ASSAY
A NEWSLETTER ABOUT ACID SULFATE SOILS

No 23. September 1999

National news

National Coastal ASS Strategy

During its August meeting the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) endorsed the 'National Strategy for the Management of Coastal Acid Sulfate Soils'.

It will form a National Coastal Acid Sulfate Soil Coordinating Group (NATCASS) to facilitate implementation and distribution of the National Strategy. The terms of reference include: to improve information exchange between jurisdictions; to facilitate actions which involve multiple jurisdictions; to evaluate the strategy and develop annual reports; to aid research and technical support for ASS management and facilitate rehabilitation of disturbed sites.

Nominations will soon be called for from the following organisations for representation on this group: the NSW ASSMAC, Queensland Acid Sulfate Soil Management Advisory Committee, Environment Australia, AFFA, Local Government Association, National Farmers Federation, National Seafood Industry Council, Australian National University, CSIRO, ANZECC and MCFFA.

At this stage it is envisaged that NATCASS will have its inaugural meeting in October. The National Strategy is available on the internet at the following address:

http://www.dpie.gov.au/dpie/armcanz/pubsinfo/ass/ass.html. For a copy of the National Strategy when it is published, please telephone Jennifer Grant on 02 6626 1346 or email on jennifer.grant@agric.nsw.gov.au.

Federal Government ASS funding

In December 1998, the Federal Government launched Australia's Oceans Policy. The National Oceans Ministerial Board, established to drive implementation of the policy, has agreed to four major programs to implement the policy. One of these four programs is the Marine Environment Protection Program, which includes an ASS element. The Board has allocated around $3 million over three years for the ASS element, to be administered as the Coastal ASS Program (CASSP) within the Marine Group of the Commonwealth government agency, Environment Australia.

Funding will be allocated to projects consistent with existing Commonwealth programs, such as the Coasts and Clean Seas initiative.

Priority will be given to on ground rehabilitation works of demonstration value and proponents will be encouraged to form consortia of key stakeholders, such as the community, local and state government agencies and industry. Proponents will be required to provide matching funding.

The Federal Government is expected to make a more detailed announcement later this year, including advice on how to apply for funding. In the meantime, people who would like to be put on a mailing list to receive funding guidelines should forward their name, address, phone number and email address to cassp@ea.gov.au or call 02 6274 1030.

International ASS conference at Tweed Heads

Australia is to host the next International Conference on ASS at Tweed Heads, NSW in July/August of 2001.

The last international conference, "ASS Moving the Goal Posts" was held in Vietnam in 1992. Indonesia was invited by the Internation Union of Soil Scientiests (IUSS) to host a conference in 1997 but it did not eventuate. The Chair of the IUSS subcommittee on ASS, Freeman Cook, said that a working party will organise the internationl event. It comprises Mike Melville, Ian White, David Dent, Greg Bowman, Leigh Sullivan, and Rob Fitzpatrick. For further information please contact Freeman Cook 07 3896 9465, or email: freeman.cook@dnr.qld.gov.au

National Water Quality Strategy

The Australian Water Quality Guidelines for Fresh and Marine Waters - first published under the National Water Quality Management Strategy in 1992, is being revised. Environment Australia recently distributed for public comment a draft National Water Strategy which covers a wide range of water quality issues including ASS.

The guidelines set water quality objectives - as opposed to legal standards - that will sustain current, or likely future environmental values of natural and semi-natural water resources. Ground water levels are set for aluminium, iron, and heavy metals, which are often found in above average concentrations in the upper groundwater of drained ASS sites.

The Agriculture and Resource Management Council of Australia and New Zealand in conjunction with the Australian and NZ Environment and Conservation Council helped prepare the draft strategy. For further technical information contact Chris Humphrey at Environment Australia on 08 8979 9709.

Copies of the overview document or the full suite of documents on CD-ROM, may be obtained from Environment Australia, Community Information Unit email: ciu@ea.gov.au; or freecall 1800 803 772 or visit the Internet site at: www.environment.gov.au

Pig meat warning at North Queensland site

Draining of 700 hectares of acid soils near Cairns, in North Queensland, has created a serious environmental hazard needing sophisticated management to reduce the damage, a CSIRO study says.

The report ASS in East Trinity Inlet says local residents have been warned against eating wild pigs from the area because they may be contaminated by arsenic and zinc released from the soils by the acid.

Acid runoff from the area is approximately 190 times higher than the levels produced on equivalent sites in more temperate regions of Australia. The study, compiled by CSIRO's Environmental Projects Office from research findings presented to local residents earlier this year, says more than 120,000 tonnes of sulfuric acid had drained off the site since it was cleared in 1976 and a substantial reservoir still remains.

CSIRO Environmental Projects Office Manager Dr David Fox said, “the acid causes vegetation and marine life to decline, and strips toxic minerals into the water," he said.

Dr Fox says that 30,000 square kilometres of Australia's coast is potentially affected by ASS. "Coastal development, driven by the high value of waterfront investment and associated infrastructure worth over $10 billion is threatened by ASS impacts,".

"Acid drainage and poor water quality also pose considerable threats to coastal tourism and communities reliant on good quality estuarine water to attract visitors", the new report says.

The CSIRO report highlights the need to undertake additional scientific studies in collaboration with other agencies to ascertain the full nature and extent of ASS downstream impacts.

ASS and carbon emissions

The CSIRO Trinity Inlet report also identifies that drained ASS areas may make considerable contribution to Australia’s greenhouse gas emission levels.

Calculations based on the trial site show that the total area of drained ASS in Australia could have liberated as much as 10 megatonnes of carbon

dioxide a year for the last 20 years.

Almost as much for the entire continent caused by other land use changes. CSIRO's Warren Hicks says that another concern is the form of the release of carbon dioxide. "Because the ASS layers are naturally high in carbon, large volumes of CO^2 are released by the acid dissolving carbonates and the oxidation of the old organic matter deposits may be contributing to global warming," he said.

"The irony is that in their undisturbed state ASS wetlands are natural accumulators of carbon," Peat fires - common in drained ASS wetlands - can also release carbon. Results at East Trinity show an annual carbon loss of 33 tonnes per hectare. However the rate for temperate areas may only be about a tenth of this.

More information: Dr David Fox, CSIRO Environmental Project Office 0417 937 624 or 08 9333 6758.

NSW news

ASS remediation workshop

More than 45 scientists and researchers from around Australia met in Lismore for a three day workshop to debate management options for remediating drained broadacre ASS areas.

ASSMAC Technical Coordinating Committee Chairman, Prof Ian White said it is important to stop or slow soil acidification processes and the export of acid products. "The workshop involved a wide range of scientific disciplines debating how to best manage, from a water quality perspective, the large areas of NSW broadacre agricultural areas that are drained and acidified," Ian said.

The first session of the workshop examined current laboratory methods (see separate story in technical news). The second session focused on management options involving containment or neutralisation strategies. These strategies include holding water on backswamps, holding water in drains, active management of floodgates and use of saline water to neutralise acid. Other options canvassed included the use of vegetation and organic matter to treat scalded areas, plantation forestry to promote evapotranspiration, bioremediation using sulfur reducing bacteria, drain redesign to reduce interception of acid products as well as alternative neutralising materials.

The third day of the workshop involved presentations on a range of "hotspot" areas, including the Tuckean Swamp, Everlasting Swamp, Cudgen Lake, the Macleay catchment, Manning, Broughton Creek and Trinity Inlet near Cairns.

The advantages and limitations of various management methods were debated during workshop sessions. More than 30 papers were presented. A 300 page conference proceeding will be available in January next year. The workshop was sponsored by ASSMAC under the NSW Government's ASS

Some of the 45 participants at the ASS Broadacre Remediation workshop.

Program (ASSPRO). Copies of abstracts and the workshop program are available from Jon Woodworth - see back page for details.

NSW "Hotspots' Report" published

A report on NSW ASS "hotspots" was released last month following extensive field work and desktop studies by a team from the Department of Land and Water Conservation (DLWC).

The 26 hotspots are distributed across eight major catchments, from the Tweed to the Macleay and also include Broughton Creek on the Shoalhaven River. Kempsey based DLWC officer Mitch Tulau interviewed councils, state agencies, researchers, and industry representatives during the survey. Hotspots characteristically extend over several properties, have low elevation, a known history of land degradation, low pH water and high density drainage with low flushing capacity in nearby receiving waters.

The report identified a total of 50,000 hectares as being hotspots. The hotspot data will be used to help determine remediation and management options for drained, agricultural ASS areas. The hotspot reports will be available on request and are now available on the ASSMAC web site at: http://www.agric.nsw.gov.au/Arm/acidss/index.html.

Printed copies are available at DLWC offices at $5 per booklet. For further information please contact Mitch Tulau on tel 02 656 31212 or email mtulau@dlwc.nsw.gov.au.

ASSPRO projects

ASSMAC recently allocated more than $170,000 for a total of eight new projects under the Acid Sulfate Soil Program (ASSPRO). In 1997 the NSW Government allocated a total of $2.1 million over three years to ASSPRO as part of a state wide Acid Soil Action Program. A total of 40 projects were supported by ASSPRO funding over the past two years.

ASSPRO supports projects which foster:

- Industry and community education, awareness, training, investigation and demonstrations
- Industry and community participation in ASS management
- Development of management techniques to control acid formation and discharge into waterways and;
- Catalytic funding of on-ground works and measures to rehabilitate ASS areas.

New projects approved this year include:

Project Title	**Organisation**
Darawank Creek ASS scoping study:	Wallis Lake Estuary Management Committee
use of sluice gate to allow tidal flow in Clybucca	Seven Oaks Drainage Union
Land Elevation Survey Efficiency for ASS Hot Spots	Department of Land and Water Conservation
Rehabilitation of Exposed Acid Sulfate Soils - Crookhaven Creek	Shoalhaven City Council
Develop a NSW Dairy Industry response to ASS	NSW Dairy Industry Development Company
Database of ASS scientific papers	NSW Agriculture
Local Gov Enhanced Training Seminar Series	ASSMAC
Developing acidity barriers to eliminate toxic discharge to estuaries. Tweed River	University of NSW - David Waite

For information on any of the current or previous round of projects please telephone the Acid Soil Action Coordinator, Greg Fenton on 02 6938 1906 or email: g.fenton@agric.nsw.gov.au.

ASSMAC Macleay visit

The NSW Acid Sulfate Soil Management Advisory Committee, (ASSMAC) recently visited the Macleay district to inspect ASS management programs in the Belmore, Kinchela, Clybucca and Yarrahappinni catchments.

During a site inspection of Yarrahappinni, Department of Land and Water Conservation Officer, Peter Haskins, explained water quality responses (captured on dataloggers) during a short term unauthorised opening of the multiple floodgate structure to tidal water. Yarrahappinni Wetland Trust President, Terry Parkhouse, said a development application will be lodged with Kempsey Council seeking approval for a trial opening of the floodgates.

The site inspection also viewed revegetation of an extensive acid scald site at Clybucca which has regrowth of swamp oak trees and reeds due in part to a number of very wet seasons.

Technical news

Interim update of laboratory methods

ASSMAC Technical Coordinating Committee has changed the emphasis on some of the Laboratory Methods Section of the NSW ASS Manual in line with recent research presented at the recent Acid Sulfate Soils Remediation Workshop. (see separate story). An explanatory flyer explaining the Manual changes will be produced in the near future. If you are not a registered laboratory contact Col Ahern for a copy (see below).

Greater emphasis will be placed on the Chromium Reducible Sulfur (SCR) method of Sullivan et al (1999), particularly when results are close to the action criteria and for samples containing organic matter or considerable gypsum in conjunction with low sulfide content. As a result of the workshop, there is general agreement that SCR will be an important routine method assisting with assessment, particularly on more difficult ASS sites. "It has a faster turnaround time, is more precise than other methods at low levels and will be suitable for laboratories without major capital equipment," according to Col Ahern from QASSIT.

When calculations involving amounts of lime (for treatment) differs using the chromium reducible sulfur, TOS or POCAS (acid or sulfur trail) then the chromium method will take precedence. "Where the other measurements of oxidisable sulfur or acid trail give a lower result than chromium, then a case is needed to justify a lower liming rate," he said. This may include the reacted calcium and magnesium (CaA and MgA) from POCAS, evidence of reactive fine, or an effective Acid Neutralising Capacity (ANC). Laboratory ANC method 6.2 using 0.1M HCl is preferred over method 6.1 that uses 1M HCl. However, considerable further work on an appropriate ANC method for all ASS is required.

As a result of the workshop, there is general agreement that SCR will be a useful tool in aiding measurements on ASS. "It has a faster turnaround time and will be suitable for laboratories without major capital equipment." said Col. The ASSMAC TCC agreed that laboratories involved in ASS assessment will be expected to add the chromium method to their range of analyses by 1st March 2000. "However, I strongly encourage laboratories to do this now and gain experience with the technique as soon as possible.

(SCU's Leigh Sullivan and Graham Lancaster are happy to demonstate the technique tel 02 6620 3742 for details).

"Although the chromium method is a significant advance in accurate analysis of reduced inorganic sulfur, no one method will provide 'all the answers' when dealing with ASS," Col emphasised.

Actual Acidity:

" The workshop emphasised the importance of measuring titrated actual acidity on soils and water not just pH which can be a major underestimate of total actual acidity. Actual acidity (hydrogen, iron and aluminium ions) is immediately available for export into waterways during a rainfall event, often causing extensive environmental damage. Too often in the past, we have not considered actual acidity, Potential acid sulfate soils (PASS) are a future risk if their sulfides are allowed to oxidise, however it is the actual acidity and acid products which are causing an immediate problem on sites," Col said.

Where chromium reducible sulfur is performed instead of POCAS, then pH in KCl will be required. If the pH in KCl is less than 5.5, then a Total Actual Acidity (TAA) measurement will be required. Similarly, when TOS only is done, pH in KCL (and TAA if pHKCl < 5.5) are also required to measure actual acidity. As the TOS method may lack precision at low values of percent sulfur we strongly recommend that when TOS is less 0.1%

S that additional analysis by the SCR method be undertaken.

If TOS <0.1 %S, then the SCR method is recommended to give greater precision.

As a result of papers and discussions at the workshop. ASSMAC TCC decided that the TAA measurement will be multiplied by a factor of 1.8 before calculating lime requirements. The action criterion (18, 36 and 63 mol H+ /t), before applying the factor, will remain the same until further research is conducted.

For more information contact Col Ahern, Senior Chemist by email: ahernc@dnr.qld.gov.au.

ASS exchange samples

The soil sample exchange program for laboratory analysis of ASS is a joint initiative of the NSW ASSMAC and the Qld Department of Natural Resources, Qld ASS Investigation Team (QASSIT). This is the initial stage in developing a continuing quality assurance program for laboratory analysis of ASS.

Results from the exchange sample program identified major discrepancies between many laboratories. Some of these discrepancies were traced to errors in calculations, reporting units and misunderstanding of the methods.

However, even with some of these factors corrected, the variation between laboratories was too great to effectively use the ASPAC (Australian Soils and Plant Analysis Council) statistics package. Therefore no laboratory was given a "pass status". In general, variation was greatest with the Total Actual Acidity (TAA) measurements. Some of the variation in the sulfur trail was due to the different methods used for determining sulfate. Total sulfur determinations had less variation than the peroxide based methods.

A summary of the data was presented at the recent ASSMAC Remediation Workshop in Lismore. A more detailed paper will be completed in the next month and after peer review is expected to be printed in the ASSMAC Remediation Workshop Proceedings in January 2000. The information will also be made available to the participating laboratories in about a month. Another round of exchange samples is needed. A number of labs will want to have time to equip and have gained expertise with the chromium method prior to a second exchange round.

Berry project presented at American conference

Bruce Blunden from the University of Wollongong (Department of Civil, Mining and Environmental Engineering) recently attended the ASCE Environmental Engineering Conference in Norfolk, VA, USA. The theme was Stewardship of Coastal and Estuarine Areas. Bruce presented a paper titled, "Estuarine acidification caused by drainage of pyritic sediments in coastal lowlands" which described the processes leading to the generation of acid from pyritic sediments. The description of how ASS behave was illustrated using groundwater hydrology and water quality data collected from the Berry Weir trial. The paper was well received, particularly from conference delegates from the southern and eastern parts of the USA, where water quality degradation from coastal floodplains is becoming a major issue. For further information please contact Bruce on tel 02 4283 6765.

Hydrology under sugar cane on ASS

University of New South Wales' Mike Melville and Tweed Valley cane farmer, Rob Quirk, presented a joint paper at Pacific Science Congress in Sydney in July. Their paper was titled, "Managing sugarcane land to increase production and improve environmental outcomes with ASS". For a copy contatct via email: m.melville@unsw.edu.au or telephone 02 938 5391.

Mosquito control methods

Mosquito control is a vital consideration in any major development or rehabilitation of ASS areas according to Tweed Shire Council entomologist Clive Easton.

Clive recommends that any proposed reinundation of acidified areas with freshwater or saltwater be done at the start of winter when mosquito populations are small. Mosquito larvae are acid tolerant and existing acid water in rehabilitation land may limit predatory fish stocks. Tweed Shire Council is currently controlling with biological larvicides salt march mosquitoes around Tweed estuary and up river as far as Tumbulgum. The Tweed area recently recorded an outbreak of Ross River Fever and Barmah Forest viruses. More than 50 cases of the debilitating diseases - which cause muscular pains and long malaise - were recorded in the first six months of the year. Trappings however reveal mosquito numbers well below the 10 year average. Clive says that making apertures in floodgates to increases water pH (utilising bicarbonate in salt water) also enables fish access to larvae breeding drains.

He says mosquito breed immediately after reflooding of saltmarsh areas. Control involves a bacterial spray or a hormonal regulator which stalls larvae development. Clive says the best method is to create ideal conditions in which mosquito control insects such as water striders can breed. Water quality optimally should be kept at 5.5 pH to create right conditions and prevent a sudden brood of mosquitoes.

For copies of a more detailed, fact sheet on mosquito control please contact Clive Easton direct on 02 6672 0440.

ASS in the Bega district

Roy Lawrie of NSW Agriculture recently inspected the Bega district following reports of acid water harming fish and oysters. A fish kill in the Bega river where extensive swamps have been partly drained. Last year landholders in Jellat Jellat reported a fish kill in an area where extensive swamps are drained. ASS are not depicted on the risk maps at this location. The soils are grey and waterlogged at various depths, but lack visual evidence of ASS. When tested with peroxide, samples of the grey clay subsoil collected at 10 cm depth intervals failed to show any effervescence. A trace of jarosite was seen in a sandy layer in one profile, but again there was virtually no reaction with peroxide. The water table at this site recorded a pH of 4.27. Deep boring for groundwater in the area encountered shelly estuarine sediments deeper than 5 m below sea level, too deep to become oxidised. If ASS material is present in the area it may be either permanently waterlogged at depth, or present in isolated patches, possibly with a low sulfide concentration.

Further south near Merimbula Lake more soil inspections along the western shoreline also failed to detect ASS material. In this area losses to oyster production have been reported. Although strong evidence implicating ASS with water quality problems in the Bega-Merimbula district was not found, further water quality investigations are recommended. Further information: Roy Lawrie tel 02 4633 8327.

Chemists' workshop

The Royal Australian Chemistry Institute's NSW Northern Rivers section recently hosted a "Analysis and Management of ASS" seminar at

Lismore's Southern Cross University (SCU).

Associate Prof. Leigh Sullivan, from SCU's Centre for Research on ASS (CRASS) spoke on "Analytical methods for assessment ASS". Other speakers included: Richard Bush, on "The significance of iron monosulphides in ASS" and Dr Chuxia Lin, on "The chemistry of stored acidity in ASS" which explained the role sulfates play in buffering ASS plus how aluminium sulfates can store acidity. Associate Professor David McConchie, explained how red mud - a byproduct of bauxite refining - can be used to treat exposed ASS. "Red mud can bind up heavy metals and has possible use as a cheap alternative to agricultural lime for treating drain banks," he said.

Graham Lancaster, SCU Environmental Laboratory Manager, showed how the chromium reduction method is done in the laboratory with results available in under 30 minutes.

For further information please contact Dave McConchie on tel 02 6620 3000.

New water neutralisation treatment

Earth Systems Pty Ltd recently toured Qld and NSW to showcase its Neutra-Mill chemical dispensing system for treating acid water.

The system has been extensively used in acid mine drainage treatments and Michael Leake says the company is keen to apply the technology to ASS treatments. The Neutra-Mill contains a 1 m diameter drum which is partly submerged on a floating pontoon and can dispense quick or agricultural lime. The system removes iron and other precipitate coatings - which can crust neutralising agents by grinding particles together within the rotating drum. "The Neutra-Mill can be purchased, hired, or modified according to requirement."

"The system uses the buoyancy effect of water to reduce the energy and equipment needed to dispense neutralising material. While Ag lime may cost up to $100 per ton, crushed limestone may be available for just $20 per ton enabling greater neutralising effect for the same cost.

"The company is keen to develop new technologies to serve urban, agricultural and environmental requirements for the management of ASS," he said.

For further information please telephone Michael on 03 9205 9515 (see pic below).

Agricultural news

Raised bed farming on ASS

In Southern China's Pearl River Delta, highly productive vegetable crops are grown in raised beds, irrigated down the intervening furrows in a potential ASS area where the watertable, just below the furrow, is almost as saline as seawater. ASSMAC Technical Coordinating Committee Chair, Professor Ian White says similar techniques are used to farm ASS land in Vietnam's Mekong Delta.

Ian says that in ASS coastal areas, with or without irrigation, raised beds could have similar benefits provided laser levelling is used and furrows are run to shed rain water efficiently. Raised beds may:

- prevent waterlogging by draining excess surface and soil water and aerating the root zone;
- increase plant production and decrease variability of yields by increasing the amount of plant available water and the uniformity of the root zone;
- provide an opportunity to runoff excess wet season water which would otherwise recharge acid groundwater;
- minimise the rise of acid groundwater to the soil surface;

- improve the quality of runoff waters;
- minimise the use of lime, since only soil in the raised bed need treatment;
- control traffic compaction of soil and allow machinery access in the wetter periods.

Ian says that Greg Hamilton from Agriculture Western Australia has trialed raised bed farming in inland salinity areas to improve productivity. "This system has potential benefits both for landholders and for the environment in periodically waterlogged situations in general and in coastal ASS in particular," Ian says. For copies of a more detailed report on this issue please email or telephone ASSAY editor (see back page for details).

New ASS group for Manning Valley

The recent formation of the Coopernook and District ASS Landcare Group is an indication of Manning Valley landholders' concern about ASS issues.

Chairperson, Lloyd Gill said the group aims to draft drain management plans, initiate projects facilitate the exchange of information and liaise with other stakeholders.

Members of the group have been monitoring and researching ASS weed control and water quality issues in the Lansdowne-Motto area for the last three years. Members, using their own resources, plan to develop drain management plans to cover smaller sections of the Moto-Lansdowne hotspot regarded by the local oyster industry as a cause of acid pollution. Initial considerations include:-preventing deepening the drain; drain filling; allowing tidal ingress; and regular removal of spike rush. For further information contact David McCoy on email david.mccoy@agric.nsw.gov.au

Eucalypt plantation on ASS area

Tintenbar grazier, Frank Burke, has planted more than 13,000 eucalypt hardwood trees for timber harvest on a section of undrained potential acid sulfate soil floodplain just north of Ballina, NSW.

The three year old trees have grown to an average height of six metres. NSW State Forest helped establish the plantation using flooded gum tubestock. Frank recently bought out State Forests' share in the project which is recording a 95% seedling success rate. Frank says that parts of the plantation subject to tidal inundation during Spring high tides are not growing as well. The potential ASS material is located at more than a metre deep with topsoil at pH 5.5.

"During the past six months of exceptionally wet weather the trees did not grow well as in the previous two dry years," he said. Frank was able to introduce cattle onto the plantation early in the project to control grass which competes with trees. When

Michael Leake displays the Neutra-Mill at Ballina to Michael Wood Tuckean Landcare Coordinator; John Huegill, NSW Fisheries; and Brendan Lee, Wetland Link.

the trees were 18 months old, Frank introduced dehorned wiener steers that were deloused often to reduce the need for tractor slashing of grass and weeds.

For further information contact ASSAY Editor Jon Woodworth on 02 6626 1344.

Dairy pastures cope with high sulfate levels

Very high sulfate concentrations have been found in salty subsoils beneath the Shoalhaven River floodplain. The subsoils are on dairy farms near Berry, where Roy Lawrie of NSW Agriculture is monitoring soil properties and pasture growth likely to be affected by raised water tables. In a remediation project funded by Acid Soil Action a series of weirs block tidal flows up the drains and retain fresh water runoff. Extensive groundwater monitoring by Wollongong University show periodic increases in acidity and salinity in the groundwater at the site.

Samples of the subsoil collected before construction of the weirs were highly saline, below a depth of around one metre, in a zone mottled with bright yellow jarosite. Soil testing has found that the sulfate concentrations in the salty zone range up to 1.5%, or about 1000 times higher than the chloride level. This indicates that the high soil salinity is not derived from the sodium chloride, the common salt present in tidal water. Instead, the salt has come from the soil, by oxidation of the pyrite it used to contain.

Rising saline water tables can devastate plant growth. The white crusts of salt seen in areas of ASS are not quite as lethal as in inland salinity, if they contain mostly sulfate instead of chloride salts. Raising the water table might not be as harmful to pastures if the salt it contains is mostly sulfate. A number of pasture species are being monitoring at Berry, but after several months of raised water tables, ensuing detrimental effects on growth were not observed. Sulfate concentrations in the root zone in the upper half metre of the profile are much less than in the lower half. So far, rainfall has been above average, but dry conditions are needed to further evaluate the impact of the weir construction.

For further information Roy Lawrie on tel 02 4633 8327.

Floodgate projects

NSW Fisheries' Minister opens floodgates

NSW Fisheries' Minister, Eddie Obeid, recently officially opened floodgates at "RiverBand" in North Tumbulgum, as part of a Tweed River environment management plan.

"More than 30 kms of waterway will be accessible to fish through opening the floodgate and four others in the Kynnumboom Plain during non flood periods," Mr Obeid said.

"By opening the floodgates we dramatically improve drainage channel flushing, increase fish passage and aquatic weed control, raise water quality and achieve better control of ASS leachate".

"Much of the conservation initiative comes from North Tumbulgum and Kynnumboom Plain landholders who recognised the environmental benefits. Landowners had winches designed and installed at their own expense. "The willingness of landholders to trial floodgate opening on their properties is a major step in fish habitat management," Mr Obeid said.

Floodgate openings

John Huegill from NSW Fisheries Ballina, is exam-

ining active floodgate management options for the Tweed, Richmond, Bellinger, Nambucca, Macleay and Manning catchments. The Federal Natural Heritage Trust funds the project with support from Tweed and Kempsey Shire Councils, and supervision from the North Coast Regional Catchment Committee.

The project aims to increase fish passage in waterways, improve riparian habitat, improve water quality, as well as ASS leachate control and neutralisation, aquatic weed control and drainage channel flushing.

Currently underway in the lower Macleay is a water quality monitoring project involving Raffertys Drainage Union; Scott Henderson, NSW Agriculture; Greg Robinson, DLWC; John Huegill, NSW Fisheries and recreational fisher, Alan Lyons. Drainage Union members, Jocelyn and Ron Bakewell, will help monitor water quality, pH, salinity, iron, aluminium and dissolved oxygen. This information, together with weather and tidal information, will help identify management options to improve water quality.

Clarence River environmental audit

The Clarence Floodplain Project has recently completed an assessment of coastal floodplain watercourses controlled by Clarence River County Council (CRCC) floodgates. The study enables a priority list for allocation of resources for improved management of floodgated watercourses.

Seventeen modified creeks were classified as high priority, with another nine low priority sites assessed. Four of these high priority sites now have floodgate management plans in place, in cooperation with local landholders. Discussions are continuing with landholders at another four sites. The Stage 1 summary report is available now, with the stage 2 report - an assessment of 130 floodgated drains - due in May 2000.

Floodgate protocol

The Clarence Floodplain Project (CFP) protocol for implementing floodgate management plans in cooperation with local landholders is helping Council administration keep pace with community demand. To date six management plans have been signed, with another six pending. Discussions commenced at a further three sites, and requests received for another seven which are yet to start. Costs to complete the works required before plans can be implemented vary from $5,000 to $50,000 per site.

The CFP is also considering consultants' proposals regarding an assessment of: Shark Creek acid problem; Sportsmans Creek weir structure; and data logging at Sportsmans Creek. These studies will clarify important issues in management plans being developed over the next year.

Greg Robinson training Drainage Union members in the use of a 'Stream Watch' water quality kit. (l-r) John Huegill, NSW Fisheries; Greg Robinson, DLWC; Ron Bakewell & Billy Meehan, Raffertys Drainage Union and Alan Lyons, Recreational Fisher.

Management options under investigation for Alumy Creek are largely focused on improving environmental flows either by additional inflows (from the river or reclaimed water) or replacing outflows (eg by irrigators using reclaimed water). Extensive testing of Alumy Creek waters is also underway via the Grafton Urban Area Impact Study (DLWC). More information: Katrina Williams or Alan Cibilic, CRCC: 02 6642 3277.

Queensland news

ASS and road construction

A half day workshop on "ASS Management in Road Construction and Maintenance" was held at the Carlton Crest, Brisbane on Tuesday 20 July, 1999. The Department of Main Roads, Institution of Engineers and Qld Department of Natural Resources sponsored the workshop which attracted 130 participants.

Presenters provided information about identification and chemistry of ASS, legislative requirements, sampling equipment and handling, interpretation of laboratory results and management of ASS. * Please see the ASSAY Diary (last page) for future workshops details.

ASS Presentation to Pine Rivers

Catchment Association

Julie Anorov and Kristie Watling of the Queensland ASS Investigation Team (QASSIT) recently addressed the management committee of the Pine Rivers Catchment Association Inc. The presentation covered identification and management issues associated with ASS and included a demonstration of how to conduct a field peroxide test.

The committee is interested in ASS management issues and consists of representatives from state departments, local councils, industry groups (sand and gravel extraction) and the local community.

ASS sampling equipment

Effective sampling of ASS is rarely a straightforward exercise, however QASSIT's recent purchase of a Geoprobe will significantly enhance ASS sampling capability.

The Geoprobe is a track mounted, self-propelled all-terrain vehicle improving accessibility to notoriously difficult ASS sampling sites. The Geoprobe is a hydraulically powered percussion machine that can sample to depths of up to 30 m. The Geoprobe obtains continuous soil samples that are contained in a 1.2 m removable clear polymer liners. The samples can be logged immediately or sealed and frozen for later logging. The Geoprobe retrieves soft sands and muds with minimal compaction.

CRC promotes best management of ASS

CRC Sugar has recently released an educational video called "Managing ASS" which covers research funded by the CRC for Sustainable Sugar Production. This video is a collaborative effort between industry and researchers and includes appearances from canegrowers, government department scientists and researchers.

The CRC aims to deliver benefits to industry and the community based on collaborative research and development of key sugar industry environmental and production issues.

This video looks at management of ASS in canelands and highlights some of the findings of a research project in the Pimpama catchment in South-east Queensland which looks at acid export and its management. For further information con-

tact CRC Sugar, on crcsugar@jcu.edu.au.

ASS diary

Display at Lowlands Festival

QASSIT will have a ASS display at this year's Lowland Festival at Osprey House Environment Centre at Griffin in South-east Queensland. QASSIT will also conduct presentations and chemical demonstrations throughout the day. For more information about the Lowlands Festival and about how your organisation can become involved please contact Nathan Lee, Lowlands Festival Coordinator, on 07 3886 2260.

Excavator ASS training workshop

Date: October 12 at 7pm, Tweed Shire Council,
Contact - Jon Woodworth 02 6626 1344.

QASSIT ASS workshop & field trips

Date: 15th October, 1999, Gladstone
1-day workshop and field trip, Cost: $30.

Yeppoon - one day workshop

Date: 12 October
Basic ASS identification, field test sampling for safety issues, management, local issues, Cost $30
Please RSVP September 20 contacts to local organiser John Ross DNR 07 4938 4247.

Mackay

Date: 3 - 4 November 1999, 2 day short course - $120, Day 1 - Introductory Course only - $50, All registrations to: Ross Gooley, tel: 07 4951 8881 or Jacki Wirth, tel: 07 4951 8975.

DAMOS '99 -

A workshop co-hosted by The University of Sydney and the Australian Soil Science
November 22 -26th, 1999, Relevant experts from universities, CSIRO, DLWC, NSW Agriculture, State Forests and private enterprise will present lectures and practical sessions at the workshop.
Registration forms may be obtained by email at: brendang@sf.nsw.gov.au or tel: 02 98720136.

NSW Coastal Conference -

Date: 16th - 19th November at Foster
Details - Telephone Gerard Tuckerman at Great Lakes City Council - 02 65916222

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