WAMSI PROJECT FINAL REPORT

Project Details

Project Number and Title:	3.6 Scientific Coordination: Administration, Communication and Data Management
Node Leader:	Dr Chris Simpson
Project Leader:	Dr Chris Simpson
Project Team:	Dr Kelly Waples
Project Start Date:	2005
Project End Date:	2011
Due Date for Final Report:	30 June 2011

Project Funding:

WAMSI	$
Additional Cash	$
Additional In-Kind	$
Total Funding	$

1. Project Objectives and Achievement Criteria

Confirmation of the project objectives and the delivery of milestones against the Key Performance Indicators:

This project was designed to carry out the work required to coordinate the broad range of research undertaken in the research program comprising Node 3 of WAMSI. Scientific coordination includes:

- Administration activities such as preparing project plans and agreements, monitoring progress, reviewing milestones and maintaining financial records
- Development and implementation of a communication program that addresses internal and external science communication aspects
- Development and implementation of a data management plan to ensure that the data gathered through the Node 3 research program is properly stored, catalogued and managed so that it will be readily accessible to interested parties into the future
- Integration with research programs and individuals from other Nodes within WAMSI and with research programs and individuals undertaking research at Ningaloo Marine Park, but not the umbrella of WAMSI; e.g. the Ningaloo Collaboration Cluster, AIMS and University projects
- Facilitation of the uptake of information gathered through the Node 3 research program into management policies, programs and plans; ie. effective knowledge transfer

The overriding goal of this project has been to facilitate the process of knowledge transfer and uptake between scientists and decision-makers/managers so that the new knowledge gained through the Node 3 science program can and will be used to support or improve our management of marine biodiversity in WA. To address knowledge transfer, this project was divided into the 3 elements described below.

Science Coordination and Administration refers to those activities that are necessary to ensure the Node 3 research program runs smoothly from project planning through to submission of final reports to WAMSI. Expected outputs for this element were to include:

- Compliance with WAMSI performance management and financial auditing frameworks for all Node 3 projects
- Research program within Node 3 fully integrated ensuring full collaboration and information exchange between projects
- Node 3 research program integrated within the WAMSI program to ensure full collaboration and

information exchange between nodes

- Node 3 research program integrated within the Wealth From Oceans (WFO) Ningaloo Cluster research program to ensure full collaboration and information exchange between nodes
- Assimilation and uptake of research outcomes into management processes within the DEC.

A well planned and executed **Communication Program** is critical to ensure that clear and effective communication of science findings would be achieved for the science program within Node 3. The Communication Program was designed to deliver:

- A Ningaloo Research Program communication plan which integrates activities for WAMSI, the DEC Marine Science Program, the WFO Ningaloo Cluster and the DEC Exmouth Region and completion of associated communication activities
- Annual Ningaloo Research Symposium
- Delivery of annual presentations to Regional community
- Ningaloo Research Website, jointly maintained with the WFO Ningaloo Cluster

Data Management is a critical function for Node 3 as it is needed to ensure the vast array of information gathered through the research projects is catalogued, stored and accessible into the future. The Data Management program in Node 3 will:

- Develop a data management plan for the Node 3 research
- Develop a data management framework that can be used to store and make accessible data gathered by Node 3 research projects over the long term

2. Research Chapter(s)

This project is not a research project per se, rather it represents the coordination around the numerous projects that comprise Node 3. The overriding goal of project 3.6 is to ensure effective knowledge transfer and uptake for the science within Node 3. Knowledge transfer refers to the movement of information between researchers, managers and policy makers ultimately leading to the uptake of that information into management activities and practices. Traditionally, knowledge is generated by the scientists through investigative research. This information is distilled into reports and publications and is communicated through the scientific literature, symposiums, conferences and seminars or direct interaction between individuals. Ideally, management agencies then use the information in the development of management plans and departmental policy, establishment of monitoring and research programs and routine operational activities.

However, as straightforward as this process seems, it is often the case that the information gleaned through science is not transmitted or effectively used by management agencies, most notably when there are no political, social or environmental drivers. This project undertook to develop and trial a process for knowledge transfer that would improve the flow of information and its resultant uptake into decision-making and management action. The process is represented in the 3 elements of project 3.6 (science coordination, communication and data management) as each have a role to play in the overall function of knowledge transfer. Each of the three subprojects are detailed below, including process and outputs. While knowledge transfer activities are described under 3.6.1, the full impact of knowledge transfer is the culmination of this project and includes all elements. For a fuller description of the process and its application, see Simpson and Waples 2008 or Waples and Simpson 2011 in the Node 3 Final Synthesis Report.

3.6.1 Science Coordination

Administration

Node 3 of WAMSI comprises a broad research program that is predominately centred on ecological and biological research at Ningaloo Marine Park (NMP). This program is complimented by an additional large body of research undertaken through the CSIRO Wealth from Oceans National Research Flagship program, the Ningaloo Collaboration Cluster (the Cluster) and by core research by AIMS. Collectively these research programs are addressing many of the priority research needs identified in the Ningaloo Marine Park Management Plan 2005 to ensure that the management of NMP is based on sound and rigorous science.

The administration component of Project 3.6.1 comprises those activities that are necessary to ensure that the Node 3 research program runs smoothly. This has included assisting in the development and approval of project plans, ensuring that milestone commitments were met on time, reviewing milestone reports, preparing information and presentations for WAMSI Science Reviews and Node Leader presentations, maintaining accurate and up to date financial records and addressing issues that may arise for the Project Leaders or the Node Leader.

Node 3 can be broken down into 27 significant projects/subprojects which are divided across seven main headings. (see Appendix A for a full list). In all, there have been roughly 60 scientists working on Node 3 research projects representing four Western Australian Universities, two national research organisations and two WA State government departments. While the majority of research focuses on the Ningaloo Marine Park (NMP), one subject area (3.7) related to the finalisation of research initiated under the Strategic Research For the Marine Environment (SRFME) program and one project (3.8) addressed the compilation of metadata on all marine research in the northwest bioregion (Kalbarri to the Northern Territory). Additionally, Node 3 contains a project stream for the support of post graduate students engaged in marine science in WA (3.9). Seven post graduate student projects have received funding from WAMSI and are included under this heading. One student has withdrawn from their studies, however the other 6 projects have progressed throughout WAMSI and are either complete or nearing completion.

Administration of Node 3 has remained straightforward throughout the duration of WAMSI. Research projects have progressed more or less on track with minor adjustments to the timeframe for field work and milestone reports negotiated and agreed with WAMSI where necessary. All research projects within Node 3 have been completed and have delivered the anticipated outputs. In many cases, delivery has exceeded the expectations.

Regular reporting to WAMSI has been successfully managed for project 3.6 including annual milestone and financial reports and verbal briefs when requested to the WAMSI Board.

Science Coordination

The science coordination role of 3.6.1 involves a broad range of tasks and commitments necessary to ensure that the research undertaken within Node 3 is quality applied science that is integrated with other concurrent research programs, thus providing bigger picture and broader outcomes to support our management of marine resources. To ensure that research is well integrated within Node 3, within WAMSI and with external research programs relevant to Ningaloo Marine Park, we have engaged in a number of activities over the past five years to promote integration and collaboration, including:

- Attendance at WAMSI Operations Group Meetings,
- Attendance at symposia held by WAMSI including Node seminars, Marine Science Show and Tell days and other fora;
- Meetings with all Node 3 and other relevant Node project leaders and/or teams to discuss individual project issues, management questions and how findings will apply to management;
- Creation and coordination of the Ningaloo Research Coordinating Committee (NRCC), comprising members from Node 3, the Cluster and AIMS. This group has a shared interest in the integration of research at Ningaloo Marine Park and provision of the resultant research outputs to natural resource managers;
- Development and maintenance of a database of all marine research at Ningaloo Marine Park underway between 2005 and 2011;
- Regional visits to discuss the research program with DEC staff, DoF staff, the Ningaloo Sustainable Development Commission and other regional community groups in Exmouth and the broader Ningaloo Region;

These activities have all been instrumental in forming a cohesive research program where the scientists are aware of the vast body of research underway and have opportunities to foster linkages and collaborations with other relevant projects at NMP. Additional activities described under communication below have also assisted in this regard.

3.6.2 Communication

Knowledge transfer relies very heavily on communication at a range of levels. The importance of communication in Node 3 and specific goals in that regard were agreed early in the life of Node 3 and documented in the jointly prepared Ningaloo Research Communications Plan (Appendix 2). The plan identifies the need for clear communication objectives, key messages and a range of activities to promote these. Communication activities have been jointly planned and executed in conjunction with WAMSI and with the Ningaloo Collaboration Cluster. The plan was revised and updated for the final year of both WAMSI and the Cluster to address specific communication issues around the completion of the science and dissemination of key findings.

Communication activities and achievements that have been undertaken through this project include:

- Coordination and co-hosting of three Ningaloo Research Symposia and publication of associated Proceedings,
- Coordination and co-hosting of a Ningaloo Research Synthesis Workshop in the final year of the research program to focus research findings on outcomes and management application and to develop cross-cutting issues;
- Coordination and co-hosting of two Ningaloo Student Research Days and publication of Proceedings;
- Publication of the Ningaloo Research Progress Report 2008 which detailed research underway, early findings and implications for management;
- 21 presentations on Node 3 science including professional conferences as well as Government Departmental meetings and public symposia;
- 11 presentations on the knowledge transfer process and its application through Node 3 and related Ningaloo Research
- 17 publications on knowledge transfer and its application through Node 3 and related Ningaloo Research
- Development and maintenance of the Ningaloo research website jointly managed with CSIRO (www.ningaloo.org.au).
- A minimum of 9 media releases, 8 interviews and 5 articles on communication activities and/or promotion of Node 3 research findings
- Representation on the WAMSI Communications Committee.

Events such as the annual research symposium have provided an opportunity to showcase the research to managers so that they may find various elements relevant to their policy and management needs, as well as to the broader community to demonstrate the power generated by the extensive and collaborative research effort. Additional communication activities have been undertaken through the individual research projects and are detailed in their final reports.

3.6.3 Data Management

Data and information management is a critical function of Node 3 to ensure that the vast array of information gathered is properly catalogued and stored so that it will be accessible into the future. Each project agreement within Node 3 has a data and information management plan included which details how data will be stored and managed. Currently this involves the provision of metadata for each project to the WAMSI Data officer and the storage of data and data products at iVEC, through the management of Luke Edwards and at DEC through the management of the Marine Science Program.

Major data management activities have included:

- Development and maintenance of a database of current research at Ningaloo Marine Park held by the DEC;
- development of a protocol for the submission, cataloguing and storage of data from Node 3 research;
- compilation of all metadata records for Node 3 research projects from the MEST also held by the DEC;
- Initiation of database construction within the MSP to house relevant datasets;
- Liaison with the WAMSI Data Management Officer to ensure Node 3 metadata and data has been provided to WAMSI and is stored appropriately;
- Liaison with AIMS over the development of the Ningaloo Atlas as an on-line access point to Ningaloo Marine Park research and data.

Knowledge Transfer and Uptake development

As noted above, knowledge transfer and uptake has been a key focus for Node 3 and has been a significant role undertaken through project 3.6. While all the 3 elements of this project contribute to effective knowledge transfer and our main activities and accomplishments in this regard are described under those sections, there are several activities that are not represented elsewhere and are highlighted here instead. These include:

- Development of a process and framework for knowledge transfer and uptake that can be implemented within the DEC for other research programs and projects;
- Development and publication of a report on an associated project in Marine Research Knowledge Transfer for Temperate Marine Biodiversity;
- Development of management questions associated with each research project and provision of these questions to relevant project leaders;
- Discussions held with managers within DEC to introduce the expected outcomes from the Ningaloo research in line with their key management questions and uses for this information;
- Development of a knowledge transfer matrix that outlines Node 3 projects, their objectives, outputs and potential application of research findings to generic Marine Protected Area management categories. Information in this matrix was used as a discussion point with the scientists and DEC staff with a role in marine resource management to focus recommendations relevant to ongoing knowledge transfer;

Knowledge transfer and uptake will not end with the conclusion of project 3.6, and in many ways will just be beginning. The Node 3 Leader and Science Coordinator will both continue to engage with scientists and managers to ensure the research findings from Node 3 and other related Ningaloo research are recognised and incorporated into ongoing and future management decisions, policies and actions. Finally, a fuller description of the knowledge transfer process and framework as well as the ongoing recommendations and actions that will stem from the Node 3 research program will be contained within the Node 3 Final Synthesis Report in preparation by Simpson and Waples for submission in 2011.

3. Methodology

N/A – incorporated above

4. Results

N/A – incorporated above

5. Discussion

Implications for Management and Advancement of the Field – Describe the key findings as they relate to the objectives and the management questions discussed at the outset of the project.

N/A – implications for management are part of each of the research projects and have been interpreted and disseminated through the knowledge transfer work undertaken as part of this project (fully described under item 2 above).

Problems encountered (if any) – Describe any major problems/issues encountered during the study and how they were addressed.

No major problems were encountered.

New Research Directions (if any) – Identify new research directions pursued during the course of the

project and reasons for modifying original research plans. Describe how the changed research agenda improved the project.
N/A

6. Overall Project Accomplishments

Students supported – Record the name of each student involved with the project. Indicate whether PhD or other (give details) and briefly describe their role.
No students were directly involved in this project, however Node 3 supported 5 students through top up scholarships. An additional 2 students were provided full scholarships through a BHP Billiton funding scheme that was coordinated through the NRCC. Science coordination activities under this project also related to the following students who are not identified under other project final reports. Frazer McGregor – PhD Student, Murdoch University, BHP Billiton Scholarship Cecile Rousseaux – PhD Student, UWA, BHP Billiton Scholarship and WAMSI Top Up scholarship Janja Ceh – PhD Student, Murdoch University, WAMSI Top Up scholarship Soheila Taebi – PhD Student, UWA, WAMSI Top Up scholarship Abbie McCartney – PhD Student, UWA, WAMSI Top Up scholarship A number of other students have been supported by or worked on specific research projects within Node 3 and their details are contained within those project reports.
PhD theses, Dissertations and Student Placement – Please give complete citation for theses and dissertations (student's name, month and year completed or expected, level of degree, institution). Please provide a copy of the abstract of the thesis or dissertation when complete.
N/A
Publications - List in standard academic format the citations of literature produced during the reporting period. Include journal articles, book chapters, reports, etc. submitted, in press and printed. Please provide a paper and electronic version copy of each publication resulting from the project. If there is a link to the journal electronically, please also include this.
Armstrong, Shannon. 2006. Current research in the Ningaloo Marine Park. Department of Environment and Conservation. Perth, WA Armstrong, Shannon. 2006. Bibliography of marine scientific research relevant to the Ningaloo Marine Park and adjacent waters. Department of Environment and Conservation. Perth, WA Hill, Andrew. 2010. Marine research knowledge transfer for temperate marine biodiversity. Report prepared for the Department of Environment and Conservation, WA. 43pp. Irvine, TR, Keesing JK (eds). 2007. Whale Sharks: Science, Conservation and Management. Proceedings of the First International Whale Shark Conference, 9-12 May 2005, Australia. Fisheries Research Special Issue 84 Irvine, TR, Keesing JK (eds). 2007. The First International Whale Shark Conference: Promoting international collaboration in whale shark conservation, science and management. Conference Overview, abstracts and supplementary proceedings. CSIRO Marine and Atmospheric Research, Australia. 98p McKenna, S, Waples, K. 2008. Communicating science. In Proceedings of the Second Annual Ningaloo Research Symposium: Discovering Ningaloo- latest findings and their implications for management. 28 and 29 May, Murdoch University, WA. Ningaloo Research Coordinating Committee. Perth, WA. NRCC. 2007. Proceedings of the Ningaloo Marine Park Symposium, 16-17 July 2007, Murdoch University, Perth. Department of Environment and Conservation. Perth, WA NRCC. 2008. Discovering Ningaloo: latest findings and their implications for management. Proceedings of the Second Annual Ningaloo Research Symposium, 28-29 May 2008, Murdoch University, Perth. Department of Environment and Conservation. Perth, WA NRCC. 2008. Ningaloo research communications plan. Draft for CSIRO, WAMSI and Department of

Environment and Conservation, Perth WA.

NRCC. 2009. Proceedings of the Ningaloo Research Day for Students. 30 March 2009, Floreat WA. Ningaloo Research Coordinating Committee. Department of Environment and Conservation, Perth WA.

NRCC. 2009. Proceedings of the Third Annual Ningaloo Research Symposium: Ningaloo into the future - integrating science into management. 26 and 27 May, Exmouth, WA. Ningaloo Research Coordinating Committee. Department of Environment and Conservation, Perth WA.

NRCC. 2010. Proceedings of the Ningaloo Research Day for Students. 30 March 2010, Floreat WA. Ningaloo Research Coordinating Committee. Department of Environment and Conservation, Perth WA.

Simpson, C, Waples, K, Kendrick A.. 2008. Science and management: a framework to enhance knowledge transfer. Pages 88-90 in Discovering Ningaloo: latest findings and their implications for management. Ningaloo Research Program Progress Report. Ningaloo Research Coordinating Committee. Department of Environment and Conservation, Perth WA.

Waples, K and Simpson, C. 2009. Integrating science into management to support marine conservation: a management perspective. Pages 9-16 in Proceedings of the Third Annual Ningaloo Research Symposium: Ningaloo into the future - integrating science into management. 26 and 27 May, Exmouth, WA. Ningaloo Research Coordinating Committee. Perth, WA.

Waples, K, Simpson, C. 2010. Focus of the MSP knowledge transfer and uptake process for the Ningaloo Research Program 2010-2011. Internal report. Department of Environment and Conservation

Waples, K, Simpson, C. Draft. Enhancing knowledge transfer and uptake: process for the Ningaloo Research Program. Technical paper. Department of Environment and Conservation, Perth WA

Waples, Kelly. 2007. Current research in the Ningaloo Marine Park, 2007. Department of Environment and Conservation. Perth, WA

Waples, Kelly and Hollander, Edwina. 2008. Ningaloo Research Progress Report: Discovering Ningaloo: latest findings and their implications for management. Ningaloo Research Coordinating Committee. Department of Environment and Conservation, Perth WA.

Wood, S. 2010. Ningaloo research communication and engagement plan. Internal report for CSIRO, Hobart Tas and Department of Environment and Conservation, Perth WA.

Presentations - Cite any presentations resulting from the project, including conferences, symposiums, etc.

Following is a list of presentations at conferences, symposia and formal meetings. Additional informal presentations and briefings have been provided throughout the project to DEC staff as well as other relevant stakeholders.

Mau, Roland. 2007. The role of science in the management of Ningaloo Marine Park. ACRS. Esplanade Hotel, Fremantle

Mau, Roland. 2008. WAMSI Node 3 - Managing and conserving the marine state: best practice management and underpinning science. Ningaloo Sustainable Development Commission meeting. Coral Bay

McKenna, Sue. 2008. Communicating science. Ningaloo Research Symposium. Murdoch University, Perth

Simpson. 2010. Ningaloo Research Program. WAMSI/AMSI show and Tell . Maritime Museum, Perth

Simpson, Chris. 2007. Science for Management. Ningaloo Research Symposium. Murdoch University, Perth

Simpson, Chris. 2007. A science based approach to the management of WA coral reefs: focus on Ningaloo Reef. ACRS. Esplanade Hotel, Fremantle

Simpson, Chris. 2008. WAMSI Node 3 - Managing and conserving the marine state: best practice management and underpinning science. Node Leader presentations to the WAMSI Governors. Perth Convention Centre

Simpson, Chris. 2008. Implementing the Marine Science Strategy and update on WAMSI Node 3. MPRA.

Simpson, Chris. 2008. Science and management: a framework to enhance knowledge transger. Ningaloo Research Symposium. Murdoch University, Perth

Simpson, Chris. 2008. Node 3 annual report to the WAMSI Board. WAMSI Board Meeting. Perth, WA

Simpson, Chris. 2009. Node 3 annual report to the WAMSI Board. WAMSI Board Meeting. Perth WA

Simpson, Chris and Waples, Kelly. 2007. Research at Ningaloo Marine Park: best practice management and underpinning science. Coral Bay Society. Coral Bay

Simpson, Chris and Waples, Kelly. 2007. Research at Ningaloo Marine Park: best practice management and underpinning science. DEC and DoF staff. DEC, Exmouth

Simpson, Chris and Waples, Kelly. 2008. Research at Ningaloo Marine Park: best practice management and underpinning science. Exmouth Community. DEC, Exmouth

Simpson, Chris and Waples, Kelly. 2009. Node 3 Science Reviews- overall progress and projects 3.6, 3.7, 3.8. Science Review. Perth WA

Simpson, Chris. 2005. Marine Science Program - Research and Monitoring. MPRA. Perth

Steele, Wendy. 2008. Ningaloo research website. Ningaloo Research Symposium. Murdoch University, Perth

Waples, Kelly. 2007. WAMSI Node 3 - Managing and conserving the marine state: best practice management and underpinning science. WFO Modelling Workshop. CSIRO, Melbourne

Waples, Kelly. 2007. WAMSI Node 3 - Managing and conserving the marine state: best practice management and underpinning science. Tourism workshop. Curtin University, Perth

Waples, Kelly. 2008. WAMSI Node 3 - Managing and conserving the marine state: best practice management and underpinning science. WAMSI Show and Tell Science Day. Maritime Museum, Perth

Waples, Kelly. 2008. Update on the Ningaloo Research Program. MPRA annual audit. Perth, WA

Waples, Kelly. 2008. The Ningaloo Research Program. DEC Pilbarra Regional Meeting. Coral Bay

Waples, Kelly. 2009. Knowledge Transfer in the Ningaloo Research Program. MPRA. Perth WA

Waples, Kelly. 2009. Update on the Ningaloo Research Program and its application to management. MPRA annual audit. Perth, WA

Waples, Kelly. 2009. Science to Action: development of a process for knowledge transfer and uptake with the Ningaloo Research Program. Parks and Visitors Services annual conference. Perth, WA

Waples, Kelly. 2009. Science to Action: development of a process for knowledge transfer and uptake with the Ningaloo Research Program. Nature Conservation Division annual conference. Perth WA

Waples, Kelly. 2009. Science to Action: development of a process for knowledge transfer and uptake with the Ningaloo Research Program. Science Division, Senior Management Team. Perth WA

Waples, Kelly. 2010. Science to Action: development of a process for knowledge transfer and uptake with the Ningaloo Research Program. DEC seminar series. Perth, WA

Waples, Kelly. 2010. Knowledge Transfer in the Ningaloo Research Program: from science to action. Ningaloo Synthesis and Integration Workshop. Floreat, NSW

Waples, Kelly. 2011. Update on Ningaloo Research and application to management strategies. MPRA. Perth, WA

Waples, Kelly. 2010. Update on project 3.6. WAMSI Science Review. Perth

Waples, Kelly and Simpson, Chris. 2009. Integrating science into management to support marine conservation: a management perspective. Ningaloo Research Symposium 2009. Exmouth, WA

Other Communications Achievements - Interviews, press releases, etc.

A number of media releases, interviews and popular articles have been prepared on Node 3 science. While these often have related to specific science projects, many have been prepared and distributed through this project. Following is a list of relevant communication activities, however others are included in the relevant project final reports.

This project has been responsible for at least 8 radio interviews, 9 media releases which have led to a number of articles, and 2 Departmental newsletter articles.

7. Overall Project Benefits Please note: Benefits go beyond Results and Accomplishments to provide information on direct physical, environmental, economic or social gains realised as a result of a research project or outreach activity.

Discovery and Application of New Products and Processes (if applicable) - Describe any actual or anticipated products or processes discovered or developed in the project.
A process and framework for knowledge transfer and uptake was developed as part of this project for implementation within the Marine Science Program of the Department of Environment and Conservation. A number of presentations were provided on this process to internal groups within DEC and a second similar project was initiated to enhance knowledge transfer in the temperate marine environment. We intend to publish a manuscript on the knowledge transfer and uptake process and will work towards ensuring it becomes part of the practice of science within the Science Division at DEC.
Tools, Technologies and Information for Improved Ecosystem Management - Describe how project results are being (or will be) translated into sustainable use and management of coastal and ocean ecosystems. Tools might include benthic habitat maps or environmental sensitivity indicators. Technologies might include remote and bio-sensing, genetic markers, and culture systems. Information might include technical assistance, training and educational materials.
A joint website was developed along with the CSIRO Wealth from Oceans National Research Flagship Program: the Ningaloo Collaboration Cluster and can be viewed at www.ningaloo.org.au. Project profiles for 13 of the Node 3 projects are available on this website along with further information on the research program at Ningaloo, proceedings of the various symposia and links to additional information. The intent is for this website to remain available into the future. A second website is being developed by AIMS that will represent an e-atlas for the Ningaloo region at www.ningaloo-atlas.org.au It is planned to contain relevant science and other information on the region and include software that will allow easy visualisation of this information. This resource will be supported by AIMS over the long term and will represent a significant tool for marine park managers to use in their operational and reporting duties.
Forecasting for Natural Resource Management Decisions - Describe how results already are being used - or are expected to be used after project completion - by natural resource management to make decisions based on project forecasts. Forecasts may be due to field and laboratory studies and models. Examples include hypoxia forecast models, algal bloom alerts, forecasts of fishery harvest, and prediction of impacts from ecosystem stressors such as pollutants or invasive species.
N/A
Impacts - Impacts are higher order, usually long-term results of a project's activities that have significant scientific, economic or social benefits. Impacts may involve behavioural, policy or economic changes. Describe impacts (anticipated or realized. These impacts may involve behavioural, policy or economic changes. Seminal contributions to science are considered impacts especially if the research findings lead to major progress in a particular field, implementation of new technologies or have a substantive bearing on an economic or societal issue.
The knowledge transfer element of this project will have the longest acting impact as it will continue to deliver science findings and implementation of recommendations from that science long into the future. The specific recommendations however come from the individual science projects and are listed in those separately.

8. Project Metadata and Data Generated

These must be available at an open access repository/data centre/iVEC.

There is no data associated with this project.

9. Linkages to Associated Projects – can be WAMSI and non-WAMSI

The goal of this project has been to ensure that the science around Ningaloo Marine Park is appropriately captured, interpreted and made accessible for the ongoing management of the marine park and its ecological and social values. As such, we have established links with a broad range of research from both within WAMSI and externally. While the full research program of Node 3 has been the main focus, additional WAMSI projects include those in Node 2 and Node 4 relevant to the Ningaloo Region. Significant links and collaboration were also established with the CSIRO Wealth from Oceans National Research Flagship Program: the Ningaloo Collaboration Cluster. Finally, additional links were established with a large number of scientists engaged in research at Ningaloo Marine Park during the duration of WAMSI.

10. Other Comments and General Discussion

11. Annexures

- **List of Node 3 Projects**
- **Ningaloo Communications Plan**

Appendix A WAMSI Node 3 Science Plan - Projects and Subprojects

Reference	Title	Project Leader	Subproject
3.1	**Biodiversity assessment and development of cost-effective monitoring protocols.**	**Andrew Heyward AIMS**	**3.1.1** Deepwater communities at Ningaloo Reef. 3.1.1a Deep water habitat types *Andrew Heyward, (AIMS)* 3.1.1b Fish biodiversity associated with habitat types in sanctuary and adjacent zones Euan Harvey, *Ben Fitzpatrick, (UWA)* 3.1.1c High resolution data on cross shelf bathymetry and sediment facies *Rob McCauley, Emily Twiggs, (Curtin)* 3.1.1d Species inventory database for Ningaloo deep waters *Jane Fromont, (WAM)* **3.1.2** Methods of monitoring the health of benthic communities at Ningaloo Reef *Martial Depczynski (AIMS)* **3.1.3** Stock assessment of target invertebrates at Ningaloo reef *Martial Depczynski (AIMS)* **3.1.4** Local and regional migratory patterns of whale sharks at Ningaloo Reef. *Mark Meekan (AIMS)* **3.1.5** Ningaloo Research Program start-up project for habitat and biodiversity surveys in the deep waters of the Ningaloo Marine Park **3.1.6** Ningaloo Research Program start-up project for physical oceanography of the Ningaloo Marine Park. *Richard Brinkman (AIMS)*
3.2	**Biodiversity assessment, ecosystem impacts of human usage and management strategy evaluation.**	**Russ Babcock CSIRO**	**3.2.1** Diversity, abundance and habitat utilisation of sharks and rays. *John Stevens, Peter Last (CSIRO), Rory McCauley (DoF)* **3.2.2** Ecosystem impacts of human usage and the effectiveness of zoning for biodiversity conservation. *Russ Babcock (CSIRO)* 3.2.2a Broad scale fish surveys *Russ Babcock (CSIRO)* 3.2.2b Intertidal invertebrate species *Bob Black (UWA)* 3.2.2c Assessment of trophic cascade effects

Projects highlighted in Blue were startup projects that were incorporated into other subprojects

			Glen Hyndes (ECU) 3.2.2d Lagoon invertebrates (crayfish) *Russ Babcock (CSIRO)* 3.2.2e Assessment of zone adequacy using fish tagging and tracking *Russ Babcock (CSIRO)* 3.2.2f Finescale fish surveys – fish communities and habitats *Ben Fitzpatrick (UWA)* **3.2.3** Management strategy evaluation *Rich Little (CSIRO)* **3.2.4** Ningaloo Research Program start-up project for impacts of human usage, oceanography and management strategy evaluation.
3.4	**Characterisation of geomorphology and surficial sediments.**	**Prof Lindsay Collins Curtin**	3.4.1 Reef morphology and growth history 3.4.2 Surficial sediments
3.5	**Characterisation and modelling of oceanographic processes.**	**Prof Charitha Pattiaratchi UWA**	3.5.1 Assessment of the dominant hydrodynamic processes in the reef lagoon system and numerical simulation of waves, currents, sediment transport and particle dispersion in a shallow complex reef environment *Ryan Lowe (UWA) and Graham Symonds (CSIRO)* 3.5.2 Assessment of the near-reef oceanic processes on organism –scale nutrient dynamics *Anya Waite (UWA)*
3.6	**Science Coordination: Administration, communication and data management.**	**Chris Simpson DEC**	**3.6.1** Coordination and Administration *Kelly Waples (DEC)* **3.6.2** Communications program *Kelly Waples (DEC)* **3.6.3** Data Management program *Kelly Waples (DEC)*
3.7	**SRFME Carryover Projects**	**Chris Simpson DEC**	**3.7.1** Ecological interactions in coastal marine ecosystems: trophodynamics *Glenn Hyndes (ECU)* **3.7.2** Ecological interactions in coastal marine ecosystems: Rock Lobster *Glenn Hyndes (ECU)* **3.7.3** Ecophysiology of benthic primary producers *Paul Lavery (ECU)*

Projects highlighted in Blue were startup projects that were incorporated into other subprojects

			3.7.4 Biodiversity of marine fauna on the central west coast *Jane Fromont (WAM*) **3.7.5** Fish Communities and main fish pupations of the Jurien Bay Marine Park *David Fairclough (Murdoch)* **3.7.6** Identification of macroinvertebrate fauna *Anne Brearley (ECU)* **3.7.7** Integration of SRRME research projects *John Keesing (CSIRO)*
3.8	**Northwest Marine Research Inventory**	**Chris Simpson - DEC**	Project Team – *Tim Skewes/Tom Taranto, (CSIRO)*
3.9	**Post-graduate seed funding program**	**Chris Simpson - DEC**	**3.9.1** Deepwater communities at NMP and ecosystem impacts of human usage and the effectiveness of zoning for biodiversity conservation (Ben Fitzpatrick, UWA) **3.9.2** Characterisation of geomorphology and surficial sediments (Emily Twiggs, Curtin) **3.9.3** The policy relevance of Choice Modelling: an application to Ningaloo Marine Park (Abbie McCartney, UWA) **3.9.4** Quantifying impacts of the Leeuwin current on the ecology and biogeochemistry of the Ningaloo Reef (Cecile Rousseaux, UWA) **3.9.5** The population dynamics and habitat usage of *Sousa chinensis* and *Tursiops truncatus* in the NMP (Kristel Wenziker, Murdoch)[1] **3.9.6** Hydrodynamic processes in the Ningaloo reef system over a range of space and time scales (Soheila Taebi, UWA) **3.9.7** The role of microbial communities in reef building corals along the Ningaloo Reef, WA (Janja Ceh, Murdoch)
3.10	**Assessment of the Groundwater system and its linkages to the NMP**	**Lindsay Collins-Curtin**	

[1] Project suspended due to medical reasons.

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