local communities.
  - CM1; Protecting & rehab the coastline through NRM plans.
  - CM2; Protecting and Rehab estuaries; improved over NLWRA through NRM plans (estuary mgt plans)
  - CM3; Sustainable use of aquatic & marine resources
  - CM4; Protecting aquatic/marine biodiversity.
  - CM5; Conducting Strategic Coastal & Marine Research


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## CCI Great Lakes Council Oct '05

- To improve the quality of water in the creeks, rivers and estuaries of Wallis, Smiths and Myall Lakes and develop a water quality improvement plan (WQIP).
- Catchment and estuarine modelling of sediment and nutrient loads to Myall, Smiths and Wallis Lakes;
- Best Management Practices (BMP) Interventions to prevent and reduce suspended sediment and nutrient loads to Myall, Smiths and Wallis Lakes;
- A decision-support system for water quality improvement in Myall, Smiths and Wallis Lakes.



## Where to from here?

- Confirm Environmental Values, Water Quality & Flow Objectives
- Establish integrated Water Quality Monitoring Program (NWQMS)
- Develop partnerships with & **commitment** from all stakeholders
- Research, Planning & modelling
- Prep work towards WQIP  $\Rightarrow$  ? CCI \$\$



# Water Quality in NSW

## NSW Water Management Agenda

31 March 2006

Adam Boey

### Presentation:

1. NRM framework in NSW
2. NRC & Statewide Standard and Targets
3. Implementation - CMAs and CAPs
4. WMA 2000
5. WQOs & RFOs
6. Other approaches/tools



## 1. NRM framework in NSW

### The National context

ANZECC/ARMACNZ developed a National Water Quality Management Strategy - consistent approach to water resources management across Australia

- integrated (total) catchment management
- ecologically-sustainable development
- best management practices
- economic instruments/measures



## 1. NRM framework in NSW

### The National context (cont'd.)

The water management process:

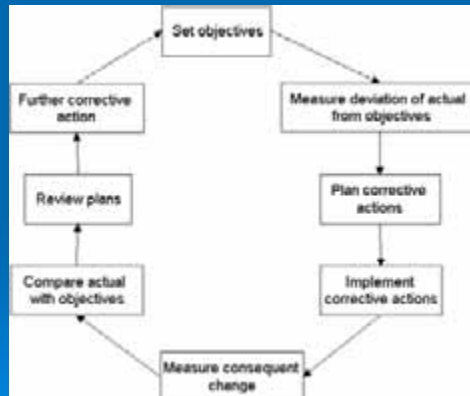
- general characteristics (i.e. admin. processes, stakeholder involvement, using economic & market forces)
- integrated planning (multi-tiered)
- WQ goals & objectives
- environmental values
- WQ criteria - risk-based approach
- **management cycle - most important!**



## 1. NRM framework in NSW

The National context (cont'd.)

The water management process - **management cycle (ARMCANZ/ANZECC):**



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## 1. NRM framework in NSW

The National context (cont'd.)

More? ([www.deh.gov.au/water/quality/nwqms/](http://www.deh.gov.au/water/quality/nwqms/))

**Tools that can be used right now:**

- Steps to develop:
  - catchments & coastal water management plans\*
  - water authorities' levels of service\*
  - community communication programs\*

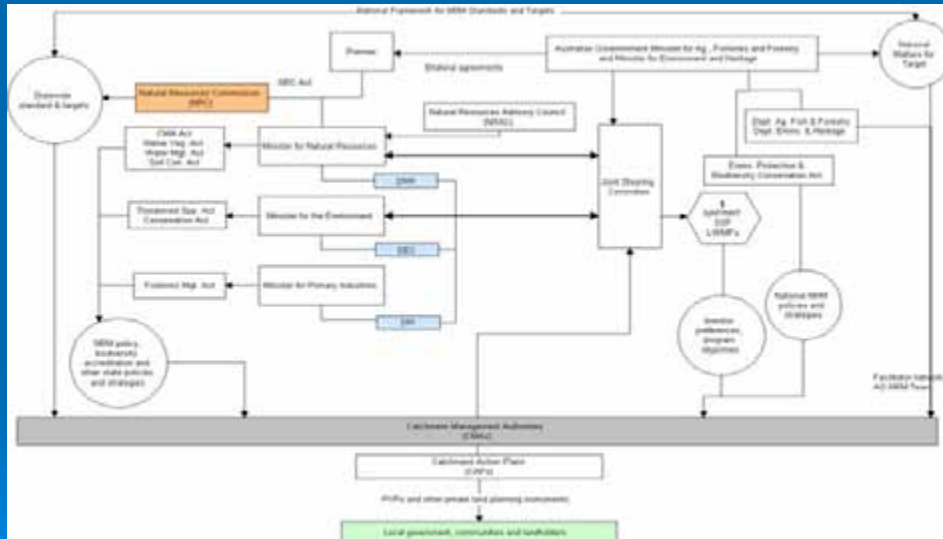
\*all in 'NWQMS Implementation Guidelines 1998' ARMCANZ/ANZECC

**Key documents:**

- Aust. WQ Guidelines
- Aust. Drinking Water Guidelines
- Guidelines for WQ Monitoring & Reporting
- Guidelines for Urban Stormwater Management

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## 1. NRM framework in NSW (NRC 2005)



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## 2. NRC & Statewide Standard and Targets

Natural Resource Commission (NRC) approach

Sept. 2005 - **'Statewide Standard and Targets'** describes:

- **quality assurance** in NRM
- the NRM **goal** for NSW
- Statewide resource condition **targets**

**'Standard and Targets'** required to be used/adopted by CMAs to deliver CAP-articulated outcomes and investment, but

can be a model for others

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## 2. NRC & Statewide Standard and Targets

### Quality Assurance in NRM - the 'Standard'

**Seven** required quality outcomes, and method to achieve them - has audit function (NRC will audit CMAs' CAPs).

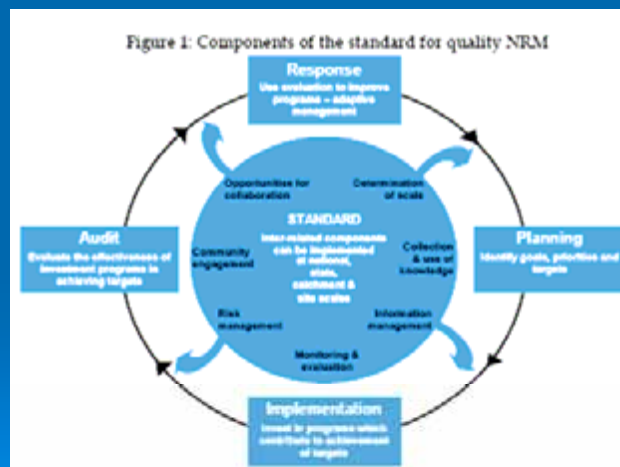
The Standard comprises of seven key aspects of NRM, which are:

- collection and use of **knowledge**
- determination of **scale**
- opportunities for **collaboration**
- **community** engagement
- **risk** management
- **monitoring** and **evaluation**
- **information** management



## 2. NRC & Statewide Standard and Targets

### Quality Assurance in NRM - the 'Standard'



## 2. NRC & Statewide Standard and Targets

### Statewide goal:

'Resilient ecologically-sustainable landscapes functioning effectively at all scales and supporting the environmental, economic, social and cultural values of communities.'

### A resilient landscape:

- maintains basic functions at all space scales including nutrient cycling, water cycling, **provision of food and shelter for biota**
- maintains viable populations of all **native species** of plants and animals at appropriate space and time scales
- reliably meets the **long-term** needs (material, aesthetic and spiritual) of people and communities.

(Recommendations: State-Wide Standard and Targets NRC 2005)



## 2. NRC & Statewide Standard and Targets

### Statewide Targets:

#### 1. **Macro-environmental** targets:

- focus on the fundamental natural resource issues - Statewide scale
- will inform NSW policy development

#### 2. **Specific priority** targets:

- support the above and provide additional guidance in identifying investment issues
- some may require alternative management, policy, or legislative frameworks, thus listed separately



## 2. NRC & Statewide Standard and Targets

### Statewide Targets:

#### **Macro-environmental** targets for Water

(N.B. 'biodiversity', 'land', 'community' themes will be relevant)

- By 2015 there is an improvement in the condition of **riverine ecosystems**
- By 2015 there is an improvement in the ability of **groundwater** systems to support groundwater dependent ecosystems and designated beneficial uses
- By 2015 there is no decline in the condition of **marine waters** and ecosystems



## 2. NRC & Statewide Standard and Targets

### Statewide Targets:

#### **Specific priority** targets for Water

(other themes relevant)

- By 2015 there is an improvement in the condition of important **wetlands**, and the extent of those wetlands is maintained
- By 2015 there is an improvement in the condition of **estuaries** and coastal lake ecosystems



### 3. Implementation - CMAs and CAPs

#### Catchment Management Authorities

- NSW Government investment and accountability in NRM through CMAs and the NRC
- > \$400 million in NRM (via CMAs) across NSW
- investment within a quality assurance framework (the **Statewide Standard**)
- outcomes independently audited (by NRC) against the **Statewide Targets** [CMAs required to comply with the standard] to ensure efficient and effective NRM investment



### 3. Implementation - CMAs and CAPs

#### Catchment Action Plans (CAPs)

- CMAs responsible for managing natural resources at the catchment scale
- Key roles include:
  - preparing CAPs
  - managing investment to deliver these plans
- CAP preparation used previous work (Blueprints), plus any relevant current information
- CAP development incl. additional consultation



## 4. Water Management Act 2000

Increasing water demands created a need for a new legislative framework as a basis for future water management in NSW

WMA 2000 repealed 25 statutes - biggest overhaul of water legislation since early last century

WMA introduces measures for:

- improved **environmental health** of the State's waters through water sharing provisions (environmental allocations, regulating threatening activities)
- shared government/community responsibility
- greater economic benefits via access rights to water, water markets and introducing improved compliance

A **State Water Management Outcomes Plan** was derived from the WMA to:

- improve WQ and aquatic ecosystem health
- increase economic value of water
- protect interests of the community



## 5. Water Quality and River Flow Objectives

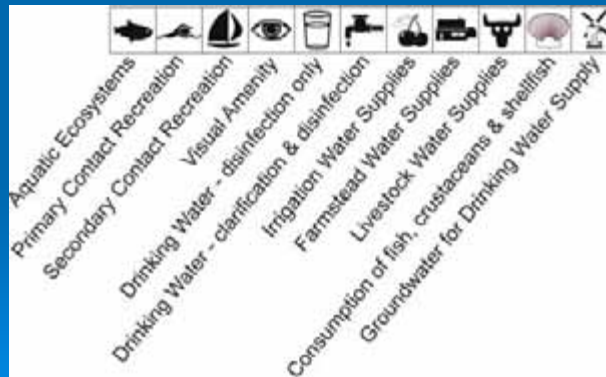
- Establishing objectives was needed as a key step
- Two-stage process for setting environmental objectives:
  - **Stage 1** - determining interim **environmental objectives**
  - **Stage 2** - Healthy Rivers Commission (HRC) **inquiries**
- HRC inquiries for Clarence, Williams, Hawkesbury-Nepean, Woronora, Shoalhaven, and Snowy Rivers (before NSW Govt. approval of the environmental objectives process)
- Environmental objectives presented as guidelines for 31 NSW catchments ([www.epa.nsw.gov.au/ieo/](http://www.epa.nsw.gov.au/ieo/))
- Objectives apply until management plans are approved
- Improving **water quality** and **flow** regimes are prime objectives for healthier waterways



## 5. Water Quality and River Flow Objectives

### WQOs

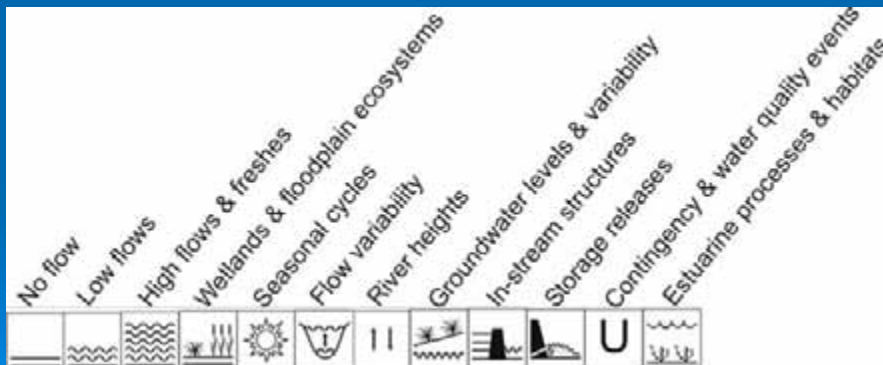
- 11 interim water quality objectives
- based on **beneficial uses** (incl. environmental), i.e. protecting aquatic ecosystems, recreation, visual amenity, drinking water and agricultural water:



## 5. Water Quality and River Flow Objectives

### RFOs

- 12 coastal interim river flow objectives
- importance of **natural river flow** patterns
- principles used in planning instruments (WSPs)



## 6. Other approaches/tools

### AusRivAS

- Australian River Assessment System (AusRivAS)
- many FW systems in Australia assessed
- standard approach - two streams: **bioassessment & physical assessment**
- shared data - interpreted information

developed under the National River Health Program (NRHP) in 1994

NRHP goal to provide the **information** needed to reverse the degradation of Australian inland waters

AusRivAS is the mechanism for the **comprehensive assessment** of the health of **inland waters**



## 6. Other approaches/tools

### IMEF

Integrated Monitoring of Environmental Flows (IMEF) developed to assess the ecological benefits of environmental water provisions (i.e. legislative water allocations for the environment detailed within **Water Sharing Plans - WSPs**)

IMEF aims to:

- better understand **ecosystem processes** in rivers and wetlands
  - measure **changes** in water levels, habitats, animals, plants and ecological processes after the release of environmental water
  - estimate the **long-term effects** of environmental water
  - provide scientific information that is needed to **review WSPs**
- 
- Ecological **benefits** include reduced algal blooms, increased wetland biodiversity, more abundant native fish and more natural ecosystem processes



## 6. Other approaches/tools

### PBH and MARA

In NSW, the State Rivers and Estuaries Policy and the NSW Water Management Act 2000 are dedicated to conserving and restoring biodiversity and the ecological processes

To assist decision-makers, the former DLWC developed the Pressure-Biota-Habitat (PBH) framework and Multi-Attribute River Assessment (MARA) assess the conservation value and health of New South Wales rivers

Special assets and potential problems can be identified, along with establishment of a baseline of current conditions, for monitoring future management performance





## NSW Shellfish Program



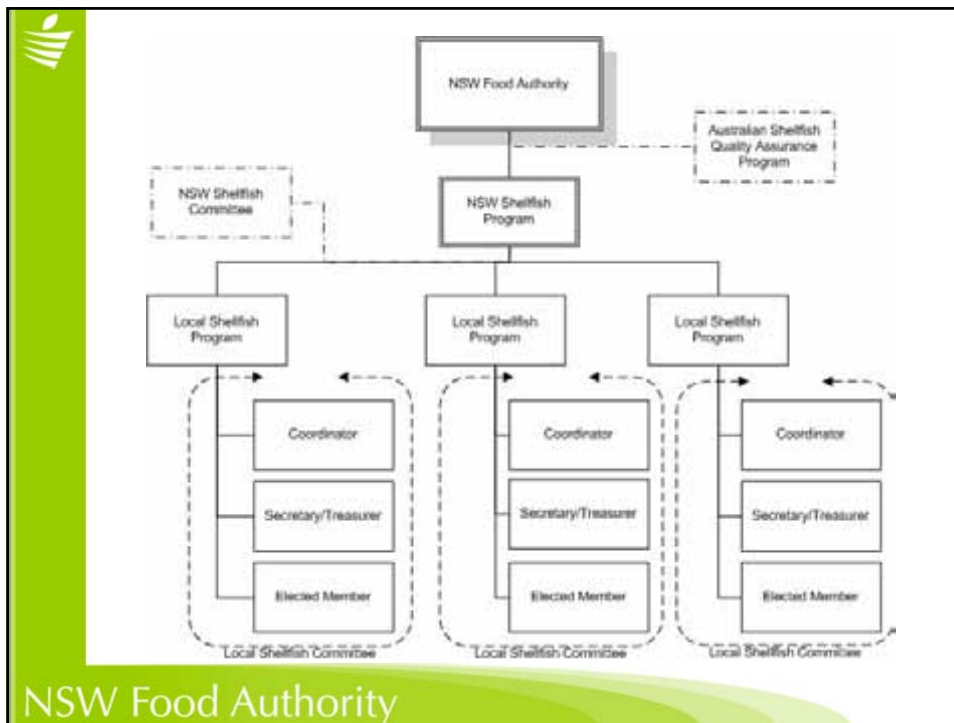
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## Legislation and Standards

- *Food Act 2003*
- *Food Regulation 2004*
  - Requirement for licensing
  - Establishment of NSW Shellfish Program
  - Establishment of Local Shellfish Programs
  - Adopts NSW Shellfish Program Operations Manual as subordinate legislation
- *FSANZ Standard 4.2.1 Primary Processing Standard for Seafood – 26 May 2005*
  - Adopts Australian Shellfish Quality Assurance Program as the national standard

NSW Food Authority

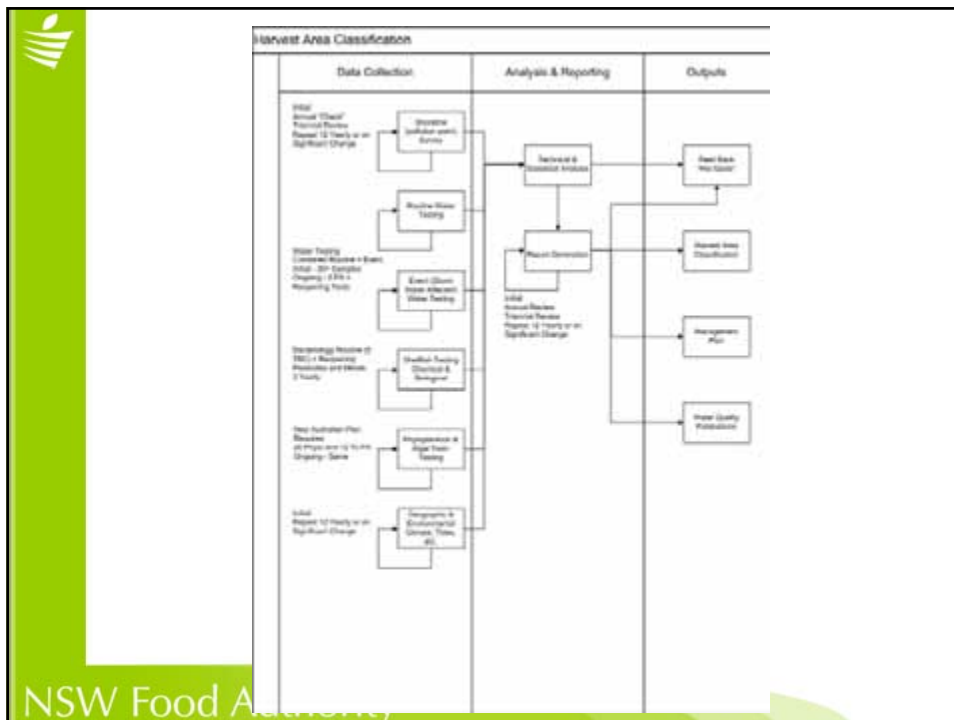


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## Requirements for Shellfish Harvest Area Management

- Classification = Risk assessment of harvest area
  - Comprehensive Sanitary Survey Report (shoreline, bacteriological, shellfish, MAB)
  - Management, MAB and Surveillance Plans
- Reviewed yearly, major review tri-annually & complete redo every 12 years.
- Outcome = Classification is assigned

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## Primary ASQAP Classifications

### APPROVED

Harvest and direct sale

- No human/animal faecal matter present, that presents an actual/potential hazard
- No poisonous substance exceeds standards
- Closure possible for a limited time due to an emergency

### RESTRICTED

Does not meet approved criteria **consistently, deplate** or relay to approved area prior to sale

- Subject to limited degree of pollution
- Level of pollution is moderate and shellfish can be made fit for human consumption by relay or **deplate**

### PROHIBITED

- No harvest at any time
- No comprehensive sanitary survey
- Adjacent to sewerage outfall
- Unpredictable pollution sources
- Contaminated with faecal wastes exceeding restricted criteria or poisonous substances



## Secondary Classifications

### Conditionally Approved

1. Direct harvest and sale when open
2. Closed when does not meet approved criteria
3. Closed for direct sale but open for relay or **depuration** if does not exceed Restricted criteria

### Conditionally Restricted

1. Area can be open for relay or **depuration** when meets Restricted criteria
2. Area closed when does not meet restricted criteria

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## The Sanitary Survey Report Includes

- A shoreline survey
- 2. A survey of the bacteriological quality of the water
- 3. The bacteriological and chemical examination of shellfish
- 4. A study of climatic, hydrographic and geographic characteristics of the harvest area
- 5. A summary of the incidence of potentially toxic algal species recorded in the area

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## Sample Sites

- Sampling stations must be sufficient in number and located to effectively evaluate all potential pollution sources
- Pollution sources outside the harvest area boundary also need to be assessed

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## Current Monitoring Schedule

- Three main categories of risk monitored
  - Faecal contamination (human & animal)
  - Algal biotoxins
  - Heavy metals and chemicals
- Temperature and density taken with all samples

NSW Food Authority



## Faecal Contamination

- Water analysed for faecal coliforms
- Shellfish analysed for *E.coli*
- Monthly, plus events during initial risk assessment.
- Sampling reduced to five adverse samples per year plus reopening sample post classification (independently verified)

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## Heavy Metal and Chemicals

- Sampling program is currently once every three years.
- A range of heavy metals, pesticides, PCB's and other high risk substances as identified in the shoreline survey.

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## Algal Biotoxin Monitoring - Phytoplankton

- Historically monthly up until July 05
- Data up to July 05 includes a full species count
- Currently fortnightly sampling with analysis for toxic species only
- Requirement for monthly independent verification

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## Biotoxin Monitoring of Shellfish

- Monthly shellfish samples for algal biotoxins (ASP, PSP & soon DSP)
- Additional toxin monitoring when potentially algal toxic species detected

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## Why do we need to sample?

- Bi-valve shellfish are filter feeders that can bio-accumulate pathogenic substances
- A single oyster can filter 20-30 litres per hour
- This process can result in shellfish containing substance at 100 times the concentration that it occurs in the water

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## Why do we sample for faecal contamination?

- Bacterial contamination
  - *E.coli*
  - Salmonella
  - Clostridium
- Viral contamination
  - Hepatitis A
  - Noro virus
  - Adeno virus

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## Why do we sample for Algal Biotoxins?

- There are four types of biotoxins
  - Amnesic Shellfish Poisoning (ASP)
  - Paralytic Shellfish Poisoning (PSP)
  - Diarrhetic Shellfish Poisoning (DSP)
  - Neurotic Shellfish Poisoning (NSP)

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## Symptoms of Toxic Shellfish Poisoning

### **Suspected case (general clinical case definition)**

- Vomiting or diarrhoea occurring within 24 hours of consuming shellfish;
- or any of the following neurological symptoms occurring within 24 hours of consuming shellfish:
- neurosensory
  - paraesthesia, i.e. numbness or tingling around the mouth, face or extremities
  - alternation of temperature sensations such as a prickly feeling on the skin during a bath/shower or exposure to sun, or difficulty distinguishing hot or cold objects
- neuromotor/neurocerebellar:
- weakness such as trouble rising from seat or bed
  - difficulty swallowing
  - difficulty breathing
  - paralysis
  - clumsiness
  - unsteady walking
  - dizziness/vertigo
  - slurred/unclear speech
  - double vision;
- or one or more of the following neurological signs/symptoms occurring within 48 hours of consuming shellfish:
- confusion
  - memory loss
  - disorientation
  - seizure
  - coma

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## Where to next? – Post Classification

- Sanitary survey reports will assign a classification for each harvest area. Problems areas will be identified in each harvest area.
- Potential issues:
  - Unexplained high faecal levels in shellfish or water.
  - Frequent contamination events
  - Consistently poor water quality
  - Frequent toxic algal blooms
  - Insufficient event sampling data
- Harvest area classification is ongoing, annual/tri-annual reviews. The classification outcome and/or management plan of each harvest area can change with each review.

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## Questions?



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# REALISTIC EXPECTATIONS FOR A WATER QUALITY MANAGEMENT FRAMEWORK



## How can we work together better?

Options / Opportunities:

- Water Quality Network
- Water Quality Forum – discussion sessions via email, website, meetings
- Working groups on key issues
- Project steering group
- Partnerships
- How can we work better with oyster farmer water quality programs?
- What else?



## How can we make progress towards a shared framework for water quality management?

### Options / Opportunities:

- Working Group to develop water quality management framework outline
- Project proposal: for funding application / funds from existing programs?
- Prepare a draft framework for input / comment by forum members
- Who should be invited onto working group?



## REALISTIC EXPECTATIONS FOR COMMUNITY MONITORING

- **How can we engage and harness community interest and energy to improve water quality management?**

### Options / Opportunities:

- ?
- ?
- ?



## Water Quality Improvement Plans – do we want to go down this path?

Opportunities, priorities

- Pro's & Cons of Water Quality Improvement Plans
- Possible catchments for WQIP's? (eg Clyde, Tuross, Wallaga, Bega)
- Consensus on where to next with Water Quality Improvement Plans?



# FUTURE DIRECTIONS

## A FRAMEWORK FOR SOUTH EAST WATER QUALITY MANAGEMENT



## Future Directions for Water Quality Sampling

Thought prompters:

- Where, What and How to monitor?
- Who monitors? Who pays?
- Many organisations sample water quality for different reasons, with little or no coordination.
- Given limited resources and high costs, how can we prioritise what gets sampled and what doesn't?
- Can we have a standard format for sampling and recording site data?
- How can we better coordinate the collective effort?

## Future Directions for Water Quality Data and Information Management

Thought prompters:

- Many organisations hold data in different formats and databases.
- Access to data is highly variable. Quality of data also varies.
- Is it realistic to expect central access to water quality data?
- Can we expect broad adoption of a framework and a standard format for water quality data?
- How can we better share and manage water quality data and information?

## Future directions for reporting and management response to water quality issues

Thought prompters:

- Much water quality information is not well reported.
- Many water quality reports are not reviewed
- Often there is no response to reported issues.
- Where there is a response this is often more the result of good luck than good process.
- What might be the role for State of Environment Reports?
- How can we build-in a management response?
- Is there a place for developing Water Quality Improvement Plans for key water bodies?



## **Future directions for community water quality monitoring, education & awareness programs**

Thought prompters:

- Waterwatch, Bugwatch and Streamwatch programs have a strong history with local schools and groups.
- Community monitoring has lost momentum lately.
- Should we revive support for community water quality monitoring? How???
- What support is required for effective education and awareness programs on water quality?
- How can community, university and school – based monitoring best integrate with a new water quality management framework?