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Environmental Research Institute of the Supervising Scientist Workplan 1997-1998

Environmental Research Institute
of the Supervising Scientist

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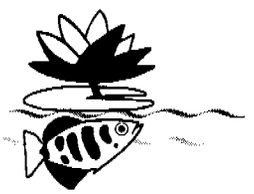
ENVIRONMENTAL RESEARCH INSTITUTE

OF THE

SUPERVISING SCIENTIST

WORKPLAN 1997–1998



OUR VALUES, VISION AND OBJECTIVES

The Environmental Research Institute of the Supervising Scientist (***eriss***) is a branch of the Supervising Scientist Group of Environment Australia, within the Department of Environment, Sport and Territories. ***eriss,*** as part of Environment Australia, operates in the strategic framework provided by the Environment Australia Corporate Plan and is committed to the values expressed there to guide our dealings with our Minister, clients, stakeholders and each other. ***eriss*** is also a highly specialised agency in a unique geographical location, requiring its own strategic plan and corporate work plan.

The strategic directions of ***eriss*** are contained in the document entitled '***eriss*** Strategic Plan', which was last revised in 1995 and needs to be redeveloped in the light of recent changes to the Supervising Scientist's administrative arrangements and projected budget. This revision is currently underway and will involve the Supervising Scientist, the staff of ***eriss*** and our major stakeholders including, in particular, the Aboriginal people of the Kakadu region.

The mission statement of ***eriss*** is:

- To be recognised as leading providers of independent environmental management advice.

Our Principal Objectives are:

- Provide advice to the Minister, based on general environmental research, on issues specifically identified by the Government.
- Provide advice, based on research and monitoring, to the Supervising Scientist and other stakeholders on standards, practices and procedures to protect the environment from the effects of mining, particularly uranium mining in the Alligator Rivers Region.
- Provide advice, based on research and monitoring, to the Supervising Scientist and other stakeholders on the social impact of mining and other developments on the Aboriginal people of the Alligator Rivers Region.
- Provide advice, based on research and monitoring, to key stakeholders on the protection and management of wetlands.
- Communicate with key stakeholders to identify needs and priorities and publish, and provide advice on, the results of our research in a manner suited to the needs of stakeholders.
- Communicate with the broader community on the results or our research, and in particular understand and meet the information needs of the local Aboriginal people.
- Develop purposeful partnerships with industry, government and community groups at a local, national, and international level in order to optimise environmental research.
- Ensure the provision of a high standard of technical and administrative support to the research programs in line with Government policies.
- Pursue appropriate opportunities to support and enhance ***eriss***' research base
- Promote ***eriss*** locally, nationally and internationally as a leading environmental research body.

WHAT *eriss* WILL DO

The primary reason for the Institute's existence is to carry out independent research, on behalf of the Australian community and our stakeholders, to establish the best methods available for the protection of people and ecosystems in the Alligator Rivers Region both during and following mining in the region.

We recognise, however, that some sectors of the Australian community, particularly Aboriginal communities downstream of mining activities and Aboriginal traditional owners of the land affected, have concerns about the possible impact that mining might have on the highly valued environment of the region which includes Kakadu National Park, a world heritage area of international renown which was listed on the basis of both cultural and environmental criteria.

Following the Government's decision in 1993 that the Institute should carry out more general environmental research, we have, therefore, chosen to make a special contribution to the wellbeing of people and the environment of the region by carrying out research on the protection and management of wetlands, a field of growing importance and one in which the Institute has recognised expertise. By the 1999–2000 financial year, we hope that this program will be earning a very significant proportion of its running costs from external contract research.

Our research program needs to be developed in cooperation with the communities potentially affected, as well as regulators, mining companies and wetland managers. Thus, the outcomes of our programs need to be communicated in forms that are suitable for our diverse target audiences. A special challenge is posed by communicating about research directly to Aboriginal people of the region, and this will be a focus of ***eriss***' work plans in 1997–98.

To fulfil these expectations of ***eriss***, we will carry out the following programs:

- research on the impact of mining, particularly uranium mining, on people and ecosystems.
- research on the protection and management of wetlands in northern Australia.
- general environmental research as requested by Government.
- provision of corporate support services to the science programs and staff.

IMPACT OF MINING PROGRAM

The objective of our program on the impact of mining is:

> ***through research on the environmental impact of mining, particularly uranium mining, enable the development of standards, practices and procedures that will ensure protection of the environment both during mining operations and following rehabilitation.***

The 1997–98 program includes some areas of additional new project work, and heralds the conclusion of a number of projects. Work on the effect of soil ripping as a rehabilitation tool to reduce erosion has been completed. Also completed is work on radionuclide concentrations in Magela Creek, and phase 2 of the laboratory scale bioreactor which removes uranium and radium from water. Major project work on Mount Lyell has been completed and the new ANZECC water quality guidelines are nearing completion. Significant work time expended on the Jabiluka EIS will soon be complete. The commitment that ***eriss*** has made to the Kakadu Region Social Impact Study is largely completed, with the study report having been presented to the Commonwealth and Northern Territory Governments.

New work to be undertaken in the 1997–98 year includes projects related to Jabiluka. Baseline radionuclide, chemical and biological data from Swift Creek will be gathered, and baseline work will be undertaken on associated billabongs. Because the Jabiluka project entails higher concentrations of radionuclides, dose rates to both members of the public and to workers will become a more important issue. Monitoring of atmospheric radon and its daughters will receive greater attention in 1997–98 with expansion of a district radon monitoring program. Because some concern has been raised by Aboriginal people on the concentrations of radionuclides in bush tucker, further research involving the collection and radioisotope analysis of bush tucker has been initiated.

Other new research includes collaborative work on sediment toxicity testing. Work will also be undertaken in remote sensing and use of Geographic Information System (GIS) for evaluation of environmental impacts of uranium mining. Airborne radiometric data will be obtained from the Ranger Jabiluka and Nabarlek mines, and digital spectral data will also be collected. These data will be analysed in a GIS which will be developed in 1997–98 in collaboration with NTU and the ***oss***.

Much of the 1997–98 research program builds upon research efforts of the previous year particularly in the fields of the radiological impact assessment of radon emanation and dust resuspension, the performance and function of wetland filters, biological monitoring, and landscape evolution modelling. In determining the program, the Institute has taken into account the priorities for research that were agreed at the meeting of the Alligator Rivers Region Technical Committee on 5 December 1996.

Assessment of the impact of mining on people

During 1997–98 we will include the following tasks and performance will be judged against the indicators listed:

Table 1 Projects for 1997–98 in the Impact of Mining Program - Assessing the impact of mining on people

Project and aims	Staff commitment (pw)	Indicator
Identification of traditional Aboriginal foods for radiological assessment		
Aims 1 Identification and cataloguing of traditional Aboriginal foods collected in the Alligator Rivers Region. 2 Recognition of the preparation techniques used with traditional foods. 3 Measurement of radionuclide content of traditional foods for estimation of radiological significance. *Project leader:* B Ryan	*Res staff:* 4	Internal Report June 1998. *Commence:* 1997 *Expected completion:* 2000
Radiological impact arising from uptake by freshwater mussels		
Aim: Analyse and publish the data currently available on uptake of radionuclides by freshwater mussels in the Alligator Rivers Region. *Project leader:* P Martin	*Res staff:* 8	Internal Report 'Freshwater mussels as environmental monitors of natural-series radionuclides'. December 1997. *Commenced:* July 1997 *Expected completion:* December 1998
Aim: Develop a method for rapid assessment of the radiological impact of waters discharged from uranium mines. *Project leader:* P Martin	*Res staff:* 8 *Tech staff:* 2	Internal Report 'The use of live mussels in the monitoring of release of uranium mine effluent'. November 1997. *Commenced:* 1995 *Expected completion:* November 1997
Radiological impact arising from dispersion of dust		
Aim: Determine dust dry and wet deposition factors to enable prediction of the transport of radionuclides on dust from rehabilitated minesites. *Project leader:* P Martin	*Res staff:* 15 *Tech staff:* 6	Internal Report 'Grain size distribution of radioactivity in the vicinity of the Ranger Mine'. August 1997. *Commenced:* 1992 *Expected completion:* December 1998
Radiological impact arising from dispersion of radon and radon progeny		
Aim: Develop and validate a model for the atmospheric dispersion of radon and radon progeny. *Project leader:* P Martin	*Res staff:* 4	Supervising Scientist Report 'Validation of a radon dispersion model over a five year period'. September 1997. *Commenced:* 1988 *Expected completion:* September 1997
Aim: Assess the importance of unattached radon progeny for public and employee radiation exposure at the Ranger mine. *Project leader:* P Martin	*Res staff:* 2	Supervising Scientist Report 'Two stage diffusion battery measurements from Jabiru and Jabiru East'. January 1998. *Commenced:* 1993 *Expected completion:* January 1998

Project and aims	Staff commitment (pw)	Indicator
Establishment of a regional radon measurement network		
Aims: 1 Establish a network of radon and meteorological stations in the Alligator Rivers Region. 2 Collect time-series data; establish background radon levels and determine the effect of uranium mining on regional radon concentrations. *Project leader:* S Tims	*Res staff:* 10 *Tech staff:* 10	Establish a second radon/meteorological station at JaJa December 1997. *Commenced:* 1997 *Expected completion:* 2000
Uranium in groundwater seepage at ERA - Ranger		
Aim: Determine uranium retardation factors in the groundwater aquifer at Ranger. *Project leader:* P Martin	*Res staff:* 10	Internal Report July 1997. Supervising Scientist Report June 1998. *Commenced:* 1996 *Expected completion:* June 1998
Radiological impact assessment of the rehabilitated Nabarlek site		
Aims: 1 To validate presently-used models for radionuclide transport in the environment. 2 To obtain information to assist in planning for the rehabilitation of uranium minesites. 3 To enable a prediction of radiological dose in the vicinity of the Nabarlek site. *Project leader:* P Martin	*Res staff:* 45 *Tech staff:* 20	Internal Report 'Radiological impact assessment of the rehabilitated Nabarlek site: Phase 1'. September 1997. *Commenced:* 1996 *Expected completion:* 1999
Long term erosion of tailings from a above-grade repository		
Aim: Assess the potential for radionuclides in eroded tailings to disperse in solution. *Project Leader:* C leGras	*Res staff:* 3	Internal Report 'Long-term tailings erosion: Leaching and dispersal of labile radionuclides' September 1997 *Completion:* September 1997
Aim: Determine the potential effects of deposition of eroded tailings in wetlands and the influence of the chemistry of wetland systems on the release of radionuclides into solution. *Project Leader:* D Klessa	*Res staff:* 10 *Tech staff:* 10	Internal Report 'Radionuclide concentration in the water column arising from the deposition of dispersed tailings'. *Completion:* December 1997
Kakadu Region Social Impact Study (KRSIS)		
Aims: 1 To participate in the study through membership of the KRSIS Advisory Group. 2 To provide secretariat support to the KRSIS Advisory Group. *Project Leader:* M Andrews	*Res staff:* 4	Report of the KRSIS Advisory Group - 'Aboriginal Action Plan'. *Commence:* October 1996 *Completion:* July 1997

Assessment of the impact of mining on ecosystems

During 1997–98 we will include the following tasks and performance will be judged against the indicators listed:

Table 2 Projects for 1997–98 in the Impact of Mining Program - Assessing the impact of mining on ecosystems

Project and aims	Staff commitment (pw)	Indicator
Early detection of mine-related effects using creekside testing procedures		
Aim: Transfer knowledge and expertise on ***eriss*** creekside protocols to ERA. *Project leader:* C Humphrey	*Res staff:* 3 *Tech staff:* 5	Internal Reports and ***eriss***notes on ***eriss*** creekside monitoring protocols: baseline data, data analysis procedures and maintenance procedures; January 1998. Reports on joint ERA/***eriss*** biological monitoring program, Wet season 1995–1996 & 1996–1997; December 1997. Review need for further testing: November 1997. *Commenced:* 1985 *Completion:* protocols January 1998; review of further testing November 1997.
Community structure of macroinvertebrates in streams		
Aim: Develop a biological monitoring program based on the community structure of benthic macroinvertebrates in streams of the ARR. *Project leader:* R O'Connor & C Humphrey	*Res staff:* 37 *Tech staff:* 24	Internal Reports: 1) Macroinvertebrates of 'macrophyte-edge' habitat in Magela Creek, 1988–1996; August 1997. 2) Analysis of 5-stream, 'macrophyte-edge' data set, 1995–96, for selection of future control streams; December 1997. 3) Determine within-site sampling effort for future monitoring of macrophyte-edge habitat; April 1998. 4) Evaluation of live-sorting procedures for Magela Creek study; Jun 1998. Sampling of Magela Creek and control streams; May 1998. 5) Complete internal review and develop a proposal for a demonstration monitoring project. May 1998 *Commenced:* 1988 *Review:* June 1998 *Completion:* Ongoing
Community structure monitoring: fish		
Aim: Develop a monitoring program to detect effects of mining on Magela Creek ecosystems using fish in lowland billabongs. *Project leader:* R Pidgeon	*Res staff:* 10 *Tech staff:* 19	Report on evaluation of monitoring procedure and status of research program; November. Sampling program for completed; June 1998 Protocol for monitoring procedure: June 1998 *Commenced:* 1984 *Completion:* Review June 1998
Aim: Develop a monitoring program to detect effects of mining upon recruitment and migration of fish in Magela Creek. *Project leader:* R Pidgeon	*Res staff:* 8 *Tech staff:* 7	Report on evaluation of monitoring procedure and status of research; November 1997 Sampling completed may 1998 Protocol for monitoring using chequered rainbowfish; June 1998 *Commenced:* 1984 *Completion:* Review June 1998

Project and aims	Staff commitment (pw)	Indicator
Aim: Assess the recovery of the fish community in Gadjarigamundah Creek near the Nabarlek uranium mine. *Project leader:* R Pidgeon	*Res staff:* 4 *Tech staff:* 3	Data analysed and internal report submitted; December 1997. Draft external publication submitted; February 1998 *Commenced:* January 1995 *Completion:* February 1998
General biological monitoring		
Aim: Publish proceedings of Workshop to review ARRRI Biological Monitoring program. *Project leader:* M Finlayson & C Humphrey	*Res staff:* 3	Draft proceedings submitted; August 1997. *Commenced:* January 1994 *Completion:* Jan 1998
Sediment toxicity test		
Aims: The development of a sediment toxicity test for tropical conditions. *Project Leader:* D Klessa	*Res staff:* 5 *Tech staff:* 5	Six monthly Internal Report: June 1997. *Commenced:* 1996 *Completion:* October 1999
Limnological characteristics of Swift Creek		
Aim: Determine temporal and spatial water chemical, biological and radiological characteristics in the Swift Creek catchment. *Project Leader:* D Klessa	*Res staff:* 12 *Tech staff:* 12	Internal Report: 'Characteristics of water in the Swift Creek catchment' June 1998. *Completion:* June 1998
Source of sulphate in surface and ground waters at Ranger		
Aim: Test a predictive model for sulphate flux in the RP1 catchment. *Project Leader:* C leGras	*Res staff:* 6 *Tech staff:* 1	Internal Report: 'Model predictions of sulphate import and export in the RP1 catchment' June 1998. *Completion:* June 1998
Limnological characterisation of waterbodies in the ARR		
Aim: Provide a physico-chemical and biological baseline for billabongs in the ARR and investigate seasonal variations. *Project leader:* R Pidgeon & D Klessa	*Res staff:* 14 *Tech staff:* 16	Project proposal with options for sampling parameters and sites: March 1998. *Commenced:* November 1997 *Completion:* October 1998 and then reassessed
Quantification of solute and particulate loads discharged from rehabilitated landforms at Ranger uranium mine		
Aim: To develop methodologies for assessing off-site impacts due to erosion products from mining which can be used in the rehabilitation planning process and management of mine sites. *Project Leader:* M Saynor & K Evans	*Res staff:* 30 *Tech staff:* 20	Supervising Scientist Report, Review of previous work - Consultancy by W Erskine, December 1997. Finalise a research proposal, February 1998. Plain English summary - April 1998 *Commenced:* June 1997 *Expected completion:* Ongoing
Use of remote sensing in the assessment of rehabilitation success		
Aims: 1 Carry out radon and gamma spectrometry measurements in the field during and after the aerial survey for quality control purposes. 2 Assess the usefulness of the technique for radiological impact assessment. *Project leader:* P Martin	*Res staff:* 8 *Tech staff:* 2	Internal Report March 1998. *Commenced:* 1997 *Expected completion:* February 1998

Development of environment protection mechanisms

During 1997–98 we will include the following tasks and performance will be judged against the indicators listed:

Table 3 Projects for 1997–98 in the Impact of Mining Program - Development of environment protection mechanisms

Project and aims	Staff commitment (pw)	Indicator
The treatment of mine waters by constructed wetland filters		
Aims: 1 Assess the role of carbon cycling in contaminant retention in constructed wetland filters.	*Res staff:* 6 *Tech staff:* 4	Internal Report 'Carbon supply as a factor influencing the fate of contaminants in constructed wetland filters', March 1998. *Completion*: March 1998
2 Evaluate the performance of the RP1 constructed wetland filter.	*Res staff:* 6 *Tech staff:* 4	Internal Report 'The performance of the RP1 constructed wetland filter', May 1998. *Completion*: May 1998
3 Optimise methods for the reduction of sulphate in Ranger mine waters. *Project Leader*: D Klessa	*Res staff:* 10 *Tech staff:* 4	Internal progress reports: October 1997 & April 1998 *Completion*: January 1999
Bioremediation of radionuclides from contaminated effluent		
Aim: Develop a method for removal of radium and uranium from mine waters. *Project leader:* P Martin	*Res staff:* 4	Supervising Scientist Report summarising results of the Phase 2 bioreactor studies, October 1997. *Commenced (Phase 1):* 1995 *Expected completion (Phase 2):* October 1997
Validation of the SIBERIA landform evolution model		
Aims: 1 To test the predictions of the long-term landform evolution model, SIBERIA 2 Implement changes where necessary to improve model predictions. *Project Leaders:* K Evans	*Res staff.:* 15 *Tech staff:* 8	Draft Supervising Scientist Report. December 1997. Plain English summary, September 1997. *Commenced:* April 1996 *Expected completion:* December 1997
The effect of vegetation on erosion of the Ranger waste rock dump		
Aims: 1 To compare hydrology and erosion parameters derived from experiments on vegetated areas of the Ranger waste rock dump with parameters derived from unvegetated areas, and 2 To assess, using a long-term erosion model, several alternative proposals for rehabilitated landforms based on unvegetated and vegetated surfaces. *Project Leader:* K Evans	*Res staff:* 24 *Tech staff:* 6	Journal paper; Sediment transport model and rainfall-runoff model parameters for a mine site, September 1997. Journal paper; Effect of fire on erosion and runoff from mine soils, September 1997. Conference paper; Incorporation of landform evolution modelling in mine site rehabilitation planning, October 1997. Plain English summary, November 1997. SSR; Effect of vegetation and surface amelioration on landform at Ranger, Dec 1997. *Commenced:* July 1994 *Expected completion:* December 1997
Temporal changes in the hydrology and erosion of rehabilitated landforms		
Aim: To determine and compare the erosion rates and hydrology of waste rock dumps at Ranger and undisturbed schist terrains at an analogue site and identify and interpret temporal trends in model parameters. *Project Leader:* K Evans	*Res staff:* 9 *Tech staff:* 5	SSR; Temporal effects on landscape evolution modelling, February 1998. Plain English summary, August 1997. *Commenced:* 1992 *Expected completion:* February 1998

WETLANDS PROTECTION AND MANAGEMENT PROGRAM

The objective of our program on the protection and management of wetlands is:

> ***through research on tropical freshwater and estuarine ecosystems, provide advice on the conservation and sustainable development of wetlands in northern Australia.***

The 1997–98 program builds on extensive community consultation conducted over the past three years. Taking into account international initiatives to further bridge the gap between wetland research and management practice, we have taken many steps to consult with wetland owners, users and managers. The first major initiative was holding a wetland workshop in Jabiru during March 1995 with a broad cross section of wetland stakeholders in attendance. The papers from this workshop were published as a Supervising Scientist Report. The feedback from the workshop and the report were positive and indicated a general requirement for management oriented wetland research in the wet-dry tropics of Australia.

The conclusions of the workshop discussions were taken forward and incorporated into two major reviews of wetland research and management needs in northern Australia. The first was carried out for LWRRDC as part of a national R&D identification program for wetlands. We reviewed R&D needs for wetlands in the wet-dry tropics and then summarised R&D needs for wetland invasive species at a national level. The second review was carried out for the Parks and Wildlife Commission of the NT and concentrated on the conservation status of wetlands of the NT. As such, it will serve as a resource document for the development of a NT wetland management strategy. Both reviews will be published, the first by LWRRDC and the second as a Supervising Scientist Report.

A further major scene-setting study was a vulnerability assessment of wetlands in the Alligator Rivers Region to climate change and sea level change. This was a multi-disciplinary study conducted under contract to DEST as part of a national program. Importantly, it indicated the linkage between wetland management and carefully planned monitoring of environmental change with due regard to jurisdiction and social factors. It led to the establishment of a coastal monitoring node at ***eriss***, in collaboration with Environment Australia and others, which has added to our list of national programs. It also provided substantial support to continuation of research by ***eriss*** as part of the National River Health Program and the ANZECC funded assessment of biological criteria for setting water quality guidelines. These activities were very much linked to the ***eriss*** input to a workshop held by ANSTO and CSIRO to develop a national approach to ecological risk assessment.

Consultation at the local community level continued with active participation in Landcare meetings and an advisory role to the Northern Land Council's program for wetlands on Aboriginal land. Such consultation is providing a major communication channel for ***eriss*** staff as they seek to become further involved in providing management advice to wetland managers. Collaboration and communication have also been advanced through active participation in the Centre for Tropical Wetland Management at the Northern Territory University. At the other extreme, technical advice on interpreting change in the ecological character of wetlands was given to the Conference of the Contracting Parties to the Ramsar Convention. A member of staff participated in the Australian delegation to the Conference and continues to provide technical advice to the Convention. A second member of staff is an active participant on the technical panel providing guidance to Australia's Monitoring River Health Initiative.

The above initiatives have resulted in an enhanced profile of ***eriss***' wetland research potential in local, national and international fora. It is highly evident that ***eriss*** has an opportunity not only to contribute to the research base for wetland management at all three levels, but to provide scientific leadership.

Throughout this developmental period we have attempted to identify a philosophical basis for wetland research that supports national agreements on ecological sustainable development and conservation of biological diversity. As a consequence, our three research directions have been assessed and past projects are being reviewed and placed into a holistic framework for wetland management. This review process will continue as we seek ways of being even more flexible and responsive to community needs for advice on crucial wetland issues. We are adopting a modular approach to our research planning to enable both urgent short-term and highly targeted issues to be addressed alongside longer-term strategic issues. The current projects reflect this mixture and we fully anticipate further changes in the existing balance as we extend our activities under programs such as that being developed by the NLC.

The above linkages and emphasis on transferring our knowledge base on wetlands is expected to stand us in good stead as we face changing operating procedures for the future. The wetland program is being critically reviewed with the intent of developing a far greater commercial basis. It is expected that will extend our activities internationally and into supporting training exercises. Towards the end of 1996–97 we developed an initial wetland management training module that will form the base for further exercises of this nature. In the same vein we are seeking further external grants to complement the tasks that we can currently undertake and further our expertise as a provider of timely and quality information for wetland management.

Ecological characterisation of wetlands

During 1997–98 we will include the following tasks and performance will be judged against the indicators listed:

Table 4 Projects for 1997–98 in the Wetlands Protection and Management Program - Description of the ecological character of wetlands

Project and aim	Staffing commitment (pw)	Indicator
Survey and management planning for wetlands on Aboriginal lands in the NT		
Aim: Assess the ecological status and uses of key wetlands on Aboriginal lands and assist with developing management plans. *Project leader:* M Finlayson	*Res staff:* 20 *Tech staff:* 20	IR; Survey of freshwater fish and wetland vegetation. Reference collections prepared for BAC laboratory, Nov 1997. IR; Survey proposals for estuarine mangroves and macro-invertebrates. IR; Draft management plans in collaboration with Aboriginal groups and NLC; April 1998. *Commenced:* July 1996 *Completion:* July 1999
Underlying reasons for change in ecological character of Australian wetlands		
Aim: Assess the underlying reasons for wetland loss and degradation in Australian wetlands. *Project leader:* M Finlayson	*Res staff:* 5	Paper on general reasons, climate change and monitoring issues and jointly edit special issue of the journal *Wetland Ecology and Management* : October 1997. *Commenced*: July 1996 *Completion*: October 1997
Preliminary investigation into temporal and spatial patterns of spread of *Mimosa* in northern Australia		
Aim: To use landsat TM to investigate temporal and spatial spread of *Mimosa pigra* in selected areas of northern Australia. *Project leader:* A Bull	*Res staff:* 12 *NTU staff:* 3	Acquisition of imagery; end July 1997 Digital spatial datasets on mimosa areas at different time intervals compiled. Report; January 1998. *Commenced:* June 1997 *Completion:* February 1998
Scales of freshwater fish of the ARR		
Aim: Provide an identification key for fish on the basis of scale description for users. *Project leader:* D Walden	*Res staff:* 1 *Tech staff:* 5	Draft completed, end June 1997. Internal report, July 1997. SSR Jan 1998. *Commenced:* 1995 *Completed*: Jan 1998
Field key to the trees and shrubs of the Jabiru area		
Aim: To provide an identification key to the trees and shrubs of the Jabiru area based on the use of perennial vegetative plant features. *Project leader:* K Brennan	*Res staff:* 3	Internal Report: May 1997. SSR publication MS submitted to publications officer; December 1997 *Commenced:* August 1995 *Completion:* June 1998
The impact of Wet season burning on herbaceous vegetation in eucalypt woodland		
Aim: Describe the short and longer term effects on herbaceous vegetation of Wet season burning practices in lowland eucalypt woodland. *Project leader:* K Brennan	*Res staff:* 5	Journal paper on short term effects of Wet season burning submitted; May 1998. *Commenced:* 1992 *Completion:* May 1998

Project and aim	Staffing commitment (pw)	Indicator
Technique development and databases for enhanced wetland inventory in northern Australia		
Aim: 1. Enhance capability for inventory through RS and GIS technology for hydrology and vegetation 2. Provide an information base for early warning and predictive monitoring of adverse change 3. Provide database techniques for information on annual and seasonal extent of wetlands to assess natural variation and changes due to global change *Project leader:* M Finlayson	*Res staff: 20* *Tech staff:* 5	Progress reports to NPW. September 1997 & January 1998 Final report May 1998 *Commenced:* June 1997 *Completion:* June 1998

Risk assessment and restoration of wetlands

During 1997–98 we will include the following tasks and performance will be judged against the indicators listed:

Table 5 Projects for 1997–98 in the Wetlands Protection and Management Program - Risk assessment and restoration of wetlands

Project and aim	Staffing commitment (pw)	Indicator
Risk assessment of herbicide impacts on tropical Australian wetlands (1)		
Aim: Assess the toxicity of the herbicide Tebuthiuron, used to control the woody shrub Mimosa, on 3 non-target tropical aquatic species. *Project leader:* R van Dam	*Res staff:* 4 *Tech staff:* 1	Supervising Scientist Report: August 1997 *Commenced:* April 1996 *Completion:* December 1997
Risk assessment of herbicide impacts on tropical Australian wetlands (2)		
Aim: To assess the toxicity of the herbicide, tebuthiuron, to two native, non-target aquatic phytotrophs. *Project leader:* R van Dam	*Res staff:* 10 *Tech staff:* 24	Supervising Scientist Report, April 1998. Paper presentation at ASE, July 1998. *Commenced:* July 1996 *Completion:* April 1998
Effects of speciation on water quality guidelines for uranium and copper		
Aim: Investigate the influence of key physico-chemical parameters on the toxicological responses of hydra and gudgeon to uranium and copper. *Project leader:* R van Dam & S Markich	*Res staff:* 2 *Tech staff:* 5	Progress Report November 1997, May 1998. Progress Report to ANZECC, May 1998. Presentation at ASE, July 1998. Final report/SSR, June 1999. *Commenced:* July 1997 *Completion:* June 1999
Copper speciation and toxicity in estuarine water		
Aim: To relate copper toxicity to copper speciation in estuarine water. *Project leader:* R van Dam	*Res staff:* 1 *Tech staff:* 0	Presentation at metal speciation symposium in September 1997. Final Report (SSR), June 1998. *Commenced:* May 1997 *Completion:* May 1998
Development of an algal toxicity testing protocol		
Aim: Develop a toxicity test to assess the sensitivity of primary producers to toxicants. *Project leader:* R van Dam	*Res staff:* 2 *Tech staff:* 0	Supervising Scientist Report, December 1997. *Commenced:* January 1997 *Completion:* November 1997
Development of rapid waterflea toxicity test using feeding inhibition as an endpoint		
Aim: Develop a rapid waterflea toxicity test to meet regulatory needs. *Project leader:* R van Dam	*Res staff:* 1 *Tech staff:* 2	Internal Report; July 1998. *Commenced:* March 1998 *Completion:* June 1998
Implementation of a regular reference toxicity testing program		
Aim: To implement and maintain a regular program of toxicity testing using reference toxicants, to monitor the status of laboratory test organisms. *Project leader:* C Camilleri	*Res staff:* 3 *Tech staff:* 16	Internal Report, June 1998. *Commenced:* July 1997 *Completion:* Ongoing

Monitoring change in the ecological character of wetlands

During 1997–98 we will include the following tasks and performance will be judged against the indicators listed:

Table 6 Projects for 1997–98 in the Wetlands Protection and Management Program - Monitoring of changes in the ecological character of wetlands

Project and aims	Staff commitment (pw)	Indicator
Temporal variability in macroinvertebrate communities of Australian streams		
Aim: Evaluate the influence of temporal variability in Australian stream macroinvertebrate communities on the development of the predictive models for the national monitoring programs. *Project leader:* C Humphrey	*Res staff:* 4 *Tech staff:* 3	Final report to LWRRDC; October 1997. *Commenced:* January 1995 *Completion:* October 1997
Quality assurance and quality control of identifications conducted in Australian macroinvertebrate monitoring programs		
Aim: Provide quality control and assurance of macroinvertebrate identifications of different agencies involved in national monitoring programs. *Project leader:* R O'Connor	*Res staff:* 2	Final report to LWRRDC; September 1997. *Commenced:* January 1995 *Completion:* September 1997
Quality assurance and quality control of sample processing procedures in Australian macroinvertebrate monitoring programs		
Aim: Provide quality control and assurance of macroinvertebrate sample processing procedures of different agencies involved in national monitoring programs. *Project leader:* C Humphrey	*Res staff:* 2	Final report to LWRRDC; October 1997. *Commenced:* January 1995 *Completion:* October 1997
Influence of temporal variability and sample processing errors on development of AUSRIVAS predictive models		
Aim: Present results of MRHI studies on influence of temporal variability and sample processing errors on development of AUSRIVAS predictive models. *Project leader:* C Humphrey	*Res staff:* 6	RIVPACS International conference attendance (Oxford, UK); September 1997. *Completion:* Submission of paper, November 1997
A monitoring framework for investigating coastal processes and climate change in the ARR		
Aim: Develop a monitoring framework for assessing biophysical changes on the floodplains of the ARR and identifying appropriate management responses. *Project leader:* M Finlayson	*Res staff:* 25 *Tech staff:* 30	DGPS operating with Auslig GPS base station, August 1997. Remote reference stations established within ARR coastal zone, October 1997. 4 staff trained in use of DGPS and in-house training manual prepared as Internal Report, Mapping of salt flat and salt water intrusion area at 3 locations. GIS for ARR established, October 1997. Outline of the status of available information, management issues and potential monitoring strategies for ARR Coastal zone (12 sub projects), October 1997. Metadatabase for all information compiled, October 1997. Saline intrusion monitoring undertaken June 1998. *Commenced:* July 1996 *Completion:* October 1997

Project and aims	Staff commitment (pw)	Indicator
Monitoring of Ghanaian coastal wetlands		
Aim: Provide advice to the Ghanaian Government on the ecological integrity and sustainable use of Ghana's coastal wetlands. *Project leader:* M Finlayson	*Res staff:* 6 *Tech staff:* 4	Provide report to Wildlife Department of Ghana, December 1997. *Commenced:* October 1996 *Completion:* December 1997
Weed management and the biodiversity and ecological processes of tropical wetlands		
Aims: 1 To assess the impact of Para Grass on faunal biodiversity and ecosystem processes of wetlands in KNP. 2 To assess effectiveness of herbicide control and effects on biodiversity and ecosystem processes. *Project leader:* M Douglas, NTU ***eriss*** *contact:* R Pidgeon	*Res staff:* 11 *Tech staff:* 6	Research associate appointed, October 1997. Experimental sites selected and sampling methods finalised, November 1997. Sampling and sample analysis for first year completed, June 1998. *Commenced:* October 1997 *Completion:* April 2000
Identifying and monitoring change in wetland inundation and vegetation patterns, ARR		
Aims: 1 To use radarsat to monitor changes in wetland inundation to delineate freshwater from tidal wetland areas. 2 Use SAR to monitor wetland vegetation change as either degradation or success of conservation practice. 3 Establish a GIS to develop predictive modelling capable of assessing impact of future change. 4 Develop routine procedures for mapping wetland change over northern Australia. *Project leader:* AK Milne UNSW ***eriss*** *contact*:: A Bull	*Res staff:* 40 *Tech staff:* 12	Research staff appointed, October 1997. By June 1998: Acquisition of radarsat data, Fieldwork (groundtruthing) undertaken, GIS set up, Relational data encoded, Wetland workshop undertaken. *Commenced:* October 1997 *Completion:* March 2000

Provision of management advice and services

About twenty percent of wetlands staff time will be devoted to the provision of advice on the management of wetlands and the provision of services that are of value to others in the wetlands field. Some of these activities arise in an ad hoc manner during the year. Others can be identified in advance. Some of the activities in the latter category for 1997–98 are listed in table 7.

Table 7 Planned management advice and service provision in the Wetlands field during 1997–98

Project and aim	Staffing commitment (pw)	Indicator
Providing information to Ramsar Convention		
Aims: 1 Provide guidance to Ramsar Convention and site managers on guidelines on interpreting ecological change.	*Res staff:* 4	Establish case studies to test guidelines for site description and provide recommendations to Ramsar Convention on possible changes to these: May 1997. *Commenced:* October 1997 *Completion:* November 1998
2 Provide advice to Ramsar Convention on appropriate techniques for monitoring wetlands.	*Res staff:* 8	Prepare paper for Ramsar Convention; September 1997. *Commenced:* November 1996 *Completion:* September 1997
3 Provide an update on the information available in international and national wetland inventories for the Ramsar Convention. *Project leader:* M Finlayson & Wetlands International	*Res staff:* 20 *Tech staff* 15	Negotiate joint arrangements with Wetlands International offices and NTU; August 1997. Prepare report for Ramsar Convention; December 1997.
Alligator Rivers Region Herbarium		
Aim: Provide a reference source, identification service and repository for voucher specimens for botanically based projects in the ARR. *Project leader:* K Brennan	*Res staff:* 3	Checklist of ARR flora completed July 1996 and proposal for developing a key to wetland plants, December 1997. *Commenced:* 1981 *Completion:* Biennial Revision
Tropical Wetland Management unit for NTU MSc		
Aim: To transfer information to assist wetland managers and/or policy makers develop skills and understanding about wetland processes, surveys and threats. *Project Leader:* M Finlayson	*Res staff:* 8 *Tech staff:* 12	Course to be held at ***eriss*** on 7–18 July, 1997. The information base for the course to be collated and published as an SSR by November, 1997.

GENERAL ENVIRONMENTAL RESEARCH PROGRAM

The **objective** of our general environmental research program is to

> ***undertake environmental research that meets specific needs identified by the Australian Government or in collaboration with other environmental research organisations which would benefit from the unique location of eriss or its specialised knowledge and expertise.***

During 1997-98 we will achieve this by carrying out the following tasks and performance will be judged against the indicators listed:

The Commonwealth, State and Territory Governments, through ANZECC and ARMCANZ, have developed a National Water Quality Management Strategy for the sustainable use of Australia's water resources. An important component of that strategy is the *Australian Water Quality Guidelines for Fresh and Marine Waters* released by ANZECC in 1992. ***eriss*** has been given the task of managing the first review of the Guidelines on behalf of ANZECC and will report to a Project Committee consisting of representatives from the key groups. The review of the guidelines will be comprehensive requiring a number of the tasks to be contracted out to expert consultants.

One of the key recommendations of the Project Committee at its first meeting in Jabiru in February 1996 was that the next version of the Guidelines should place much greater emphasis on biological indicators of ecosystem health. Two specific projects are being carried out by ***eriss*** staff to achieve this. The first reviews the use of whole effluent testing as a control measure for protection of aquatic ecosystems and will recommend protocols for use in Australia. The second project reviews the use of biological indicators and will give guidance on the adoption of suitable biological monitoring programs. The final ***eriss*** project associated with the revision is a review of the methods and protocols used for physico-chemical assessment of water quality. The need for this work was clearly identified in the feedback obtained from users of the Guidelines.

The full list of projects to be carried out by ***eriss*** in the program on General Environmental Research during 1997–98 is given in table 7.

Table 7 Projects for 1997–98 in the General Environmental Research Program

Project and aims	Staff commitment (pw)	Indicator
Review of Australian Water Quality Guidelines		
Aim: Review, and incorporate the latest scientific information on, water quality guidelines relevant to Australian and New Zealand conditions for use by appropriate authorities in both countries. *Project Leader:* K McAlpine	*Res staff:* 52	Draft released for public comment by March 1998, with the final revised document ready for SCEP endorsement in October 1998. *Commenced:* June 1996 *Completion:* October 1998
Aim: Collate and review protocols for 'Direct Toxicity Assessment' and recommend an approach suitable for use in Australia and New Zealand. *Project Leader:* R van Dam	*Res staff:* 3	Report on whole effluent testing incorporated into chapter on toxicants in water, July 1997. Some on-going involvement responding to feedback required. *Commenced:* January 1997 *Completion:* July 1997
Aim: Review, assess and collate biological indicators and monitoring methods and recommend indicators and protocols appropriate to Australia and New Zealand. *Project Leader:* C Humphrey	*Res staff:* 4	Final chapters on biological indicators and monitoring, July 1997. All protocols and examples completed October 1997. On-going involvement responding to feedback required. *Commenced:* December 1996 *Completion:* October 1997
Aim: Review and recommend appropriate methods and protocols for physico-chemical assessment of water quality. *Project Leader:* C leGras	*Res staff:* 4	Final chapter on physico-chemical methods and protocols, July 1997. Some on-going involvement responding to feedback required. *Commenced:* October 1996 *Completion:* July 1997
Maritime Continent Thunderstorm Experiment		
Aim: Assist in an international project on lightning strike frequency in the Top End of the Northern Territory. *Project leader:* S Tims	*Res staff:* 2	Successful collection of data for the yearly cycle. *Commenced:* 1995 *Expected completion:* 1999

CORPORATE SERVICES PROGRAM

The objective of our corporate services program is to:

> ***ensure by sound management practices and effective communication that we achieve our objectives, that we consult with and inform our clients and the general community, and that the Institute is a good place in which to work.***

During 1997–98 we will achieve this by providing the following services, and performance will be judged against the indicators listed:

Service delivery & Aims	Staff commitment (pw)	Indicator
Coordination of *eriss* executive processes and projects		
Aims: 1 Develop and administer ***eriss***'s planning and reporting cycles, including corporate plan and research plan. 2 Provide secretariat support to executive meetings. 3 Provide administrative support to Revision of WQ Guidelines and KRSIS. 4 Provide input to coordination of DEST and EA policy coordination matters. *Project Leader*: R Graham	*Staff:* 55	Corporate Plan July 1997. Research Plan August 1997. Annual Report September 1997. Monthly and quarterly reports as requested. Timely production of papers and minutes for meetings. Ongoing service provision
Provision of human resources services		
Aim: To coordinate and manage provision of human resources to meet ***eriss*** objectives. *Project Leader*: D Lehmann	*Staff:* 46	ASL targets met for 1997/98. Review pay processing arrangements December 1997. Update Staff development program November 1997. Ongoing service provision.
Provision of financial services		
Aim: To coordinate and manage provision of budgetary, financial and purchasing functions for ***eriss***. *Project Leader*: D Lehmann	*Staff:* 55	Financial Statements submitted August 1997. Implement local arrangements for CEIs under FMA Act; February 1998. Undertake Phase 2 of Stocktake plan.; May 1998. Ongoing service provision.
Information technology support		
Aims: 1 Develop the information technology platform of ***eriss*** in accordance with the needs and capacities of the organisation. 2 Ensure the IT system assists users in meeting corporate goals. 3 Ensure users are able to use the system effectively. 4 Maintain system security. *Project Leader*: R Graham	*Staff:* 82	IT Strategic Plan to be written December 1997. Scientific and administrative applications developed or installed as needed. System performance monitored. Provide training in office automation software to users. Backups performed and checked regularly. Passwords maintained.
Information and data management support		
Aim: Promote and facilitate information and data management for ***eriss*** *Project Leader*: R Graham	*Staff:* 20.5	Monitor and implement DEST/ERIN Information Management Strategies. Report on Information Management status and options, December 1997.

Service delivery & Aims	Staff commitment (pw)	Indicator
Library services		
Aim: To provide library services to meet information needs of ***eriss***. *Project Leader:* J Mount	*Staff:* 40	Ongoing service provision.
Communications and public relations		
Aims: 1 Manage a comprehensive communications strategy in accordance with the responsibilities and needs of ***eriss***. 2 Implement the publications program. 3 To co-ordinate all aspects of production of the Supervising Scientist's annual report 1996/97 including copy editing, liaising with authors and AGPS on the publication. *Project Leader:* R Graham	*Staff:* 77 *Staff:* 10	Preparation of a modular display kit for PR activities, July 1997. Update ***eriss*** World Wide Web site January 1998. Completion of MLRRD publications program, July 1997. Continuation of IR, SSR and erissnote publications. Ongoing service provision. Publication of 1996/97 Supervising Scientist's annual report, October 1997.
Administrative support		
Aims: 1 To provide administrative support systems appropriate to ***eriss***. *Project Leader:* D Lehmann 2 To provide co-ordinate and manage property services function (incl. domestic housing) for ***eriss*** staff. *Project Leader:* D Lehmann 3 To maintain security and safety of ***eriss*** resources (both human and physical). *Project Leader:* D Lehmann 4 Review and update Policy circulars. *Project Leader:* D Lehmann	*Staff:* 47 *Staff:* 42 *Staff:* 11	Develop and implement an archiving program and disposal schedule for research and admin records, January 1998 Ongoing Registry service provision. Review terms of contracts and letting of contracts for services to Institute May 1998. Ongoing service provision. Safety manual to be produced November 1997. Audit induction procedures January 1997. Support 6 meetings of OHS Committee. Ongoing service provision. Produce 3 Policy circulars on vehicles, volunteers and housing, May 1998. Audit adequacy of Policy circulars in accordance with FMA Act.
Administration and business management for scientific projects		
Aim: Facilitate preparation of contracts and scholarship arrangements and monitor performance of consultancies and external contracts. *Project Leader:* R Graham	*Staff:* 7	Timely preparation of legally sound agreements for conduct of research. Efficient handling of contracted moneys in and out. Regular (bi-monthly) compliance monitoring and reporting of consultancy contracts.

Service delivery & Aims	Staff commitment (pw)	Indicator
Aboriginal communications		
Aims: 1 To develop and implement an Aboriginal communications plan 2 To develop appropriate Aboriginal consultation mechanisms 3 To develop cultural awareness and communications skills throughout ***eriss*** 4 To develop and implement an Aboriginal employment and training plan *Project Leader:* P Wellings	*Staff: 34*	Communications plan; Dec 1997 Implementation of consultation strategy by Nov 1997 Cultural awareness training for all staff by Dec 1997 Implementation of day labour scheme by Nov 1997