National Estuaries Network

24th Meeting

9th –11th April 2013, Port Stephens

Hosted by: NSW Dept. Primary Industries

Organisers and Conveners:

NSW DPI: Alan Jordan:
(02) 4984-8248; Mob: 0439 418 142

Geoscience Australia: Lynda Radke
(02) 6249 9237; Mob. 0428 422 970

Attendees:

State/Territory	Delegate	Organisation
NSW	Alan Jordan	NSW Department of Primary Industries
	Bob Creese	NSW Department of Primary Industries
	Peter Scanes	NSW Office of Environment and Heritage
	Tony Roper	NSW Office of Environment and Heritage
	Karen Astles	NSW Department of Primary Industries
	Angus Ferguson	NSW Office of Environment and Heritage
	Jaimie Potts	NSW Office of Environment and Heritage
Victoria	Greg Woodward	Vic. Department of Sustainability & Environment
Queensland	James Udy	QLD Healthywaterways
Tasmania	Christine Coughanowr	Tas. Dept. of Primary Industries, Parks, Water & Envt.
	Christine Crawford	University of Tasmania
WA	Kerry Traylor	Swan River Trust (Phone hook-up)
National	Lynda Radke	Geoscience Australia
	Simon Allen	CSIRO Wealth from Oceans National Flagship
	Jonathan Hodge	CSIRO Land and Water

Tuesday 9th April, 2013

	National Estuaries Network Meeting NSW Fisheries Office, 2nd floor 12B Teramby Road Nelson Bay
8:45 – 9:00	Tea, Coffee and settle in
9:00 – 9:10	**Alan Jordan & Lynda Radke** Welcome, Housekeeping, Apologies & Introductions
9:10 – 10:40	**State/Territory Roundtable Update** (Each State/item – up to 20 min (including discussion): (Chair: Lynda Radke) What's happening in estuary science/management in Australia - each state and national representative to give a brief overview of estuary management/science within their jurisdiction. o **NSW** update (Jaimie Potts/Angus Ferguson; Bob Creese) o **QLD** update (James Udy) o **TAS** update (Christine Coughanowr/Christine Crawford) o **SWAN RIVER TRUST** update (Kerry Traylor; 08-9335-1334)
10:40– 11:00	***MORNING TEA***
11:00– 12:30	**Continue with State Roundtable update** o **VIC** update (Greg Woodward) o **CSIRO** update (Jonathan Hodge) o **Geoscience Australia** update (Lynda Radke)
12:40– 1:30	***LUNCH*** *Chair: Alan Jordan*
1:30 – 3:00	o Discussion on models and assessment frameworks that include risk and threat components o Discussion on threat interactions and future change
3:00 – 3:20	***AFTERNOON TEA*** *Chair: Bob Creese*
3:20 – 5:00	o Discussion on recent changes in estuarine and coastal zone governance arrangements o Communication tools for improved estuary management o Other Business – Next meeting
7:00 pm – late	***NEN Dinner at Sandpipers Restaurant, Nelson Bay– (see map)***

National Estuaries Network

NSW GOVERNMENT | Department of Primary Industries

Estuarine ecological risk assessment: frameworks and data needs

NEN Science Symposium - Thursday April 11, 2013

Port Stephens Fisheries Centre – Taylors Beach

Agenda

	8:20 - 8:40	Coffee and tea on arrival	
	8:40 – 8:50	Welcome to symposium and outline of objectives	Bob Creese
Session 1 **Risk assessment frameworks**	8:50 – 9:20	Development of estuarine ecological risk assessment frameworks in NSW	Karen Astles
	9:20 – 9:40	General discussion on risk frameworks used in other jurisdictions	All
Session 2 **Land-based impacts**	9:40 – 10:00	Biochemical process and seagrass growth modelling	Angus Ferguson
	10:00 – 10:20	Estimating human disturbances to macrophytes	Greg West
	10:20 – 10:40	Estuarine flood plumes – monitoring of distribution	Peter Davies
	10:40 – 11:00	Estuarine risk assessment modelling	Jocelyn Dela-Cruz and Tony Roper
	11:00 – 11:20	**Morning Tea**	
Session 3 **Resource use**	11:20 – 11:40	Threats from extractive and non- extractive uses in NSW estuaries	Karen Astles
	11:40 – 12:00	Aquaculture, estuaries and resource information for informed management	Pia Winberg
	12:00 – 12:20	Threats to iconic benthic habitats and species in the Port Stephens estuary	David Harasti
Session 4 **Estuarine biosecurity**	12:20 – 12:40	Assessing threats from estuarine pests	Tim Glasby
	12:40 - 1:20	**Lunch**	
Session 5 **Estuarine pollution**	1:20 – 1:40	Ecological changes in heavily modified estuaries	Emma Johnston
	1:40 – 2:00	Untangling human threats and natural disturbances to marine biodiversity: fish kill and algal bloom case studies	Nathan Knott
Session 6 **Climate change**	2:00 – 2:20	Climate change and estuarine responses	Pauline Ross
Session 7 **Threat interactions and future change**	2:20 – 2:40	Risk assessment of threat interactions	Karen Astles
General discussion	2:40 – 3:00	General discussion	
	3:00	Workshop close	

National Estuaries Network	**Meeting No. 24** Port Stephens NSW April 9-11
AGENDA PAPER	NSW

Prepared by: Kerryn Stephens[1] / Dr Peter Scanes[1] / Tony Roper[1] / Dr Alan Jordan[2]
Position: Regional Operations Division/ Scientific Services Division/ Fisheries Research
Organisation: 1. Office of Environment & Heritage / 2. Department of Primary Industries

1. Update – Estuary Management

- As previously discussed the NSW Minister for the Environment, announced in late 2011 that she was seeking feedback on the arrangements for managing coastal erosion, coastal plans and coastal regulation and ideas for improvement. A Ministerial taskforce has been established to look at these matters. Outcomes of stage 1 of the coastal reforms included the Government no longer recommending sea level rise projections for councils due to uncertainty in projections of future sea level rise and because Councils need the flexibility to consider local conditions when determining local future hazards. The Government is not intending to release a new sea level rise policy statement. Stage 2 of the reforms are progressing.

- NSW Marine Estate Authority has been announced to better manage the NSW marine estate across our marine waters, coastline and estuaries, including the existing six marine parks.

  The NSW marine estate includes:

  - the sea enclosed within the three-nautical-mile limit including all marine related bays.
  - rivers under a detectable tidal influence.
  - mangrove systems, islands, wetlands and lakes that are intermittently connected to the sea.
  - coastal systems such as dune systems and headlands that are strongly influenced by the oceanic processes even though they are not episodically inundated.

  The new approach will be driven by two new advisory bodies.

  The Marine Estate Management Authority will:

  - have an independent Chair. The Ministers have selected Dr Wendy Craik for this role.
  - oversee management of the NSW marine estate, including the current system of marine parks.
  - report jointly to the Minister of Primary Industries and Minister for the Environment.
  - include as members the heads of NSW Trade and Investment, Primary Industries, Environment and Heritage, Planning and Infrastructure, and Transport, and the Chair of the Expert Knowledge Panel.

  The independent Marine Estate Expert Knowledge Panel will:

  - be chaired by Dr Andrew Stoeckel.

- provide the Authority and Ministers with expert advice across ecological, economic and social sciences.
- Dr Stoeckel will also be a member of the Marine Estate Management Authority to provide for the Authority having direct access to scientific expertise.

The Authority and Expert Knowledge Panel will focus on these key initiatives:

- Developing a threat and risk assessment framework – to underpin and prioritise. effective management across the marine estate to address the primary threats.
- Developing a Marine Estate Management Strategy – through which the strategic framework and priorities will be set, and monitor its implementation.
- Marine park management reforms – including consideration of multiple use zoning, incorporation of ecological threats and risks, economic and social considerations, and improved public communication and engagement processes.

The new approach allows the Government to respond to threats and risks to better manage our precious marine resources across the entire marine estate not just in marine parks.

- OEH continues to support Local government in the development of coastal zone management plans (that address pressures on estuary health) and localised estuary health assessments. Both are priorities for funding under the NSW Estuary Management Program (funding applications for 2013/2014 closed in February 2013 and are currently being assessed).

2. Update – Estuary Research

- The coverage of estuarine macrophytes in NSW is mapped on a rolling 10 year program. This mapping uses the latest multiband ADS-40 imagery provided by LPMA NSW with the goal of mapping at least 11 estuaries per year. New methods are also currently being developed to map these habitats using object orientated image segmentation and classification techniques, allowing a move away from on-screen digitising to a more standardised and systematic methodology. This new technique is also being used in conjunction with very high resolution aerial imagery, obtained from low level helicopter flights, to map seagrass areas at a very fine resolution, providing detailed information about the density, composition and cover of the mapped seagrass beds.
  ONGOING. For further information, contact Greg West on greg.west@industry.nsw.gov.au

- Methods for small-scale rehabilitation of the seagrass *Posidonia australis*, which is declared as threatened in many NSW estuaries, is progressing steadily. The work (funded initially by the NSW Environmental Trust) has focussed on methods for rearing *Posidonia* from seeds and aims to enhance growth rates of the plants to hasten their establishment. Methods are also being developed for transplanting mature *Posidonia* plants. This work has also involved studies on seagrass/sediment interactions to help identify the sediment requirements of these plants. Major field trials in Botany Bay will commence in November 2011,
  ONGOING. For more information, contact Tim Glasby on tim.glasby@industry.nsw.gov.au

- The two main invasive species in NSW estuaries are the green alga *Caulerpa taxifolia* and the European shore crab *Carcinus maenas*. NSW government scientists undertake regular surveys for these invaders in NSW estuaries. In addition, there are ongoing projects to investigate the potential impacts of *Caulerpa taxifolia* on seagrasses and, in collaboration with the University of Technology Sydney, impacts on estuarine invertebrates. In collaboration with Macquarie University and the Sapphire Coast Marine Discovery Centre in Eden, NSW DPI is also investigating the impacts of *Carcinus* on native species and the oyster farming industry.
  ONGOING. For more information, contact Tim Glasby on tim.glasby@industry.nsw.gov.au

- A comprehensive risk assessment project examining the threats to marine biodiversity in NSW (including in estuaries) has been initiated, partly as a response to the terms of reference for the current Independent Scientific Audit of NSW Marine Parks (see http://www.marineparksaudit.nsw.gov.au/). The project will use a QERA approach (Qualitative Environmental Risk Assessment) which relies on collating existing information and eliciting

expert opinion from marine scientists working in NSW. NEW project – started July 2011, will run for approx. 18 months. For more information, contact Karen Astles on karen.astles@industry.nsw.gov.au

- NSW OEH, Jervis Bay Marine Park and Katarina Mikac of the University of Wollongong have been collaborating to assess the effects of prohibition of bait pumping in inter-tidal sand flats in marine sanctuary areas on benthic macroinvertebrate abundance/diversity and benthic oxygen and nutrient cycling processes. This work is completed and is being reported. For further information – contact Nathan Knott on Nathan.knott@environment.nsw.gov.au

- NEW NSW OEH Two recent experiments to measure direct in-situ metabolism of seagrass beds using specially designed chambers have shown that they changed from net autotrophic at the end of winter to net heterotrophic at the end of summer. This has implications for whether temperate Zostera beds are net carbon sinks. Contact Angus Ferguson angus.ferguson@environment.nsw.gov.au or Jaimie Potts Jaimie.potts@environment.nsw.gov.au

- NEW NSW OEH Comparison of tissue nutrient concentrations in seagrass from NSW estuaries supports the hypothesis that C:N ratios provide an indicator of long-term nutrient enrichment. For further information – Jaimie Potts at Jaimie.Potts@environment.nsw.gov.au

- NSW OEH is continuing to sample estuaries through spring/summer as part of the Monitoring Evaluation and Reporting (MER) process. 140 estuaries have been sampled so far and 20 more will be sampled this summer. Dissolved oxygen measures will be included this summer. Scores and grades have been calculated for all estuaries. Contact Peter Scanes at Peter.Scanes@environment.nsw.gov.au

- NSW OEH In collaboration with UNSW (Prof Ian Suthers) OEH will test the feasibility of measuring zooplankton size/abundance characteristics as a potential indicator of estuarine condition. ONGOING. Contact Jocelyn dela Cruz at jocelyn.delacruz@environment.nsw.gov.au.

- NEW NSW OEH is using measurements of the relative concentrations of radon in waters to determine the importance of groundwater as a source of nutrients, carbon and water to estuaries with small catchments NEW. Contact Peter Scanes at Peter.Scanes@environment.nsw.gov.au

- NEW NSW OEH, data from the MER program is suggesting strongly that P limitation in lake and lagoon estuaries (i.e. those with limited ocean exchange) is the normal situation Jaimie Potts on Jaimie.Potts@environment.nsw.gov.au

- NEW NSW OEH, research using core and chamber incubations is showing significant amounts of N fixation. This may require a revision in the assumed dominance of N fixation and denitrophication processes in nutrient processing models. Jaimie Potts on Jaimie.Potts@environment.nsw.gov.au

- NSW OEH, Jaimie Potts and Peter Scanes are investigating possible reasons for the absence of seagrass in many intermittent estuaries. In particular we are investigating the possibility of nitrogen toxicity, even in low impact systems. This work may result in an indicator of seagrass stress based on stable carbon isotopes. NEW Contact Jaimie Potts Jaimie.potts@environment.nsw.gov.au

- NSW OEH in collaboration with DPI Fisheries have submitted a funding application to Catchment Action NSW for $245,000 to develop a predictive modelling capability for estuary and marine condition and a decision support system for prioritising investment and management. Exploratory statistical analysis using multivariate techniques will be utilised and

will include investigating classification systems used in the MER program, predictor-response relationships and index design and sensitivity. Major clients are the five coastal CMAs, the Marine Parks Authority and local government. NEW Contact Tony Roper at tony.roper@environment.nsw.gov.au or Bob Creese at bob.creese@industry.nsw.gov.au.

- NEW NSW OEH has calculated new Triggers values for NSW estuaries which will be submitted to ANZECC as part of the review of the NWQMS. Contact Peter Scanes at Peter.Scanes@environment.nsw.gov.au

National Estuaries Network	**Meeting No. 24** Port Stephens, NSW April 9-11
AGENDA PAPER	Queensland

Prepared by: Andrew Moss
Position: Principal Scientist
Organisation: Department of Science, Information Technology, Innovation and the Arts

1. Update – Estuary Management

- The Queensland Government is in the process of setting up a Gladstone Healthy Harbour Partnership for the Port Curtis region. This follows on from the public concern about widespread fish deaths in this region in 2011. The Partnership is based on the SE Qld Healthywatersways model. For more information see: http://www.ehp.qld.gov.au/gladstone/healthy-harbour/index.html

2. Update – Estuary Research

- A report on the results of long term WQ monitoring in Central Qld estuaries is now available on the Queensland Department of Environment and Heritage Protection web site: http://www.ehp.qld.gov.au/water/monitoring/qld-coastal-water-quality.html

National Estuaries Network	**Meeting No. 24** Port Stephens, NSW April 9-11
AGENDA PAPER	Tasmania

Prepared by: Christine Crawford and Christine Coughanowr
Position: Senior Research Fellow, and Director
Organisation: IMAS, University of Tasmania, and Derwent Estuary program

1. Update – Estuary Management

Derwent Estuary Program

- Monthly ambient water quality monitoring and weekly recreational water quality monitoring (weekly) continues;
- Seafood monitoring continues (mercury in flathead; heavy metals in shellfish) – seafood safety brochure updated and new signage produced;
- 2012 Report Card released – decline in some areas due in part to wet year;
- Nutrient response model continues to evolve (CSIRO) and MARVLIS project (Derwent Virtual Lab) underway to provide user-friendly data products through the ANDS portal (IMAS).
- Grant-funded projects underway to reduce pollution (stormwater treatment, groundwater remediation);
- Foreshore weed management continues (rice grass, karamu);
- Iconic species projects (little penguins, spotted handfish);
- Wetland and waterway overlays developed for planning schemes (including retreat zones for sea-level rise);
- Educational materials and guided walks (salt marsh, tidal wetlands, rocky intertidal);
- Regional walking tracks website developed with focus on the Derwent.

Tamar Estuary and Esk Rivers program

- Tamar Augmented reality app – 3D app to explore the Tamar;
- 2012 Report Card released;
- Tamar seafood safety investigation & signage;
- Northern Tasmanian stormwater program;

D'Entrecasteaux Channel/Huon Estuary program

- Collaborative project to improve management of Channel/Huon formally launched in December;
- Participants include local & state government, Southern Water, aquaculture, NRM South, IMAS, CSIRO and DEP/IRF (twinning project).
- First output has been State of the Channel report.

EPA – Water Quality Objectives

- WQOs are currently being developed for rivers and estuaries around Tasmania by the EPA - first step has been the collection and compilation of existing water quality data.

2. Update – Estuary Research

- FRDC funded project "INFORMD Stage 2: Risk-based tools supporting consultation, planning and adaptive management for aquaculture and other multiple-uses of the coastal waters of southern Tasmania" to CSIRO and IMAS is underway. A study of '*Your Marine Values'* which identifies key marine values for integration into decision-support tools is being conducted by IMAS.
- The Redmap Australia website (Range Extension Database and Mapping project) was launched in December 2012. Redmap encourages fishers and divers to report sightings and upload photos of marine life that aren't usually found in their local area.
- A proposed expansion of salmon aquaculture in Macquarie Harbour by 64% has received state and Commonwealth government approvals provided research is conducted in 3 main areas: (i) Baseline survey of macroalgae before the expansion occurs), (ii) Characterising benthic pelagic interactions in MH - organic matter processing in sediments and importance for nutrient dynamics, and collecting biological information on the threatened Maugean skate.
- Reef Life Survey project continued monitoring MPAs and other reefs around Australia. This year they will be undertaking opportunistic surveys, mostly focusing on reefs on offshore Commonwealth MPAs and islands, but also some estuarine surveys, including in Sydney Harbour, Port Stephens and Moreton Bay.
- HABs: Major algal bloom of *Alexandrium tamarense* Group IV detected for first time on the East coast of Tasmania in late 2012. PSP toxins produced by this species were detected in Tas. mussels imported into Japan, resulting in closure of Australian shellfish imports into Japan. Also found in commercial and recreational rock lobster, abalone, oyster and scallop industries, which were closed to harvest on the East coast of Tas. for several months.
- Sense-T –which is a economy-wide intelligent sensor network that integrates different data sources, is being trialled in Tas. as part of the roll-out of the fast broadband NBN network. An initial focus is the oyster industry, developing a decision support system which utilises machine learning, matching current data patterns with historical data to predict and recommend shellfish farm closures. An oyster bio-sensor measuring heartbeat, gape and other parameters is also being developed; this data is transmitted in real-time and integrated with broader environmental data and forecasts.

3. List the 3 most important gaps/needs for better estuary management in your State/Territory:

- Assessment of the condition of most Tasmanian estuaries, except for large and already severely degraded systems.
- A management/regulatory framework that specifically considers estuaries
- An updated coastal (and estuarine) management policy – still under review...

4. Any Other Significant Issues for Discussion

- Current Australian government (and Opposition) initiatives/views on estuarine science & management?

National Estuaries Network	**Meeting No. 24** Port Stephens, NSW April 9-11
AGENDA PAPER	SWAN RIVER TRUST

Prepared by: Kerry Trayler
Position: Principal Scientist
Organisation: Swan River Trust

1. Update – Estuary Management

- **River Protection Strategy**

A River Protection Strategy is a requirement of the *Swan and Canning Rivers Management Act 2006* and includes a Strategic Management Program that specifies strategies and actions that river management organisations will commit to over the next five years to meet health, community benefit and amenity targets.

A draft River Protection Strategy for the Swan Canning Riverpark was finalised and endorsed by the Board of the Swan River Trust in August last year. The document was not endorsed by cabinet prior to the State election in March and will be presented to the new Minister for Environment at the earliest convenience. More information: roxane.shadbolt@swanrivertrust.wa.gov.au

- **Urban Drainage Partnership Agreement**

The Trust, along with the Department of Water, the WA Local Government Association and Water Corporation, has signed a formal commitment to collaboratively improve drainage management within the Swan Canning coastal catchment. The signing of the Urban Drainage Partnership Agreement (UDPA) in November last year will support Local Government management of urban drainage systems within the Swan Canning coastal catchment, and should lead to improved environmental, social and economic outcomes. A schedule of works was produced to complement the UDPA, further clarifying actions over the next 12 months. The Agreement is valid for one year, and will be evaluated 10 months after the date of signing.

The Trust's commitment to the agreement involves reviewing the existing framework for water resource information sharing and supporting the development of a more efficient framework to meet various users needs; and developing guidelines on approvals processes for community based NRM organizations to undertake works on and around drains.
More information: roxane.shadbolt@swanrivertrust.wa.gov.au

- **Non- nutrient contaminants program**

The Trust is working with the Department of Water, progressing a series of investigations to understand the source of contaminants to key areas of the Swan Canning Riverpark and expects a number of new reports to be released shortly. Our current focus is on answering the question: Are fish caught in the Swan and Canning rivers safe to eat? The project is likely to focus on a single species (Black Bream) and a broad range of contaminant types in order pilot an approach to providing consumption limits.
More information: steeg.hoeksema@swanrivertrust.wa.gov.au

- **Oxygenation projects**

The Trust works closely with the Department of Water to operate four oxygenation plants within the Riverpark; two in the upper Canning and two in the upper Swan. Planning approvals are underway for a 5th plant to be constructed on the Canning River and operational before end of June 2013.

An algal bloom that lasted 100 days in winter/spring 2012, together high biological oxygen demand into summer 2012-13 have impacted on the available oxygenation operating funds and necessitated a change in the oxygenation operations in order to conserve resources for emergency situations.

More information: steeg.hoeksema@swanrivertrust.wa.gov.au

- **Water quality improvement planning**
  The Trust, in cooperation with partner organization has established nine local Water Quality Improvement Plans (WQIPs) including priority catchments as identified in the Healthy Rivers Action Plan and based on modeling in the Swan Canning Water Quality Improvement Plan. The WQIPs aim to reduce nutrient loads into the Swan and Canning rivers through nutrient intervention and changed management practices. The Trust is investing up to $125,000 to implement key actions in local WQIPs as they are developed for each priority catchment. To date the WQIPs have attracted investment from local, State and Federal Governments to the value of almost $18 million and enabled a number of onground and community education projects that will improve water quality entering the Swan Canning Estuary. A bid was made recently to the Caring for our Country initiative to fund further action within priority catchments.
  More information: debbie.besch@swanrivertrust.wa.gov.au

  A report is pending with the results of a small scale soil amendment trial using Alkaloam, Neutralised Used Acid (NUA) and Lime Amended Bioclays (LaBC) at a one hectare site in the Ellen Brook Catchment. The results will be used to inform a larger scale (>50ha) trial in Ellen Brook catchment due to begin this year. More information: alex.hams@swanrivertrust.wa.gov.au

  Avon Catchment Modelling
  The Department of Water and the Swan River Trust are collaborating in a project aimed at modeling nutrient loading from Avon subcatchments into the upper river system. The project will develop scenarios to test management options and their impact on loads. This approach is similar to that taken for the Swan catchments and will be used as the basis for water quality improvement planning.
  More information: alex.hams@swanrivertrust.wa.gov.au

- **Drainage intervention works**
  The Drainage Nutrient Intervention Program continues to trial the application of constructed wetland and compensation basin restoration projects to principally improve water quality, but also habitat and amenity value at sites where they are implemented. Currently there are nine sites with intervention works in place. Three of these occur in the Ellen Brook catchment. Ellen Brook is the largest of the Swan Canning catchments feeding into the estuary and provides a disproportionately large load of nutrients to the system. Detailed designs have been submitted for review through the development approvals process. Construction is now expected to occur during the summer/autumn period of 2013/14, subject to additional funds being available to complete the project.

  Wetland nutrient removal is expected to be boosted by the use of a Phoslock dosing system and the application of Neutralised Used Acid (NUA) in a nutrient filter within the wetland. Specifics of this NUA application are still being finalised. More information: peter.adkins@swanrivertrust.wa.gov.au

- **Foreshore management**
  The Trust works in partnership with 21 local government and 6 agency groups to manage foreshore in the Riverpark. Through its Riverbank Program funding scheme the Trust has distributed more than $7.9 million across 162 projects since 2002. Along with partner contributions, the value of these projects is estimated at almost $16 million. An estimated 2 million seedlings have been planted in the past four years. But the approach is not limited to natural shorelines. Funding is also available for the restoration of built shores in keeping with Trust's mandate for achieving environmental and community benefit objectives. The approach is supported through a Foreshore Assessment and Management Strategy (2008), Best Management Practice Guidelines for Foreshore Restoration (2009), foreshore management and restoration planning guidelines, as well as a training program. A call went out recently for the expressions of interest to the scheme in 2013/14. In addition, the Trust has also undertaken a survey of site eligible for proactive funding in the same year.
  More information: stephen.lloyd@swanrivertrust.wa.gov.au

- **Invasive species control**
  The Trust is working with the Department of Fisheries, Murdoch University and the City of Swan to eliminate Pearl Cichlids from a wetland in the Bennett Brook catchment. Previous research has indicated that this species has invasive potential in the Swan River and that the wetlands are a major source of a breeding population. Rotenone was due to be used to control these fish in late February following a dewatering exercise to limit the treatable area. However, the cost of dewatering proved

was beyond that presently available and an interim approach of reducing the viable population through electrofishing was recently undertaken.
More information: jeff.cosgrove@swanrivertrust.wa.gov.au

The Department of Fisheries are responding to a biosecurity threat in the estuary after two Asian Paddle Crab were found last year. To date only three of these crabs have been located despite extensive surveys. The Department released a biosecurity alert on the species with information on the identification of this species

2. Update – Estuary Research

- **Development of Indicators of ecological health**
  Fish communities: The Trust has finalized its work with Murdoch University in developing the fish community index and will make reports available on its website soon. The approach has been implemented in the past year with a recent report suggesting the fish community was in comparatively good condition and has improved since the mid 2000s. Monitoring is continuing this year and is expected part of the Trust's reporting on ecosystem health.
  More information: kerry.trayler@swanrivertrust.wa.gov.au

  Seagrass: Department of Water has provided a draft report on the development of a seagrass health index. Measurements of leaf metrics, sediment condition, epiphyte characteristics are evaluated as part of the report. Transects established through this project will be sampled annually as part of a seagrass habitat monitoring project.
  More information: kieryn.kilminster@water.wa.gov.au

  Choice modelling: The Swan River Trust has commissioned research to explore general public and expert preferences for environmental and social outcomes for the Riverpark. This work is being finalized and will provide an indication of the dollar value placed on a range of outcomes.
  More information: roxane.shadbolt@swanrivertrust.wa.gov.au

- **Estuarine Modelling**
  The Department of Water and the Swan River Trust are collaborating with modellers from the University of Western Australia in the development of a coupled hydrodynamic-biogeochemical model that can simulate oxygenation dynamics at key locations in the Swan-Canning estuary. A hydrodynamic grid was established in TUFLOW and validation of physico-chemical data is complete. Scenario testing well underway with the visual output of the model being developed further. While the initial application of this model is to enable the optimal operation of oxygenation plants, it is recognized that it will have broader application. More information: kieryn.kilminster@water.wa.gov.au

- **CRC for Water Sensitive Cities**
  The Trust is a participant in the CRC for Water Sensitive Cities, which is an initiative that links three Australian universities and approximately 70 industry partners from most states of Australia, Singapore and the Netherlands. Research through the CRC is focusing on four key programs: Society; Water Sensitive Urbanism; Adoption Pathways; and Future Technologies, many of the outcomes of which have relevance to catchment management. A stakeholder forum was held in Perth on 3-4 April. More detail can be found at http://watersensitivecities.org.au/.

- **Growing community awareness by growing prawns**

  The Trust and partner organizations (Murdoch University, Challenger Institute, WA Fish Foundation, Department of Fisheries) are undertaking a project aimed at addressing the decline of the recreational fishery for the Western School Prawn and in doing so engage fishers in the stewardship of the fishery and the Swan Canning Riverpark. The project will pilot the production and release of Western School Prawns into the Swan-Canning Riverpark over a 3 year period to enhance the community values of the recreational prawn fishery. The aim is also develop a citizen science Prawn Watch program to engage the community through stock release and monitoring of the recreational fishery.

  Over the past 5 months effort has been invested in collecting broodstock and establishing culture procedure. This species has never been cultured before and has proven challenging due to its small size. Funding is still being sought for an investigative research element that uses the stock enhancement to gain an insight into issues that may limit natural recruitment and survival of Western School Prawns in the Swan-Canning River Park. More information: kerry.trayler@swanrivertrust.wa.gov.au

3. List the 3 most important gaps/needs for better estuary management in your State/Territory:

- Drainage management (pollutants)
- Encompassing whole of catchment management
- Soil amendments

National Estuaries Network	**Meeting No. 24** Port Stephens, NSW April 9-11
AGENDA PAPER	Victoria

Prepared by: Fiona Warry & Greg Woodward
Position: Estuarine Scientist & Senior Policy Officer
Organisation: Department of Sustainability and Environment, Victoria

1. Update – Estuary Management

Gellibrand River fish death event
As a result of an artificial estuary opening of the Gellibrand River in late February (conducted by Parks Victoria and approved by Corangamite CMA), a large fish death event occurred shortly after. Total numbers were estimated to be in the thousands.

When the mouth was opened, the combination of very low tides and the lack of inflows from the upper catchment changed the behaviour of flows out of the river mouth to the sea. The low tide and high water levels in the estuary resulted in a much larger opening to the sea than expected, increasing flows out of the river mouth. This, combined with the lack of replacement flows from the upper catchment, saw the level in the estuary drop by up to 1.5m overnight. The sudden drop has stranded fish, and the movement of the oxygenated water out of the system resulted in fish deaths.

Victorian Waterway Management Strategy (VWMS) – estuary chapter
The draft VWMS (estuary chapter) was presented to the NEN at the November 2012 meeting and the final is expected to be released later this year. After a community consultation phase, a number of updates have been incorporated.

Gippsland Lakes Ministerial Advisory Committee (GLMAC)
In 2012, the GLMAC was established by the Minister for Regional and Rural Development, Peter Ryan, and Minister for Environment and Climate Change, Ryan Smith to:

- Advise the Ministers on matters relating to the health of the Gippsland Lakes and improved decision-making on development within the Lakes region
- Prepare an environmental strategy that considers future development, tourism and fishing; planning processes, research and monitoring, education and community information
- Coordinate government agencies to implement the Strategy and foster better coordinated management of the Lakes

The Committee will oversee the expenditure of the $10 million Gippsland Lakes Environment Fund and will advocate to secure the future environmental condition of the Lakes.
The Gippsland Lakes Environmental Strategy is expected to be released in the mid-year.

2. Update – Estuary Research

Functional Links between Estuaries and their Catchments – ARC Linkage
ARC linkage project is underway to investigate changes in ecological and biogeochemical function as land use changes. The intensive field work is now ending and Ryan is working up the data.
Contact: Ryan Woodland (ryan.woodland@monash.edu)

Nodularia blooms of the Gippsland Lakes – history and ecological effects
Monash University has been undertaking a body of research to understand the history and ecological effects of *Nodularia spumigena* blooms in the Gippsland Lakes. Blooms of the toxic cyanobacterium have occurred in the Gippsland Lakes during the summers of 2011 – 2012 and 2012 – 2013. Some key highlights of the research are outlined below.
Contact: Perran Cook (perran.cook@monash.edu)

Daryl Holland (post doc) has just published a paper which showed that grazing by zooplankton enhances the growth of *Nodularia spumigena* by facilitating the transfer of nutrients from the spring phytoplankton pool to the newly emerging Nodularia biomass. *Holland, D.P., Van Erp, I.C., Beardall, J., Cook, P.L.M., 2012. Environmental controls on the growth of the nitrogen-fixing cyanobacterium Nodularia spumigena Mertens in a temperate lagoon system in South-Eastern Australia. Marine Ecology Progress Series 461, 47-57.*

Ryan Woodland (Post Doc) has lead a project which has traced the flow of newly fixed nitrogen into the foodweb using stable isotopes of nitrogen. This is the first study of its kind and found an unexpected flow of nitrogen into zooplankton during the bloom, followed by a large pulse of newly fixed nitrogen into the food web upon bloom collapse.

Todd Scicluna (PhD student) has been undertaking work on phosphorus release from the sediment in relation to *Nodularia* blooms. He has discovered phosphorus storage within the sediment is greatly enhanced by the presence of the polychaete *Capitella capitata* which aerates the sediment. During stratification, hypoxia causes these organisms to become dormant or die leading to a large release of phosphorus from the sediment which fuels the bloom. The good news is re-oxygenation of the water column quickly re-establishes the phosphorus stores.

Miles Jennings (Honours student) has just finished a study on dated cores from the Gippsland Lakes to look at cyanobacterial bloom history. The work showed we could identify a recent period of eutrophication after the 1940s. Surprisingly the work also showed the Lakes were highly eutrophic prior to European settlement and the opening of the artificial entrance.

Yafei Zhu (PhD student) is currently working on a coupled hydrodynamic-biogoechemical model for the Gippsland Lakes to pull all the knowledge about the system together as well as gaining new insight and making predictions about past and future function.

Tracing Nitrogen Inputs in the Werribee River Estuary
Wei Wen Wong (PhD student) is putting the finishing touches on her PhD which has traced nitrogen inputs into the Werribee Estuary using isotopes. Her work has shown that groundwater inputs of nitrogen dominate over surface water inputs and that the nitrogen is derived primarily from the agricultural areas (as opposed to the Western Treatment Plant).

Wong, W.W., Grace, M.R., Cartwright, I.C., Cardenas, M.B., Zamora, P.B., Cook, P.L.M., Currently under revision. Dynamics of groundwater-derived nitrate and nitrous oxide in a tidal estuary from radon mass balance modelling. Limnology & Oceanography.

Contact: Perran Cook (perran.cook@monash.edu)

Hypoxia and Nitrogen Cycling in the Yarra River Estuary
Keryn Roberts (PhD student) is putting the finishing touches on her PhD on the effect of hypoxia on the nitrogen cycle in the Yarra Estuary. Her work showed that hypoxia increases nitrogen recycling efficiency.

Roberts, K., Eate, V., Holland, D., Eyre, B.D., Cook, P.L.M., 2012. Hypoxic events stimulate nitrogen recycling in a shallow salt-wedge estuary: The Yarra River estuary, Australia. Limnology & Oceanography 57, 1427-1442.

Contact: Perran Cook (perran.cook@monash.edu)

Dentrification in Sandy Sediments
Adam Kessler (Honours student) and Victor Evrard (post doc) showed that denitrification in sand sediments is a lot less efficient than we thought. This means we may need to be more conservative in setting nitrogen load targets for estuaries dominated by sands

Kessler, A.J., Glud, R.N., Cardenas, M.B., Larsen, M., Bourke, M., Cook, P.L.M., 2012. Quantifying denitrification in rippled permeable sands through combined flume experiments and modelling. Limnology & Oceanography 57.

Evrard, V., Glud, R.N., Cook, P.L.M., In Press. The kinetics of denitrification in permeable sediments. Biogeochemistry.

Contact: Perran Cook (perran.cook@monash.edu)

Carbon Dioxide and Tidal Flats
Peter Faber (PhD student) has shown that carbon dioxide emissions from tidal flats drop dramatically upon exposure to the atmosphere because of alkalinity generation within the sediment.

Faber, P., McKelvie, I.D., Kessler, A., Meysman F, J., R., Cook, P.L.M., 2012. Effect of alkalinity generation on the flux of CO2 and dissolved inorganic carbon during emersion and inundation on tidal flats. Biogeosciences 9, 4087-4097.

Contact: Perran Cook (perran.cook@monash.edu)

Seagrass Resilience in Port Phillip Bay
The DSE funded Port Phillip Bay seagrass resilience project is aimed at determining seagrass resilience and how seagrass responds to disturbance. There are three main components that are currently being conducted; a survey to determine flowering times, densities and seed production and persistence; a genetic survey to determine connectivity and structure within PPB and determine modes (sexual or asexual) of reproduction; and a manipulative experiment to determine rates and modes of recovery after disturbance. Additionally we have been investigating the viability and potential of vegetative rafts as a form of seagrass reproduction. The project is ongoing and we hope to have some results by the middle of next year. Partners include Melbourne Uni, Deakin Uni, University of Technology Sydney, University of Tasmania.
Contact: Tim Smith (tim.smith@deakin.edu.au)

Functional Approaches to Seagrass Monitoring in the Gippsland Lakes
Elemental nutrient ratios and stable isotope signatures of seagrass leaves have been used to help understand seagrass condition in the Gippsland Lakes. Preliminary results suggest that seagrasses are not nutrient limited and that spatial patterns of light availability may be reflected in $\delta^{13}C$ signatures. Work is being funded by the Gippsland Lakes Ministerial Advisory Committee (GLMAC).

Report soon to be available from the GLMAC website - http://www.gippslandlakes.net.au/
Warry, F. Y., Reich, P, R.J. Woodland, P. Cook (2013) Using leaf chemistry to better understand the ecological function of seagrass in the Gippsland Lakes. Arthur Rylah Institute for Environmental Research Unpublished Client Report for the Gippsland Lakes Ministerial Advisory Committee, Department of Sustainability and Environment, Heidelberg, Victoria

Contact: Fiona Warry (Fiona.y.warry@dse.vic.gov.au)

Detecting Impacts of Urban and Agricultural Pollutants in Estuaries
The Estuaries Group at the Centre for Aquatic Pollution Identification and Management (CAPIM), led by Prof. Mick Keough and Assoc. Prof. Steve Swearer in the Department of Zoology at the University of Melbourne, continues with their efforts to develop new approaches for detecting impacts of urban, industrial and agricultural pollutants in estuaries.

Victorian Index of Estuarine Condition
Trial of a multi – themed estuarine health assessment (funded by DSE and Melbourne Water) is in its final stages. Fish and bird survey components being done by Arthur Rylah Institute. Hydrology, Water Quality and Flora components being done be Deakin University.

Contact: Fiona Warry (fiona.y.warry@dse.vic.gov.au)

Spawning of Amphidromous Australian grayling (Prototroctes maraena)
Spawning and movement patterns of the threatened diadromous Australian grayling (*Prototroctes maraena*) were investigated in the Bunyip River, Victoria, using drift sampling and acoustic telemetry. Downstream migration and peak egg abundance were associated with increased river flows. This work is ongoing.

Contact: Wayne Koster (wayne.koster@dse.vic.gov.au)

Impacts of Dam Removal on the Nicholson River on Fish Communities
The Nicholson River dam has been decommissioned and removal has commenced. Researchers from the Arthur Rylah Institute are monitoring the effects on estuarine fish and seagrass communities and upstream migrations of catadromous species.

Contact: Justin O'Connor (justin.O'connor@dse.vic.gov.au)

Development of Estuarine Electrofishing techniques
The structural complexity of a range of estuarine habitats impedes the use of most netting gears conventionally used for sampling fish in estuaries. A proto-type, boat-mounted electrofisher capable of operation in estuarine waters (where electrical conductivities often exceed 20 000 μms^{-1}) was assessed. Like netting techniques, electrofishing demonstrated bias towards particular components of the fish assemblage and fish assessments aiming to characterise fish assemblage structure will benefit from the use of multiple gears. Electrofishing shows immense promise for discretely sampling highly structured habitats to test hypotheses about habitat use.

Warry, F.Y., Reich, P., Hindell, J.S., Mckenzie, J., Pickworth, A. Using new electrofishing technology to amp up fish sampling in estuarine habitats. Journal of Fish Biology (in press)

Contact: Fiona Warry (fiona.y.warry@dse.voc.gov.au)

State-wide Mapping of Instream Woody Habitat (IWH)
The Victorian Investment Framework has funded a project to help the Government prioritise the protection and rehabilitation of IWH in Victorian streams. The project will map densities of IWH across Victorian streams to characterise past and current conditions of IWH; identify factors that influence IWH densities and investigate how they relate to restoration actions, such as bank stabilisation and riparian revegetation. The project will cover many estuarine habitats.

Contact: Zeb Tonkin (zeb.tonkin@dse.vic.gov.au)

Werribee River estuary environmental flows
Melbourne Water recently released water to the Werribee River estuary for environmental purposes early this month. Approximately 100 million litres per day was released from Melton Reservoir. The release was to benefit the environment downstream of the Werribee Diversion Weir, where water will spill over the weir to reach the estuary. The release was to allow small bodied fish to migrate downstream from the river into the estuary to spawn and will improve water quality where the river flows through Werribee township. This is only the second time Melbourne Water has actively managed the delivery environmental flows to an estuary and we are monitoring the outcomes to inform future management.

Contact: Sophie Bourgues (sophie.bourgues@melbournewater.com.au)

Estuary Environmental Flow requirements (Port Phillip and Westernport bays)

Melbourne Water is completing a project to prioritise where there is a need to determine environmental freshwater requirements for estuaries in the Port Phillip and Westernport region, and to conceptualise risk to our highest priority estuaries. The project aims to develop our understanding where freshwater-dependant environmental values are found, the level and types of flow stress, and the likelihood that processes needed to sustain estuary function are interrupted. This will allow us to undertake proactive planning, and prioritise our efforts to understand and manage estuaries. Conceptual understanding of flow risk to our highest priority estuaries will equip us to influence future management decisions, highlighting where important threats exist and where there is a need for more information.

*Contact: Sophie Bourgues (*sophie.bourgues@melbournewater.com.au*)*

Estuary Environmental Flow requirements (LaTrobe and Thomson rivers)
West Gippsland CMA has completed an investigation into the estuary environmental flow requirements of the La Trobe and Thomson rivers.

Contact: Eleisha Keogh (EleishaK@wgcma.vic.gov.au)

National Estuaries Network	**Meeting No. 24** Port Stephens, NSW April 9-11
AGENDA PAPER	CSIRO

Prepared by: Jonathan Hodge
Position: Project Leader
Organisation: CSIRO Land & Water

This is a brief update of some current CSIRO activities. For a more complete summary of a range of CSIRO projects in the coastal space, please refer to the previous NEN report.

5. Update – Estuary Management

- The TERN symposium was held in February and was attended by researchers and managers from around the country. CSIRO presented on the Australian Coastal Ecosystems Facility and the ACEF website was launched – http://acef.tern.org.au. ACEF is building a range of systems and services to help publish coastal ecosystem data and information and will continue to work with state and commonwealth agencies as well as regional bodies, local councils and others to help publish data and information using nationally supported systems.

- The Australian Coastal Councils conference was held in Victor Harbour in April.
  .1. At this conference, the National Seachange Taskforce announced the formation of the Australian Coastal Advocacy Alliance, which will lobby for coastal issues to be heard during the upcoming Federal election. The alliance currently includes the National Seachange Taskforce, the Australian Coastal Society, Surf Live Saving Australia and others.
  .2. Coastal Councils responded well to the opportunity presented by ACEF to host and publish coastal datasets. Councils were interested as both users and providers.

- As part of the eReefs project, CSIRO's coastal water quality algorithms for satellite remote sensing are being operationalised through the Bureau of Meteorology for the Great Barrier Reef region. This means that in the future, the Bureau will provide GBR water quality products derived from satellite remote sensing on a routine basis.

- The AODN Portal team (http://portal.aodn.org.au) have released their portal code as an open source product. This is now available for anyone to install and build their own web mapping portal. Several CSIRO projects including ACEF, SEQuITOR and eReefs will be utilising this portal code for visualising data and providing access to data and metadata.

- As part of the GBR World Heritage Area (GBRWHA) Integrated Monitoring Framework, a Data Management pilot project has begun, incorporating representatives from AIMS, GBRMPA, CSIRO, IMOS, eReefs, ANDS, SEWPaC, Queensland Government, Atlas of Living Australia, TERN and the AODN. This project aims to pilot the use of a range of existing technologies (eg. from TERN, IMOS, AODN, ALA, etc) to deliver a range of datasets for use in GBR management. This project will use some of the same principles and methods as those being used by TERN, eReefs, NPEI, etc and provides another example of a domain based implementation of existing interoperable data frameworks.

6. Update – Estuary Research

- Coastal Carbon cluster was launched in Sydney on 22nd Feburary.
  For more information see http://www.csiro.au/Coastal-Carbon-Cluster or contact andy.steven@csiro.au.

- An additional round of Moreton Bay flood plume monitoring was conducted to determine the extent of the sediment deposited into Moreton Bay during the 2011 floods. This field work occurred just after a second Brisbane River flood and therefore the second round of monitoring includes the impacts of both floods. A range of data will be available from these field trips including both bio-optical and bio-physical datasets.

- CSIRO and GA have acquired a range of high resolution (50cm) WorldView2 satellite imagery for coastal and reef areas around the country. Preview images are available at http://acef.tern.org.au/data/satellite_imagery. More imagery is to be acquired and image capture will recommence in the coming months. All of this data can be made available to project partners free of charge and ACEF will be providing overlays for mapping purposes through its online data portal.

- In collaboration with IMOS, the eReefs project has deployed several gliders in and around Heron Island on the reef shelf. Traditionally, these gliders are used in deeper waters and this will result in greatly improved data in coastal waters. One glider mission occurred as a cyclone was passing through the area and some very exciting data has been collected during this period.

- The TERN Supersite equipment installed in the Logan and Albert rivers performed well during the latest floods and will soon be available for anyone to visualise online through the ACEF portal. Some significant findings from this data are the time that it is taking for the estuary to return to normal estuarine conditions. The size and intensity of the flood have meant that lower reaches of the Logan River have a very high freshwater content for an extended period. This is providing a better understanding of estuarine variability and is providing additional context for nearby long-term monthly monitoring.

- Also related to the TERN Supersite, a number of fish (bull sharks, mullet, bream) have been fitted with acoustic tags. This data is also providing some interesting insights into the behaviour of various species during periods of flood.

- The eReefs project continues to progress towards an integrated coastal information system for the GBR. The project is now progressing towards making CSIRO's satellite remote sensing and hydrodynamic model datasets discoverable and accessible.

- ACEAS seagrass workshop - bringing together seagrass researchers from around the country to improve the national level understanding of seagrasses, including collating seagrass datasets from across the country.

7. List the 3 most important gaps/needs for better estuary management in your State/Territory:

- Better data sharing
- Uncertainty of national level funding
- Reduction in the ability of state agencies to continue existing activities

8. Any Other Significant Issues for Discussion

- TERN Coastal Facility has received an additional 18 months of base-level bridging funding. This will allow for the continued operation of ACEF services and will be matched by CSIRO. CSIRO will also help support the ACEF systems and services through a range of other projects.

Compiled by: Lynda Radke
Position: NEN Coordinator and GA representative

1. Coastal Marine and Climate Change Group: Seabed Mapping and Coastal Information Section

TERN. Negotiations continue for a partnership between OzCoasts and the Australian Coastal Ecosystems Facility.

Contact: Lynda Radke | Lynda.Radke@ga.gov.au | 02 6249 9237

2. Coastal Marine and Climate Change Group: Climate Hazard and Risk Section Update – Estuary Research

Geoscience Australia, with the former DCCEE, is undertaking a project aimed at developing a first national coastal sediment compartments classification for Australia. This project will provide a key contribution towards an improved national ability to carry out coastal risk assessments, and development of effective coastal management and adaptation planning instruments. This project will deliver new information on the spatial extent of discrete coastal sediment compartments and the sediment systems and geomorphologic processes that drive them. By contributing to a robust, nationally consistent process-based coastal classification, the outputs of this project will provide a conceptual framework to support regional and site-specific coastal management, and guide the selection of approaches to modelling shoreline response. Outputs from the project include a national classification of coastal sediment compartments, and case studies demonstrating the potential utility of the characterisation for assessing and modelling coastal vulnerability and shoreline erosion due to the impacts of climate change, including sea level rise. **A report prepared for the WA Dept. of Transport (http://www.transport.wa.gov.au/mediaFiles/mar_CoastalSedimentCells_web.pdf) summarises similar work done in WA and serves as a useful reference. As part of the project, GA will be conducting a stakeholder engagement roadshow in May/June presenting the outcomes of the project and future directions.**

Detailed vulnerability assessments in Busselton (WA) are on-going. These include impact assessments of future climate sea level scenarios and coastal response, specifically looking at the impact of inundation from storm surge. The studies combine the results of the University of Sydney's Shoreface Translation Model (providing estimates of the potential coastal sediment budget and associated shoreline position response to sea level rise) with detailed hydrodynamic storm surge modelling (utilising both ANUGA and GCOM2) to determine the potential areas of inundation. The report is due out early in 2013. Geoscience Australia is also undertaking

a study with Rockhampton Regional Council to look at the potential change in risk from various hazards under climate change, including sea level rise, storm surge and erosion.

Contact: Martine Woolf | Martine.Woolf@ga.gov.au | 02 6249 9075 | hazards@ga.gov.au

3. National Earth Observation Group: Science and Strategy Section

On 17 November 2011 the Assistant Treasurer, Mr Bill Shorten announced the Government's response to the Natural Disaster Insurance Review which contains a provision to improve flood risk information which involves Geoscience Australia building, hosting and populating a single access point or shopfront, complemented by the development of national guidelines for flood modelling and collection, comparability and reporting of flood risk information. The purpose of the shopfront is to provide a single authoritative source of flood related information for use by all or any sector ranging from local government through to industry.

The earth observation component will produce a time series of observed surface water over the continent of Australia as a spatial database. The time series will be derived from the historical satellite imagery available to Geoscience Australia, in particular the archive of Landsat-5 and Landsat-7 imagery, but with a view to also include historical data available from the MODIS archive. The spatial database will allow the time-series of observed water to be queried or combined to generate map products and web feature services.

The first proof-of-concept release of the National Flood Risk Information Project (NFRIP) was launched in November 2012, comprising a web-accessible database of flood studies for locations around Australia, and a flood mapping service allowing the visualisation of flooding derived from earth observation satellites. The flood mapping service concept comprises a national, MODIS-based product, and three Landsat study areas, demonstrating individual flood maps and flood summary information. The individual flood maps, available for the three study areas, demonstrate floods as observed by Landsat satellites for single dates. The flood summary product demonstrates long time series' of observations consolidated into single maps for MODIS nationally, and Landsat for each of the study areas, showing how often floods have been observed.

The project will release the flood summary product for priority areas across Australia by November 2013, followed by the remainder of Australia by November 2014. In addition, a search-and-retrieve system will be made available online, allowing users to choose a location and retrieve individual flood maps where flooding was observed between 1987 and 2012.

Contact: Medhavy Thankappan (02-6249-9310; *Medhavy.Thankappan@ga.gov.au*).

4. Groundwater Group: Groundwater and Environment Section, A National Scale Vulnerability Assessment of Seawater Intrusion Project

The project summary report is available from the NWC website: http://archive.nwc.gov.au/library/waterlines/85. Six technical reports are in production for publication as GA Records.

Contact: Baskaran Sundaram | Baskaran.Sundaram@ga.gov.au | 02 6249 9842 |

National Estuaries Network	**Meeting No. 24** Port Stephens, NSW April 9-11
AGENDA PAPER	Northern Territory

Prepared by: Simon Townsend
Position: Manager, Aquatic Health Unit
Organisation: Department of Land Resource Management

1. Update – Estuary Management

- A new Government was formed in August last year. Policies are being developed and Government approaches to the management of Darwin Harbour evolving.
- New suburbs of Darwin have been designed using Water Sensitive Urban Design to minimise sediment and nutrient loads to the Harbour. These designs however add to the cost of land and quite rightly the question is being asked whether this extra cost can be justified. The discussion however is hindered by an absence of monitoring and general understanding of the fate of pollutants to the Harbour. With the big storms experienced in the wet/dry tropics, the effective retention ponds to reduce suspended sediment is questionable, especially when most of suspension is fine and would not be expected to sediment. A lack of science is hampering sound decision making.
- Modelling of urban and point source pollutants to Darwin Harbour is near complete. The investment into the model has been placed mainly on inputs, and not addressed the potentially complex biogeochemical implications of additional N, P and sediment. Pollutant impacts have used a conservative tracer methodology with various assumed decay rates. Unclear though how true the model predictions are, and whether catchment development the recommendation for maximum pollutant loads based on them. Again, lack of science is hampering sound decision making.

2. Update – Estuary Research

- Research projects are being developed to: (1) map the benthic habitats of Darwin Harbour, Shoal Bay and Bynoe Harbour (a 3-yr project, with GA contributions), (2) determine the and source of cohesive sediments to inform the design of a sediment monitoring program, (3) scoping studies are being design to recommend monitoring programs for mangroves and lard substrate habiats (corals, sponges). All this research is funded by “Off-set” funds provided by the gas company INPEX which is currently dredging Darwin Harbour and building a gas liquidification plant.

3. Any Other Significant Issues for Discussion

- Long term objective (5-years) to integrate Darwin Harbour monitoring to achieve a comprehensive assessment of the harbour’s ecological health. This is as much a political/people/organisation issue, as a technical one.