ASSAY

A NEWSLETTER ABOUT ACID SULFATE SOILS

Issue # 52 **June 2010**

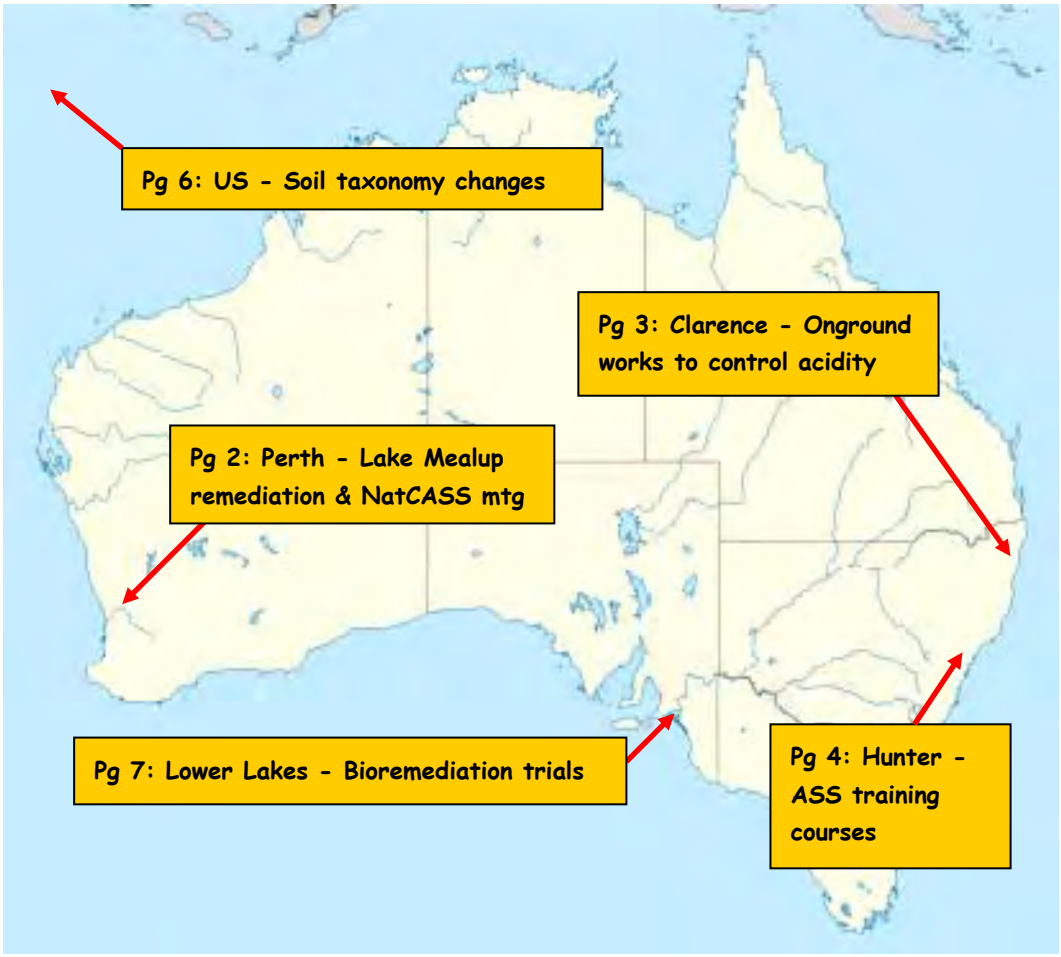
Comings & Goings…

Thanks to a shared commitment from the Federal, State and Territory National Committee for Acid Sulfate Soil (NatCASS) representatives, I am delighted to announce that ASSAY will continue to be produced for a further 12 months to June 2011. The good news was received at the last meeting of NatCASS in Perth. Many thanks go to the numerous people who have made this commitment to continue delivering quality acid sulfate soil knowledge-sharing via ASSAY.

In other news, John Williams, Chair of NatCASS, has announced his impending retirement before the end of the current financial year. John has been a seminal figure in acid sulfate soil management from its inception as a serious issue in the 1980s, right through to the present day. While we wish John all the very best for a well-deserved retirement, we will also lament the loss of the valued knowledge and practical experience that will be leaving with him.

Happy reading…Simon

Stories and places in this issue…..



Saving Lake Mealup – Western Australia

Clare Nixon, Department of Environment & Conservation

Lake Mealup ASS,* Typha *and macroalgae

An urgent recovery program has been implemented to stop the rapid decline of Lake Mealup, an internationally recognised Ramsar wetland south of Perth in WA.

Located on the eastern side of the Harvey Estuary and south-west of Pinjarra, the wetland covers an area of approximately 78 hectares. NRM project officer with the Department of Environment and Conservation (DEC), Heidi Bucktin, said Lake Mealup was valued for its waterbirds and surrounding bushland vegetation.

"However, the lake is under threat from reduced water quality, increased exposure of sulfidic soil materials and loss of open water habitat from the invasive weed *Typha orientalis,*" she said. "If nothing is done, biodiversity at Lake Mealup will continue to decline and will adversely impact waterbirds and their breeding cycles."

The Lake Mealup recovery program is a joint initiative between DEC, Lake Mealup Preservation Society and the Peel Harvey Catchment Council. Ms Bucktin said the main risk to the ecological health of Lake Mealup was the threat of continual exposure of sulfidic sediments and the extent of *Typha* invasion.

"Maintaining appropriate water levels in the lake will prevent further ASS exposure during summer and possibly prevent further acidification and spreading of invading *Typha,"* she said. She said a weir structure had been identified as the best way to manage acidity which was considered to be the key environmental threat at the lake. This structure is currently the subject of a referral under the Environment Protection Biodiversity Conservation Act. This means the Australian Government is determining whether it needs further assessment to consider its potential effects on matters of national environmental significance. If the structure is approved, a metre-tall, semi-permanent structure will be constructed in the drain (1.4 m AHD) to divert water into the southern drainage and keep the lake saturated.

However, Ms Bucktin said inundation of the lake could lead to formation of monosulfides and possibly eutrophication due to phosphorus release from the sediments. "We may need to employ management techniques, such as using Phoslock™ to lock up the phosphorus." Ms Bucktin said the major benefit of the recovery program would be the restoration of biodiversity to Lake Mealup.

"We are aiming to return the lake to a habitat suitable for water birds," she said. "Macro-invertebrate diversity is likely to be restored and overall abundance of animals enhanced with the improvement of water quality and overall wetland health over time."

For more information on the Lake Mealup recovery program, contact Heidi.Bucktin@dec.wa.gov.au

NatCASS meeting in WA

Clare Nixon, DEC (WA)

The 20th Meeting of the National Committee for Acid Sulfate Soils (NatCASS) was held in Perth, WA during April 2010.

NatCASS members were given the opportunity to visit a number of sites in South Yunderup, including an urban development adjacent to a RAMSAR-listed conservation site, acid spoils from previous canal development and an area of maintenance dredging.

WA NatCASS member and Department of Environment's Acid Sulfate Soil Section Manager Stephen Wong said the highlight of the field trip was a visit to Lake Mealup, a degraded Ramsar site of international significance (see the previous story). Mr Wong said NatCASS was focused on identifying acid sulfate soil risk and improving management of the affected areas to avoid adverse impacts on water quality and aquatic ecosystems in coastal regions.

Due to the alignment with NatCASS' areas of focus, the NatCASS membership were also in unanimous support of the proposed national guidance recommended by the national Joint Steering Committee for Acid Sulfate Soils (which includes a number of NatCASS members). This proposal for guidance development relates to key acid sulfate soil issues relating to water quality and asset degradation and was presented in the meeting.

"Four key areas for further guidance development have been nominated for Environment Protection and Heritage Council Standing Committee endorsement and funding," he said. These are:

- groundwater guidance for dewatering activities and other activities that may disturb ASS;
- guidance to manage iron monosulfide accumulation in waterways;
- guidance for dredging ASS sediments and dredge spoil management;
- review of existing technical guidance and creation of a national "Methods Manual".

Mr Wong said NatCASS' key success was the sharing of information and expertise to expedite knowledge exchange through regular meetings, training opportunities and support of the national newsletter, ASSAY.

Imesons Swamp improvements - NSW

Fiona Ensbey, Clarence Valley Council

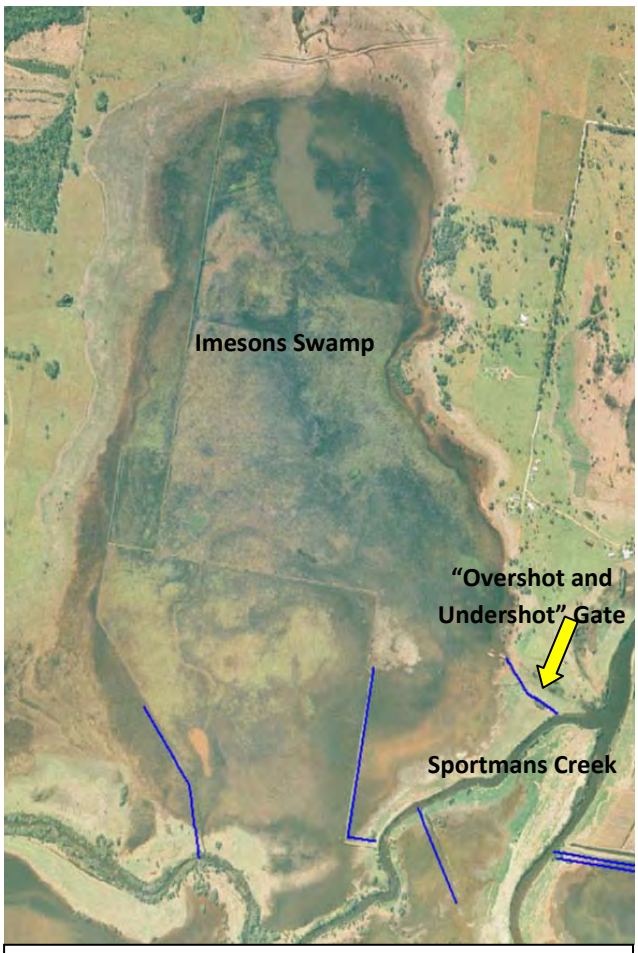
A new water retention structure has been installed in the largest drain in Imesons Swamp, northern NSW.

Imesons Swamp is a large and significant wetland, however previous drainage works and levee construction have unintentionally altered the hydrology, caused the degradation of wetland values and contributed to severe acid sulfate soil management issues.

By working together, landholders and Council have implemented a Drain Management Plan for Imesons Swamp and as part of this plan, have installed an "Overshot and Undershot" gate to help retain water in the wetland at an agreed level. This gate will enable the landholders to regulate the water level on their properties and improve the potential for wet pasture grazing.

These actions will also improve the wetland values, enhance habitat for wildlife and assist in the management and containment of existing acidity. Funding was provided for the on-ground works through the NSW Government's Environmental Trust's Urban Sustainability Program.

For further information please contact Nicole.white@clarence.nsw.gov.au



Aerial view of Imesons Swamp and location of the new water retention structure (Blue = Drains)

An "Overshot and Undershot" gate, a similar structure to that installed at Imesons Swamp

Acid sulfate soil training in the Hunter

Richard Good, NSW Land and Property Management Authority

The NSW Soil Conservation Service recently presented a series of acid sulfate soil training courses to environmental, operational and planning staff from Hunter Water Corporation in Newcastle.

Land and Property Management Authority
Soil Conservation Service

Simon Groves, Environmental Planner and R&D Coordinator for Hunter Water Corporation in Newcastle commented that "the awareness gained from the ASS courses by our staff will be advantageous given we have a large capital works program to deliver over the next four years. A lot of our ASS-trained staff passed on positive feedback from the courses.

Staff found the training to be both practical and relevant to Hunter Water's needs. Well-presented case studies were provided to our staff, they were easy to relate to, and included many local examples from the Hunter. We would recommend the Soil Conservation Service ASS training to organisations looking to increase their awareness on ASS issues facing their business and the environment."

The training focused on:

- Identifying the characteristics of acid sulfate soils and their likely occurrence;
- Describing the potential environmental and economic impacts of their disturbance;
- Using the ASSMAC Guidelines for best practice management of ASS;
- Using soil and water tests to calculate acid generation potential and lime requirements;
- Techniques and liming materials for treating acid sulfate soil and leachates;
- Preparation of ASS Management Plans.

Hunter Water staff - Bob Fraser and John Elich inspect a sample

For more information regarding the ASS training courses presented by the Soil Conservation Service, please contact Richard Good on 0408 691 473 or Richard.Good@lpma.nsw.gov.au

High demand for professional acid sulfate soil training

Chrisy Clay, Southern Cross University

Interest in Southern Cross GeoScience's professional short course on acid sulfate soils is steadily increasing with organisers receiving requests for the course from all corners of the country. The demand for training in acid sulfate soils has far exceeded expectations, and has uncovered a significant knowledge gap in many professionals operating in the field.

Since the 1990s planning controls, policies and guidelines have been progressively introduced across the country, to ensure the disturbance of acid sulfate soils is properly managed. However, to date, there has been little or no professional training on how to manage the issue during development and many stakeholders are unsure of current best management practices.

Organisers have found that even experienced practitioners, who have been working in the field for some years, are improving their knowledge, skills and confidence by attending the course. In particular participants are interested in obtaining further information on the detailed analysis of acid sulfate soils and how to interpret laboratory results. These aspects, as well as, conducting a desktop and preliminary assessment, identifying suitable management options and writing a management plan, are all covered during the course.

The course, being delivered with the assistance of Caring for our Country, will be run at least once in every State and Territory by June 2011. Building on its success, the course will be run later this month in Tasmania, where even as a relatively new issue, interest in the course has been high. The course will then be run in Victoria and the Northern Territory during October and again in Western Australia in late November.

For further information or to register for upcoming courses visit www.scu.edu.au/geoscience and follow the links. To express interest in any future courses, contact the course project officer Chrisy Clay on 02 6620 3095 or chrisy.clay@scu.edu.au

Revised definitions of the terms *sulfidic materials* and the *sulfuric horizon* from the new, 11th edition of "Keys to Soil Taxonomy"

Del Fanning, DelvinDel@aol.com or dsf@umd.edu

A new, 11th edition of "Keys to Soil Taxonomy" has been published online at http://soils.usda.gov/technical/classification/tax_keys/ . This new edition contains revised definitions and back up information for the terms *sulfidic materials* and *sulfuric horizon* which are used in classifying acid sulfate soils in soil taxonomy. See pages 29 – 30 of the document for further details on the revised definitions.

Photo: John Kelley (sourced from the front cover of the report)

Bioremediation program for managing acid sulfate soils in the Lower Lakes, South Australia

Russell Seaman, Liz Barnett and Ann Marie Jolley, SA Department for Environment and Heritage

Photo credits: SA DEH

In response to record low inflows and the exposure of up to 20,000 hectares of acid sulfate soils in the Lower Murray Lakes, the South Australian Department for Environment and Heritage (DEH) has been trialling several acidification mitigation measures.

One of these involves a Bioremediation and Revegetation Program, drawing on plantings and natural regeneration of vegetation along exposed shore margins. Not only does the re-establishment of vegetation help to reduce soil erosion and dust generation, but it also enhances bioremediation of acidity by promoting sulfate-reducing bacterial activity in the exposed soil profile.

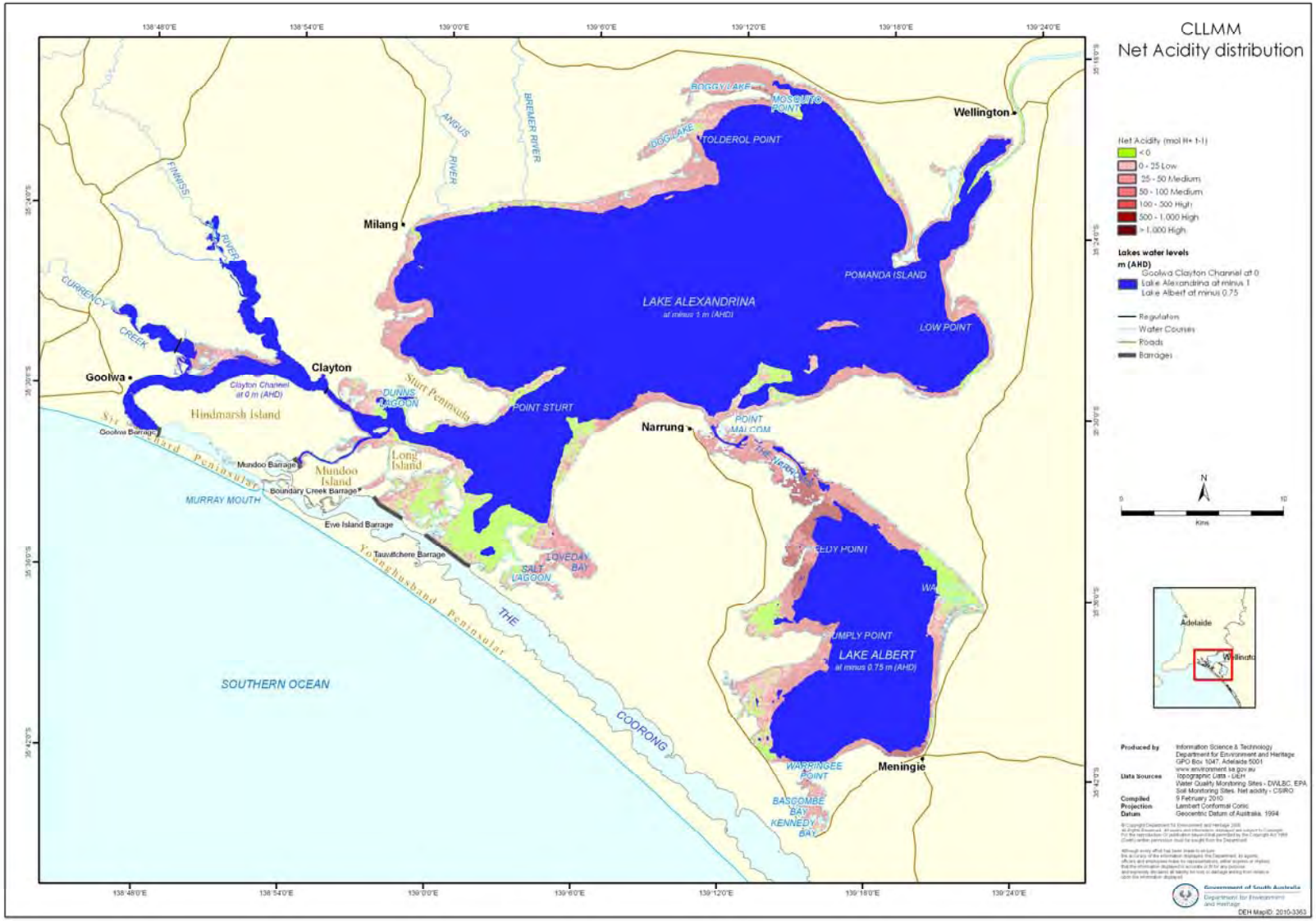
While these bacteria are likely to be prevalent throughout the Lower Lakes, they require sufficient organic carbon and iron to effectively convert sulfate back to sulfide under suitable redox and pH conditions. Reformation of sulfide can occur in several stages, and this process is being investigated to help reduce the risk of acidity in the Lower Lakes.

Revegetation trials 2008

Revegetation trials on exposed acid sulfate soils started in the spring of 2008 near Waltowa Swamp and in Lake Albert (refer to map). A range of reeds, seedlings and native grasses were planted to determine which grew best in the area. Natural revegetation lots were also included. The trials were used to analyse the potential benefits of revegetation for the management or mitigation of acid sulfate soils. The growing habits of the various plants, especially their root systems and growing periods, were also studied. A key aim was to identify those species which establish well and protect the soil surface, but do not extract large amounts of water from the soil (i.e. shallow-rooted types).

Re-vegetation trials - Waltowa Swamp (September 2009)

The results from the initial trials were used to undertake a broader revegetation trial, where 5,000 hectares of exposed lakebeds across the Lower Lakes region were seeded during autumn 2009. Up to 4,500 hectares were seeded by air using a cover crop (cereal rye) and *Puccinellia sp.*, a perennial native grass, while a further 500 hectares were machine-seeded. It was recognised that if nothing was done to stabilise the exposed acid sulfate soils, further erosion of the lakebed would be likely to take place.



Map of exposed acid sulfate soils in the Lower Lakes.

Large scale revegetation trial in Lake Alexandrina (2010)

The 2010 program began in early May with large scale re-vegetation works taking place on and around the Lower Lakes, which are being coordinated by Rural Solutions SA on behalf of DEH. The aerial seeding program used approximately 320 tonnes of seed, covering around 5,000 hectares of exposed lakebed. This wetland restoration project will include more than one million native seedlings being planted by hand by commercial and community planting teams, and is the largest known operation of its kind to date.

The bioremediation sulfate reduction research project

To better understand the sulfate reduction process and evaluate the effectiveness of the Bioremediation Program in managing acid sulfate soils, a bioremediation sulfate reduction project over the 2010/11 growing cycle is being conducted by Southern Cross University on behalf of the DEH.

The project will:

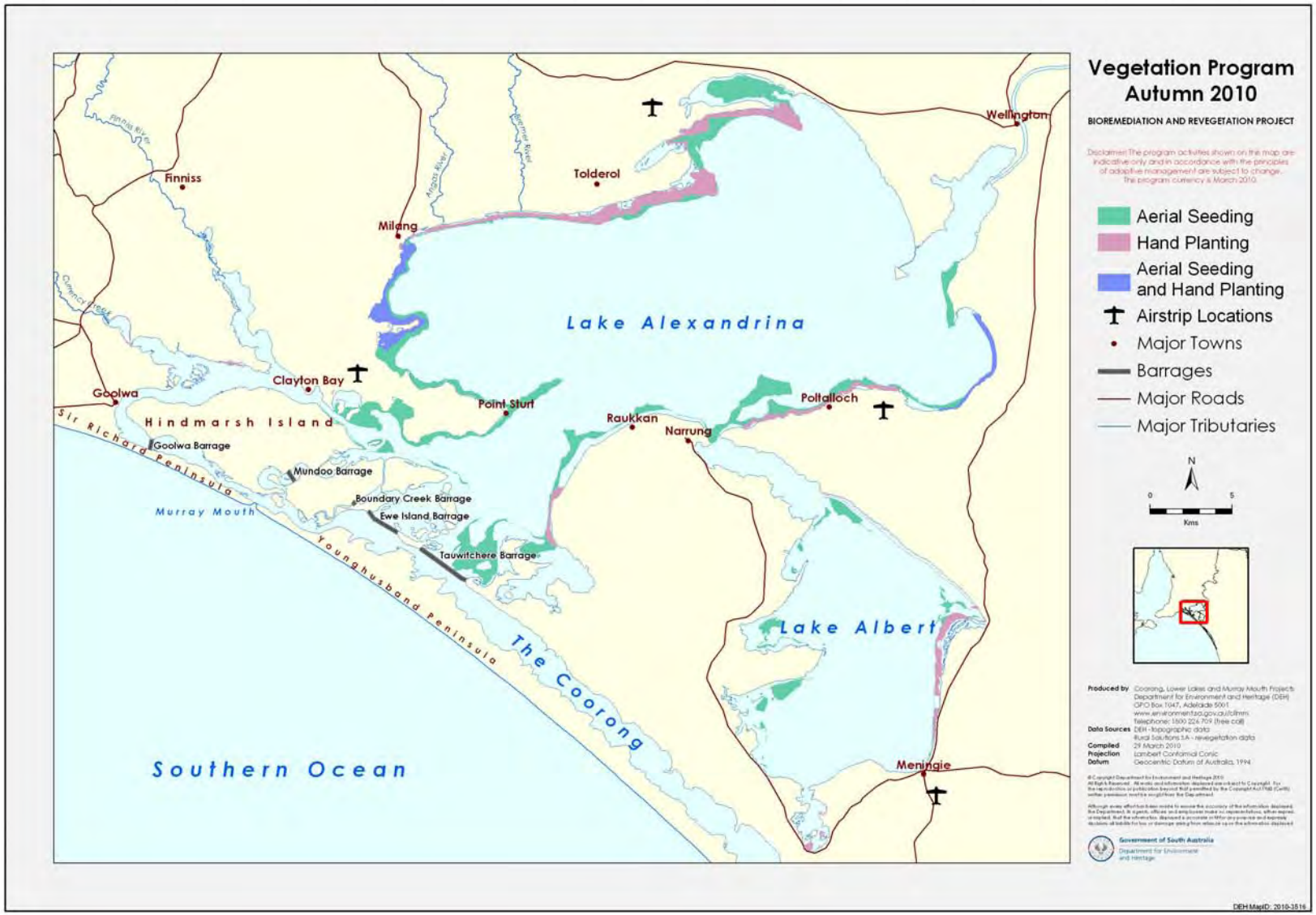
- track organic carbon increases at several sites in the Lower Lakes (in content and type of organic matter);
- quantify sulfate reduction rates at these sites as a result of any carbon changes (in content and type of organic matter);
- measure changes in alkalinity, sulfide contents and metal availability at these sites.

The results from these trials will be used to better manage acid sulfate soils in the Lower Lakes.

Planting seedlings on the exposed lake Bed, May 2010.

Photo: RSSA 2010

For further information on the bioremediation program for the Lower Lakes and the management of acid sulfate soils, visit www.environment.sa.gov.au/cllmm.



2010 Bioremediation and Revegetation program locations.

John Williams (Chair of NatCASS) retires

Various contributors

John, as Regional Director North Coast for NSW Agriculture from the early 1990s, was well-placed to recognise the need to address the emerging and controversial issue of coastal acid sulfate soil. Chairing the Acid Sulfate Soil Management Advisory Committee (ASSMAC), he brought together the diverse and often competing interests of other government agencies, local government, landholders and researchers.

In early 2000 John went on to become Chair of the National Committee on Acid Sulfate Soils (NatCASS), a committee under the national Natural Resources Ministerial Council which oversaw the development of the National Strategy for the Management of Coastal Acid Sulfate Soils. This committee has successfully dealt with many challenges including the implementation of state legislation, mapping acid sulfate soils nationally and the improvement of on-farm management practices to enhance water quality right across Australia's coastal estuaries.

The strong emotions engendered by the issue required a steady hand, strong leadership, listening skills and great powers of empathy and patience. John will be remembered for his ability to see well beyond the immediate and local context, with an appreciation of the vital importance of long term, sustainable approaches and outcomes.

Professor Ian White (ANU)

"He has displayed rare leadership abilities in his many roles as chair on ministerial and national committees, has been visionary and strategic, despite often overwhelming pressure at times for shorter, ad hockery. He has been even-handed and balanced, recognising the seriousness of the role of government and the impacts on farmers and the environment. He has been determined and persuasive, bringing together conflicting groups and organisations. Most importantly, he has been successful, bringing about quantum leaps in attitudes and practices with real environmental and production increases".

Dr John Beumer (Qld DPI)

"*I have worked with JW since the start of the NatCASS National Strategy. Descriptors of John include determined, good-humoured, good-natured, pragmatic and focussed. His capacity to integrate the often disparate views of the members of several ASS committees of which he has been chair has been the key to the successes enjoyed by these committees*".

Bernie Powell (Qld DERM)

"The effectiveness and sense of commitment and achievement engendered through NatCASS have been in large part secured through John's leadership and skills and also his support for NSW to do some of the heavy lifting with secretarial support and the continuation of ASSAY. All members of NatCASS will be sorry to see John go, and believe that his efforts has provided an enduring legacy for improved ASS management in both NSW and nationally".

ASSAY contact details

Previous ASSAY issues are available from:
http://www.dpi.nsw.gov.au/aboutus/resources/periodicals/newsletters/assay/

ASSAY is a quarterly newsletter about acid sulfate soils around Australia, and is available to all people interested in this issue.

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To subscribe, email the editor, Simon Walsh with "Subscribe ASSAY" in the subject line:

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ACID SULFATE SOILS

information and awareness