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eriss Strategic Workplan 2003–2004

Environmental Research Institute of the Supervising Scientist

October 2003

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eriss Strategic Workplan 2003–2004:

Thematic structure and priority activities

Introduction

The research undertaken by the Environmental Research Institute of the Supervising Scientist (***eriss***) has in the recent past been divided into four programs. This structure enabled administrative tasks to be undertaken alongside research projects. The research program though was more integrated than shown by the administrative structure and addressed both short-term immediate goals and longer-term strategic outcomes that cut across administrative lines. A broader thematic format has been adopted this year in response to the Alligator Rivers Region Technical Committee (ARRTC) articulation of a number of Key Knowledge Needs (refer Appendix 1). In considering these we have identified seven thematic areas as the basis of our research structure (refer below). We anticipate working with ARRTC to further develop these themes and ensure we maintain a strategic outlook and capability to respond to changing needs and particular incidents that may require expert assessment or research.

The issues addressed in the past workplans were roughly divided into three broad categories. The first category comprised baseline analyses and descriptions of ecosystem features, including biodiversity and ecosystem services and functions at a landscape-scale; major environmental pressures; and aspects of human health related to radionuclide transport in the region. The second category comprised research into and monitoring of operational issues, for example, analyses of water management options and their long-term function; and stream monitoring, which is also dependent on continued appraisal; and possible development or refinement of monitoring techniques and data management systems. Radionuclide issues were also considered, although other issues of social well-being are not within the remit of the Institute; these have purposefully been allocated to separate processes. The third category comprised research into rehabilitation issues, such as land form stability and erosion, revegetation and re-establishment of near-natural ecosystems, using field measurements and modelling techniques. This included the development of suitable techniques for assessment and monitoring, such as those needed for ecosystem rehabilitation and monitoring at Nabarlek and in the South Alligator Valley; and for human health associated with radionuclides in both the short and long-term. A summary of major activities undertaken in 2002-03 has been presented separately and submitted to ARRTC.

As noted in the 2002–03 ***eriss*** workplan (Internal Report 393) and reported to ARRTC, our program does not directly address baseline issues and data needs for the Koongarra minesite given the absence of any plans to begin mining. It is expected that the 2003-04 workplan will be influenced by decisions that may be made throughout the year about the future of the Jabiluka minesite and the acceptability of the rehabilitation, including revegetation, at Nabarlek.

As noted above, the workplan for 2003–04 comprises seven themes derived after internal discussion of the ARRTC articulated Key Knowledge Areas. These themes enable us to better represent the multi-disciplinary approach behind our research and monitoring activities. Each theme is presented with a short description of the aim and an annotated list of the major activities planned for completion in 2003-04. The second part of this document sets out a

workplan for each theme, including projects, targets and outputs. Detailed information on individual projects is contained within separate documentation and on-line as part of our electronic project approvals system. As we are required under the *Environment Protection and Biodiversity Conservation Act 1999* to seek approvals for projects conducted within Kakadu National Park (subject to the conditions under the Act), a further document covering relevant projects will be prepared from this information and submitted to Parks Australia.

Progress in meeting our program activities is assessed regularly throughout the year and the information derived used as part of our accountability processes that include reports to ARRTC and the Supervising Scientist. In preparing these documents and reports we are aware of the different information needs for planning, reporting and accounting to stakeholders and have sought to avoid duplication.

The thematic work areas are described below. These themes stretch across our research and administrative lines – this is viewed as a positive outcome that will further increase interaction and discussion between individuals with diverse expertise and background.

The themes are:

1. Rehabilitation
2. Landscape analysis
3. Ecotoxicology and biophysical pathways
4. Groundwater pathways
5. Surface water monitoring
6. Radiological risk
7. Communications and knowledge management

1 Rehabilitation

The aim of the rehabilitation theme is to provide advice on the implementation of mine rehabilitation strategies and assessment of rehabilitation sustainability. An important issue to be addressed in 2003–04 is the establishment of a process to bring together and gain consensus between stakeholders on agreed rehabilitation completion criteria.

The priority activities are to:

- undertake and publish a comprehensive review of rehabilitation issues, with particular reference to Ranger Uranium Mine, with respect to mine closure criteria; indicators to monitor success and baseline data requirements to assess rehabilitation performance; and
- develop a technological framework to assess the impact of mine site erosion products on stream systems.

Other activities include:

- complete baseline steam channel stability characteristics for Ngarradi an Gulungul Creeks and publish the results;
- apply and assess landform modelling and GIS technology for the rehabilitated Nabarlek minesite with a view to future application for the Ranger minesite;
- assess rehabilitation success at Nabarlek and Rum Jungle minesites using high resolution remotely sensed CASI data; and
- develop revegetation monitoring techniques at Nabarlek minesite using remote sensing and ground-based surveys to assess revegetation success.

2 Landscape analysis

The aim of this theme is to establish a landscape scale analysis and monitoring program to differentiate mining related impacts from other causes; and contribute within the broader context to the monitoring of the natural World Heritage values of Kakadu National Park. This theme responds to recommendations made by the Independent Science Panel in its final report to the World Heritage Committee about mining activity and associated issues in the Alligator Rivers Region, including the possibility of major changes unrelated to mining; and that there may also be unforeseen problems arising from mining.

There are two parts to the theme: (1) the development of a conceptual transport pathways model for on-site management within a risk framework; and (2) assessment of World Heritage values in the Alligator Rivers Region (for example, waterbirds & wetlands, coastal environments, key habitats & species).

All activity under this theme will be concluded in 2003–04 and the need for further landscape scale work reviewed. The activities include:

- develop a conceptual pollutant/propagule transport pathways model for Ranger Uranium Mine and associated predictive sub-models, within a risk management framework that accounts for uncertainty in data and knowledge.
- undertake a review of landscape analyses being conducted in the Alligator Rivers Region;
- catalogue, map, assess and monitor significant habitats and native species in the Alligator Rivers Region;
- assess mangrove response to environmental change in the Alligator Rivers Region and surrounding regions (particularly climate change);
- assess landscape-wide ecological risks of threats to wetlands in the Alligator Rivers Region, particularly invasive species and infrastructure impacts;
- assess the status of World Heritage waterbird values in the Alligator Rivers Region within regional, national and international frameworks; and
- integrate socio-economic frameworks and indigenous perspectives into ecological risk assessment and management frameworks.

3 Ecotoxicology and biophysical pathways

Under this theme the aquatic ecotoxicity of regionally relevant toxicants will continue to be assessed with the aim of developing or enhancing site-specific water quality guidelines. Bioaccumulation and trophic transfer information for aquatic pathways from the mine sites in the Alligator Rivers Region will be reviewed for Ranger Uranium Mine in the context of both the current operational and future rehabilitation phases. This was identified by ARRTC as a key knowledge need for risk management.

The priority activity is to:

- review bioaccumulation and trophic transfer information for aquatic and terrestrial pathways from the mine sites.

Other activities include:

- assess toxicity of enhanced levels of magnesium sulphate in Magela Creek through laboratory and field studies and derive site-specific water quality guidelines;
- refine and develop ecotoxicological procedures (ongoing) and models, using local aquatic species; and
- maintain the quality control and quality assurance system of the new ***eriss*** ecotoxicology laboratory in Darwin (ongoing).

4 Groundwater pathways

The aim of this theme is to monitor and investigate the transport of contaminants through groundwater pathways.

The priority activities are:

- investigate dispersion of uranium in groundwater at Ranger Uranium Mine; and
- continue monitoring of uranium and radium in groundwater at Nabarlek.

5 Surface water monitoring

The aim of the surface water monitoring theme is to monitor water quality in Alligator Rivers Region creeks in order to assess effects of mining upon ecosystem and human health. An integral part of this work program is the ongoing review and refinement of current water monitoring techniques and the development of new techniques.

The priority activity is to:

- monitor and assess surface water quality in the Alligator Rivers Region creeks to assess effects of mining (Ranger and Jabiluka) upon ecosystem and human health. Tasks include monitoring water physio-chemistry (suspended sediment, chemistry including radionuclides) and biological monitoring (creekside monitoring, bioaccumulation, fish & macroinvertebrate communities).

Other activities include:

- develop techniques for monitoring suspended sediments in Gulungul and Magela creeks;
- present all other monitoring protocols as Supervising Scientist Reports;
- enhance all data management aspects of the monitoring program;
- review and refine all components of the monitoring program; and
- present monitoring results in the Supervising Scientist Annual Report (and as specific protocols) and on the website; and ensure access to local stakeholders.

6 Radiological risk

The aim of this theme is to monitor and investigate radiological risk arising from present-day uranium mining operations in the Alligator Rivers Region; and to assist in planning for rehabilitation of former and present-day minesites from a radiological perspective. A focus in 2003-04 will be the completion and write-up of work which has been carried out to date at Nabarlek and at the former minesites in the South

Alligator River area. This work will provide an important input into planning for rehabilitation at Ranger.

The priority activity is to:

- provide radiological monitoring data and interpretation for the Ranger and Jabiluka minesites.

Research priorities are to:

- analyse data collected from the rehabilitated Nabarlek uranium minesite, giving an overall radiological impact assessment; and
- analyse data collected from abandoned minesites in the upper South Alligator River area.

Other activities include:

- complete analysis of data collected on radon concentrations in air in the Alligator Rivers Region;
- complete analysis of data collected on radon exhalation and lead-210 deposition in the Ranger region;
- analyse data on uptake of radionuclides by freshwater mussels; and
- investigate use of radionuclides and lead isotopes in creek sediments for mining assessment in the Alligator Rivers Region.

7 Communications and knowledge management

Communications and knowledge management works across all the themes to provide support to the research programs and to develop communication programs to inform and involve Aboriginal communities and our other research partners and stakeholders in the activities of the Supervising Scientist.

Priority areas for 2003–04 include: (1) the enhancement of programs and development of new initiatives focussed on the communication of our research to Traditional Owners and the strengthening of our partnerships in this area; (2) the promotion of ***eriss*** *and our work within the scientific community and the building of new and greater professional partnerships; and (3) corporate support and coordination on the transition to the theme-based work structure and completion and implementation of our internal communication strategy.*

This theme also supports operation of the National Centre for Tropical Wetland Research (NCTWR). This includes provision of a secretariat role and assistance in the development and implementation of programs to communicate and promote the aims and activities of the NCTWR.

The priority activities are:

- increase and enhance external communication with stakeholders, in particular, Traditional Land Owners;
- strengthen participation of Traditional Land Owners in research and monitoring projects;
- investigate the inclusion of traditional ecological knowledge into research and monitoring projects as appropriate;

- identify new stakeholders and forge new professional partnerships for the Supervising Scientist Division;
- provide research and communication support across the ***eriss*** research and program themes;
- develop and implement an internal communication plan that integrates communication across the Division and within ***eriss*** and the Office of the Supervising Scientist; and
- provide coordination and promotional support to the activities and research projects of the NCTWR and implement the NCTWR Communications and Marketing Strategy.

Thematic Workplans 2003–2004

The following workplans have been developed under the thematic headings described in the first part of this document. They reflect the work priorities that have been identified for 2003-04. Project outputs and target dates have been set out to assist us in ongoing operational planning and reporting. Indicative figures for total staff (person weeks) have been included to provide a sense of how staff resource requirements are spread over the themes.

The landscape analysis theme has been divided under two sub-headings, consistent with the two aims for this theme: conceptual transport pathways and World Heritage values. The communication and knowledge management theme, as described earlier, cuts across all themes. For this reason, the projects support and interact with all research and monitoring projects and hence underpin the corporate objectives of the organisation. Greater detail on individual projects is contained within the formal project approval forms.

1 Rehabilitation

Aim: Provide advice on implementation of mine rehabilitation strategies and assessment of rehabilitation sustainability.

Projects:	*Targets and dates:*
1. Undertake a comprehensive review of rehabilitation issues, with particular reference to Ranger Uranium mine in the tropics: mine closure criteria; indicators used to monitor success and baseline date required to assess rehabilitation performance.	Supervising Scientist Report on review of rehabilitation issues – Jun04.
2. Complete a technological framework to assess the impact of mine site erosion products on stream systems.	Determine sensitivity and error distribution of landform evolution models outputs and test spatial and temporal soil development and weathering modules. Internal Report on weathering – Sep03. Undertake sensitivity and power analysis of proposed monitoring strategies of suspended mud for assessment of catchment impact of rehabilitated landform – Nov03. Journal paper on Revised Universal Soil Loss Equation – Nov03. Journal Paper on mud monitoring – Jun04.
3. Apply and assess landform modelling and GIS techniques for the rehabilitated Nabarlek minesite with a view to future application for the Ranger minesite.	Link landform evolution models to GIS techniques and assess Jabiluka landform. PhD thesis – Dec03. Assess mine site landform stability using landform evolution modelling and GIS technology (Nabarlek case study). Internal Report – Dec03.
4. Determine baseline steam channel stability characteristics for Ngarradi and Gulungul Creeks.	Supervising Scientist Report on Ngarradj erosion results – Sep03. Internal Report on Ngarradj Dry Season data 2001-02 – Dec03. Internal Report on Dry season particle size analysis – Dec03. Internal Report on Wet season particle size analysis – Mar04. Internal Report on Ngarradj Dry Season data 2002-03 – Jun04. Internal Report on Gulungul Dry Season data 2002-03 – Jun04. Journal paper on gully initiation, Swift Creek – Nov03
5. Assess rehabilitation success for Nabarlek minesite using high resolution remotely sensed CASI data.	Determine the suitability of remotely sensed techniques for rehabilitation performance assessment and ecosystem stability. Internal Report – Aug03. Conference paper – Sep03.
6. Develop vegetation monitoring techniques at Nabarlek mine site using remote sensing and ground-based surveys.	Consolidate available information and identify and assess possible techniques – Jul03. Internal Report – Dec03. Draft journal paper – Jun04.

Theme leader: Ken Evans
Total staff: 84 person weeks

2 Landscape analysis

Aim: Establish a landscape scale analysis and monitoring program to differentiate mining related impacts from other causes; and contribute within the broader context to the monitoring of the natural World Heritage values of Kakadu National Park.

Projects:	*Targets and dates:*
Development of a conceptual transport pathways model for on-site management within a risk framework:	
1. Develop a conceptual model showing pollutant/propagule pathways and ecological linkages between uranium mining activities at Ranger and the biophysical environment of the Alligator Rivers Region.	Draft journal paper on conceptual model – Mar04.
2. Develop stochastic process sub-models of the pathways model for ecological risk assessment (atmospheric, surface water & ground water pollution; biological pollution; infrastructure impacts).	Supervising Scientist Report on risk assessment model – Jun04.
3. Assess radiation anomalies in the Alligator Rivers Region.	Internal Report on review of existing data – Jul03.
4. Assess impacts of invasive species (weeds & feral animals).	Draft journal paper on pigs – June 2004. Draft journal paper on weeds – June 2004.
5. Assess multiple landscape impacts (salt, fire, invasive species) at Boggy Plain as a non-mining comparison site.	Internal Report on vegetation survey – Sep03. Internal Report on remote sensing of vegetation change assessment – Sep03 Presentation to International Wildlife Management Conference, New Zealand – Dec03. Internal Report summarising Boggy plains project – Jun04. Supervising Scientist Note on saltwater intrusion – Oct03.
6. Map biophysical features of Magela Creek & floodplain.	Supervising Scientist Report on floodplain mapping – Jun04.
7. Landscape mapping of the Alligators Rivers Region.	Supervising Scientist Report on landscape mapping – Jun04
Assessment of national World Heritage values in the Alligator Rivers Region:	
8. Assess current status of waterbirds (migratory waders/shorebirds, waterfowl, seabirds) in the Alligator Rivers Region and adjacent to it (regionally, nationally & internationally).	Internal Report on waterbird status – Dec03. Paper on waterbird status for Australian Ornithological Congress – Dec03. Paper on Little Curlew for World Flyway Conference, Edinburgh – Apr04. Draft journal paper on waterbird-habitat dynamics – Dec04.
9. Assess mangrove response to environmental change.	Conference paper for International Geoscience and Remote Sensing Symposium 2003 – Jul03.
10. Catalogue, assess and monitor significant habitats and species in the Alligator Rivers Region; monitor key components of these in order to distinguish and assess the impacts of potential threats.	Field sampling of significant aquatic (stone country) habitats and native species in Kakadu and western Arnhem Land – 2003-04. Internal Report on aquatic invertebrates – Mar04. Initiate consultancy and student project on taxonomy of isopods (genus *Eophreatoicus*) in the Alligator Rivers Region – Apr/May04. Draft journal paper on aquatic invertebrates – Apr/May04.

Theme Leaders: Peter Bayliss & Max Finlayson
Total staff: 103 person weeks (transport pathways)
46 person weeks (World Heritage values)

3 Ecotoxicology and biophysical pathways

Aim: Assess the aquatic toxicity of regionally relevant toxicants and derive associated site-specific water quality guidelines

Projects:	*Targets and dates:*
1. Review bioaccumulation and trophic transfer information for aquatic pathways from the mine sites in the Alligator Rivers Region.	Internal Report on bioaccumulation review – May04.
2. Assess toxicity of enhanced levels of magnesium sulphate in Magela Creek through laboratory and field studies.	Complete laboratory and field studies on ecological effects of magnesium sulphate – Jul-Sep03. Student PhD thesis on magnesium sulphate ecotoxicity – Dec03. Draft journal paper on ecological/ecotoxicological effects – Jan/Feb04.
3. Assess toxicity of Djalkmara Billabong water, and if required Retention Pond 1 water, to determine dilution rate for release to Magela Creek.	Djalkmara project completed Mar04. Internal Report on Djalkmara water quality – Jun03.
4. Assess potential endochrine disruptor activity in Kakadu recreational waterways – enhance ecotoxicological effects model using life history correlates.	Complete endochrine field sampling Aug03. Internal Report on endochrine disruptor activity – Oct03.

Theme Leader: Peter Bayliss
Total staff: 77 person weeks
Students: 26 person weeks

4 Groundwater pathways

Aim: Monitor and investigate contaminant movement in groundwater in the vicinity of uranium mining activities.

Projects:	*Targets and dates:*
1. Dispersion of uranium in groundwater at Ranger uranium mine	Internal Report on groundwater contaminants, Ranger – Feb04. Annual collection of samples from Ranger minesite – May04.
2. Dispersion of contaminants in groundwater at Nabarlek minesite	Internal Report on groundwater contaminants, Narbalek – Feb04. Biennial collection of samples from Nabarlek minesite – Aug04.

Theme leader: Paul Martin
Total staff: 9 person weeks

5 Surface water monitoring

(*including chemical, physical, biological and radiological aspects*)

Aim: Monitor water quality in Alligator Rivers Region creeks in order to assess effects of mining upon ecosystem and human health.

Projects:	*Targets and dates:*
1. Monitor the physical and chemical attributes of water quality, including suspended sediments, chemistry and radionuclides.	Supervising Scientist Annual Report 2002-03: physical and chemical monitoring – Aug03. Conduct water sampling programs for physical and chemical attributes – Oct03-Jun04. <u>*Suspended sediment sampling*</u> Internal Report on suspended sediments Ngarradj, 2002-03 – Sep03. Internal Report on calibration of turbidity probe– Nov03. Supervising Scientist Report on water quality parameters derived from sediment monitoring (Ngarradj) – Jun04. Supervising Scientist/Internal Report on hydrological baseline characteristics, Gulungul – Jun04. Internal Report on hydrological baseline characteristics, Ngarradj, 2002-03 – Sep03. Internal Report on baseline data for rainfall/runoff, Ngarradj, 2003-04 – Jun04. <u>*Water chemistry (including radionuclide) monitoring*</u> Internal Report on wet season water chemistry, including radium-226 – Dec03 (*OSS-led task**). Internal Report on surface water monitoring protocols for chemistry, including radionuclides – Dec03. Refine monitoring techniques: (1) Honours thesis on Diffuse Gradients in Thin-films (DGT) for in-situ stream monitoring – Jun04. (2) Internal Report: Cross-channel variation in water chemistry at Magela Creek site GS0009 – Dec03 (*OSS-led task**). (3) Internal Report: Derive new water chemistry trigger values for Magela and Gulungul creeks. – Dec03 (*OSS-led task**). Data population of Water Chemistry Database – Nov03 Draft conference paper on stream monitoring program (radionuclides) – Nov03. Updates to Supervising Scientist website as data accrue.

* Office of the Supervising Scientist to lead task

2. Monitor the biological attributes of water quality, including creekside monitoring, bioaccumulation, fish and macroinvertebrate communities.	Supervising Scientist Annual Report 2002-03: biological monitoring – Aug03. Conduct water sampling programs for biological attributes – Oct03-Jun04. Internal Report on creekside monitoring protocols – Feb04 Internal Report on mussel bioaccumulation protocols – Feb04 Internal Report on fish bioaccumulation protocols – Apr03 Internal Report on stream macroinvertebrate protocols – Feb04 Internal Report on fish community protocols – Mar03 Internal Report on bioaccumulation of radium isotopes in mussels – Dec03. Internal Report on metals in mussels – Mar04. Internal Report on metals in fish – Apr04. Internal Report on fish communities, Ranger – Dec03. Internal Report on macroinvertebrate communities, Ranger – Dec03. Draft journal paper on stream monitoring program – May04. Draft journal paper on stream monitoring program using fish communities – May04. Supervising Scientist Note on stream monitoring program – May04. Supervising Scientist Note on stream monitoring program using fish communities – May04. Data population of Macroinvertebrate Database – Nov03 Data population of Fish Database – Feb04 Data population of Creekside Monitoring Database – Jan04 Updates to Supervising Scientist website as data accrue.
Project leader: Chris Humphrey *Total staff:* 190 person weeks *Students*: 24 person weeks	

6 Radiological risk

Aim: Monitor and investigate radiological risk arising from present-day operations at Ranger uranium mine. Assess radiological risk arising from historical uranium mining activities in the Alligator Rivers Region. Assist in planning for rehabilitation of the Ranger and Jabiluka sites.

Projects:	*Targets and dates:*
1. Radon concentrations in air in the Alligator Rivers Region.	Internal Report on meteorological and radon data, Nabarlek – Jan04.
2. Radon exhalation and Lead-210 deposition rates in the Ranger region.	Internal Report on radon exhalation on Ranger dumps – Aug03. Internal Report radon exhalation, Nabarlek – Nov03. Draft journal paper radon exhalation review – Mar04. Internal Report on seasonal and diurnal variability in radon exhalation – Jun04.
3. Radionuclides and Pb isotopes in surface water and sediment (source term; transport pathways).	Conference paper on radiological protection of ecosystems, Stockholm – Oct03.
4. Bioaccumulation of radionuclides (aquatic fauna and flora; terrestrial fauna; fruits and yams).	Internal Report on radiochemistry 2002-03 – Sep03. Paper on Alpha spectrometry methods for International Conference on Radionuclide Measurement: Draft journal article – Sep03; Conference presentation – Oct03. Internal Report on identification of Aboriginal foods – Dec03. Draft journal paper on radionuclides in mussels – Jun04.
5. Air quality monitoring (source term; lead isotopes on dust; ongoing monitoring).	Internal Report on lead isotopes on leaves – Jul03. Draft journal paper lead isotopes on dust – Apr04. Draft journal paper on radionuclides on dust, Ranger source term – May04.
6. Case study: Nabarlek.	Conference presentation to Australian Radiation Protection Society on Nabarlek study – Oct03. Draft journal paper on Nabarlek airborne survey – Nov03.
7. Case study: South Alligator River valley.	Internal Report on radionuclides in South Alligator River valley mussels – Oct03. Internal Report on Sleisbeck airborne survey – Feb04.

Theme leader: Paul Martin
Total staff: 105 person weeks

7 Communications and knowledge management

Aim: Communications and knowledge management works across all the themes to provide support to our research programs and to develop communication programs to inform and involve Aboriginal communities and our other research partners and stakeholders in the activities of the Supervising Scientist.

This theme also supports operation of the National Centre for Tropical Wetland Research.

Projects:	*Targets and dates (most outputs are ongoing):*
1. Develop and support communication activities to disseminate information about our research and monitoring programs; inform traditional owners and other Aboriginal people in the Alligator Rivers Region; maintain positive relationships with other partners and stakeholders; and promote the profile and work of ***eriss***.	Integrate communication outputs and strategies into work planning at theme and project level. Support internal and external publications and other communication outputs across research programs. Publish ***eriss*** newsletter *Update* (6 issues per year; next issue: Gurrung – Sep03). Assist with identification of topics for and publication of Supervising Scientist Notes (3 for each of the 4 scientific program areas – Jun04). Ensure appropriate consultation for existing and new projects is undertaken prior to work commencing, including adherence to relevant permits and protocols. Ensure consultation activities are properly documented (ongoing) and provide an Supervising Scientist Annual Report contribution about consultation activities – Aug03. Support and maintain timely reporting back of the results of research to traditional owners and stakeholders in the Alligator Rivers Region. Produce effective vehicles for communication with traditional owners and other Aboriginal people: poster series; picture books; use of other/multi media. Commence new poster/picture book series Sep03 – produce at least 8 posters and 2 picture books by Dec03. Support opportunities to network and strengthen links. Support for commercial activities – as required. Document and report on ***eriss*** *Science Profile* – Sep03. Participate in communication activities and community presentations. Key events include National Science Week – Aug03; Gunbalanya Open Day – Sep03; World Environment Day – Jun04; Supervising Scientist 25th anniversary; and others to be identified. Support contribution to wetlands conservation issues at an international, national and local level – as required.
2. Identify and coordinate the involvement and employment of local and other Aboriginal people in research and monitoring programs.	Coordinate employment and contract arrangements. Assess training needs for local staff who will be working with Aboriginal people and implement. Develop an indigenous employment discussion paper, including investigation of funding and training support opportunities. Present for discussion at internal seminar – Nov03 Liaise with other employment providers in the Alligator Rivers Region on possible coordination of employment strategies and opportunities.
3. Develop awareness by staff and provide cross-cultural training opportunities.	All staff and students undertake communication induction. Cross cultural training opportunities identified and offered to new and existing staff. Update information pack on Aboriginal Associations in the Alligator Rivers Region – Jan04.

4. Coordinate work planning and internal communication strategies to support research and monitoring programs.	Draft Supervising Scientist Strategic Plan – Sep03. Complete ***eriss*** strategic/thematic workplan (and produce as Internal Report) – Sep03. Coordinate thematic approvals structure: including ongoing development and implementation of SSD-Explorer project management system; and 6-weekly work planning meetings. Internal communications strategy: first draft – Oct03; complete with plan of implementation – Nov/Dec03. Input to Supervising Scientist Annual Report – Aug03.
5. Coordinate and promote the activities and research projects of the National Centre for Tropical Wetland Research.	Secretariat functions: Board of Management; Advisory Committee. Update website; assist with publications. Implement Communications and Marketing Strategy – Dec03.
Theme leader: Nathan Harris / Jacqui Rovis-Hermann *Total staff:* 75 person weeks	

Appendix 1 – Key Knowledge Needs

This list of key knowledge needs was developed by the Alligator Rivers Region Technical Committee at their meeting in February 2003. It is to be refined through further discussion.

Primary objective: Protection of the Alligator Rivers Region

Mine operations ('now') within a risk framework

1. Reassess and quantify contaminant movement within biophysical pathways (concentration, species, loads, dynamics)
2. Contaminant movements through groundwater pathways from current operations
3. Linking ecotoxicological knowledge and biophysical pathways (first flush, terrestrial, food, sediments)
4. Human health risks associated with biophysical pathways (bush tucker, bioaccumulation, drinking water)
5. Radiological effects on people (source terms, dose assessment parameters, sampling and analysis)
6. Linking of conceptual models with onsite management (adaptive, not operationalising the science)

Mine Closure ('future')

7. Completion criteria, shared reclamation objectives and indicators of success
8. Ecosystem establishment techniques (landform, vegetation, fauna, hydrology, geochemistry)
9. Sustainability of rehabilitation (weeds, fire, nutrients, resilience, extreme events)
10. Radon emanation and bioaccumulation of radionuclides from final landform
11. Adequate baseline data to underpin indicators of success (for example, hydrology of Gulungul)
12. Demonstrated ability to reconstruct an ecosystem (Nabarlek)

Knowledge Management and Communication

13. Between and within research providers (past, present and into the future)
14. Uncertainty analysis of data (for example, risk assessment) and communicating
15. Development of an integrated framework (landscape scale analysis)
16. Effective communication of science to stakeholders