National Action Plan for Salinity and Water Quality and Natural Heritage Trust program 2003–2009

Final Report

March 2010

Managing Our Natural Resources

Prepared for:

Western Australian State Government

by the State Natural Resource Management Office

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Contents

Page

Acknowledgments

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Acronyms

g/L	grams per litre
GL	gigalitres
ha	hectares
kg	kilograms
ML	megalitres
mg/L	milligrams per litre
mL/GL	millilitres per gigalitre
t	tonnes
ACC	Avon Catchment Council
ANAO	Australian National Audit Office
ARB	Avon River Basin
AVONGRO	AVONGRO Wheatbelt Tree Cropping
AWC	Australian Wildlife Conservancy
BA	Birds Australia
BBG	Blackwood Basin Group
BOM	Bureau of Meteorology
CAR	Comprehensive, Adequate, Representative
CDI	Catchment Demonstration Initiative
CENRM	Centre of Excellence in Natural Resource Management
CfoC	Caring for our Country
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFWA	Department of Agriculture and Food Western Australia
DEC	Department of Environment and Conservation
DeGrey LCDC	De Grey Land Conservation District Committee
DEWHA	Department of Environment, Water, Heritage and the Arts
DIA	Department of Indigenous Affairs
DoF	Department of Fisheries
DoP	Department of Planning
DoW	Department of Water
DPI	Department of Planning and Infrastructure
EEI	Engineering Evaluation Initiative
ELCDC	Esperance Land Conservation District Committee
EMRC	East Metropolitan Regional Council
FBG	Fitzgerald Biosphere Group
FFI CRC	Future Farm Industries Cooperative Research Centre
FPC	Forests Products Commission
GAC	Gnowangerup Aboriginal Corporation
GAWA	Greening Australia WA
GeoCatch	GeoCatch Inc
GHD	GHD Australia
GLCDC	Gingin Landcare District Committee

Acronyms (continued)

IBRA	Interim Biogeographic Regions of Australia
ICM	Integrated catchment management
IDP	Industry development plans
INFFER	Investment Framework for Environmental Resources
KLC	Kimberley Land Council
KLCDC	Katanning Land Conservation District Committee
LCC	Leschenault Catchment Council
MCC	Moore Catchment Council
MG Corporation	Yawoorroong Aboriginal Corporation
MIG	Mingenew Irwin Group
MOMA	Midwest Oil Mallee Association
NACC	Northern Agricultural Catchments Council
NAP	National Action Plan for Salinity and Water Quality
NAR	Northern Agricultural Region
NARFIP	Northern Agricultural Region Flora Information Project
NHT	Natural Heritage Trust
NHT2	Natural Heritage Trust Extension
NLP	National Landcare Program
NMCG	North Metropolitan Conservation Group
NRM	Natural resource management
NSPNR	North Stirling Pallinup Natural Resources inc
OHCG	Oyster Harbour Catchment Group Inc
OIC	Ord Irrigation Council
OLW	Ord Land and Water
OMA	Oil Mallee Association
OMC	Oil Mallee Company
PFDC	Private Forestry Development Committee
PHCC	Peel-Harvey Catchment Council
PMMC	Pilbara Murchison Management Committee
PMP	Property management plan
PRNRM	Perth Regional NRM Inc
PSR	Performance story report
RAIN	Ravensthorpe Agricultural Initiative Network Inc
RCM	Resource condition monitoring
RCT	Resource condition target
RNRM	Rangelands NRM Inc
RoB	Ribbons of Blue
SCC	Swan Catchment Council
SCNRM	South Coast NRM Inc
SCRIPT	South Coast Regional Initiative Planning Team
SEFF	South East Forestry Foundation
SERCUL	South East Regional Council for Urban Landcare

Acronyms (continued)

SJLCDC	Serpentine Jarrahdale Land Conservation District Committee
SKM	Sinclair, Knights, Mertz
SLIP	Shared Land Information Platform
SME	Small and Medium Enterprises
SOC	Soil organic carbon
SoE	State of Environment
SPA	Saltland Pastures Association
SRT	Swan River Trust
SWALSC	South West Aboriginal Land and Sea Council
SWCC	South West Catchments Council
SWEK	Shire of Wyndham East Kimberley
TIP	Targeted Investment Program
TSA	Timber Share-farming Agreement
URS	URS Australia
UWA	University of Western Australia
VWA	Vegetables WA
WALGA	Western Australian Local Government Association
WAMEAC	Western Australian Monitoring and Evaluation Advisory Committee
WANRMMC	Western Australian NRM Ministerial Council
WAPC	Western Australian Planning Commission
WCC	Warren Catchment Council
WDLAC	Western Desert Lands Aboriginal Corporation
WICC	Wilson Inlet Catchment Committee Inc
WIN	Water information
WMNRMG	West Midlands NRM Group
WNRM	Wheatbelt NRM Inc
WQIP	Water Quality Improvement Plan
WRLC	Western Rock Lobster Council
WWF	World Wildlife Fund for Nature Australia
WWLCDC	Wagin Woodanilling Land Conservation District Committee
YYRCMC	Yarra Yarra Regional Catchment Management Council

Executive summary

Western Australia's natural assets

A vast and resource-rich area, Western Australia exports its natural products to the world. Its reputation as a first class primary producer and a wealthy State is undeniable with $74 billion being added to the State's economy each year from the renewable use of our natural resources and from the export of minerals.

As a consequence of this use over the relatively short period of 200 years, our land, water and biodiversity assets are facing some major threats to their condition. This has resulted in the costly and in some cases irreplaceable loss of benefits from our ecosystems.

Now Western Australia faces severe salinity degradation with 2 million hectares of agricultural land affected and the potential to double the area at risk over the next 50 years. Thirty per cent of south-west rivers are currently brackish or saline, with an additional 16 per cent marginally affected. This has significant consequences for our potable and irrigation water supplies.

Salinity is also impacting on the unique biodiversity found in the south-west of Western Australia, an area identified as a national and international biodiversity hotspot. Extensive destruction of ecosystems through land clearances has threatened some 450 plant and 400 animal species with extinction.

Salinity continues to threaten infrastructure, including buildings and roads, and land productivity. The cost to the State of addressing salinity impacts on infrastructure is estimated at $350 million a year (Commonwealth of Australia 2000). A very recent estimate determined the cost of foregone agricultural production alone, due to soil salinity, as $344 million per year (Herbert 2009).

Soil acidity is also a major degradation threat to soils. In the Avon River basin, over half of the agricultural lands have a moderate or a high risk of subsurface acidification. Acidic soils cause significant losses in production and restricted crop choice, with reduced plant growth leading to increases in erosion and nutrient leaching. Losses in agricultural production are in the order of $300–400 million a year (Gazey 2009).

Predictably, the reported trend for natural resource assets is a continued decline in their condition particularly with climate change over coming decades posing an additional pressure (Government of Western Australia 2007b).

Evidence of an environment declining in condition has influenced the community to develop an active involvement in natural resource management (NRM), which continues to gather momentum. The pressure to ensure sustainable use of our natural resources has never been so strong. Over the years the community has witnessed such alarming changes to their environmental assets that now they advocate restoration and protection. All community and industry groups and individuals have a part to play in maintaining Western Australia's prosperity. We must implement early and effective action to avoid large-scale degradation and costs.

Funding sources

The Western Australian and Commonwealth Governments identified the need for a coordinated approach to protecting and restoring Western Australia's environmental assets. Together they invested $560 million in cash and in-kind support to deliver projects that managed priority natural assets, assisted

knowledge and information gathering and supported community participation in NRM planning and partnerships or action in Western Australia.

They devised two natural resource management programs–the National Action Plan for Salinity and Water Quality (NAP) and the extended Natural Heritage Trust (NHT)–both of which were implemented over seven years. See Appendix 1 for a final reconciliation of funds for the NAP and NHT Programs in Western Australia.

In addition, estimates of community cash and in-kind contributions varied from one to six dollars for every government dollar invested. At least $1 billion has been invested in government policy for NRM over seven years.

Funding was delivered through two processes–regionally via the six regional NRM groups and across the State through state-wide priority projects and a strategic reserves process. The six regional NRM groups are:

- NACC = Northern Agricultural Catchments Council
- RNRM = Rangelands NRM
- SCNRM = South Coast NRM (formerly South Coast Regional Initiative Planning Team SCRIPT)
- SWCC = South West Catchments Council
- PRNRM = Perth Region NRM (formerly Swan Catchment Council SCC)
- WNRM = Wheatbelt NRM (formerly Avon Catchment Council).

Table 1 **Total government funds for delivery of NAP and NHT programs in Western Australia (December 2002–December 2009)**

Program	Western Australian government ($)	Australian government ($)
NAP Cash	158 million	158 million
NHT Cash		125 million
NHT In-kind	125 million	
Total	**283 million**	**283 million**

Table 2 **State and Commonwealth cash contributions for regional and state-wide delivery of NAP and NHT programs**

Funding category	State	Commonwealth		Total ($'000)
	NAP ($'000)	NAP ($'000)	NHT ($'000)	
REGIONAL DELIVERY				
Foundation funding including Regional Strategy and Investment Plan development	**1705**	**1705**	**8040**	**11 450**
Priority projects funded pending Strategy and Investment Plan development	**1580**	**1580**	**12 861**	**16 021**
Implementation of investment plans	**71 884**	**75 131**	**57 434**	**204 449**
Regional coordination	**1200**		**17 091**	**18 291**
Core administration	**4417**		**2650**	**7067**
TOTAL	**80 785**	**78 416**	**98 075**	**257 276 (58%)**

Table 2 continued

Funding category	State	Commonwealth		Total ($'000)
	NAP ($'000)	NAP ($'000)	NHT ($'000)	
STATEWIDE DELIVERY				
Strategic Reserve	**12 365**	**20 689**	**14 356**	**47 410 (11%)**
Strategic Tree Farming	**32 200**	**32 200**		**64 400**
Collie River Salinity Recovery	**15 000**	**15 000**		**30 000**
Engineering Evaluation Initiative	**4000**			**4000**
Catchment Demonstration Initiative	**6000**			**6000**
Administration (State and Commonwealth)	**7662**	**11 707**	**12 678**	**32 047**
TOTAL	**77 227**	**79 596**	**27 034**	**183 857 (42%)**
TOTAL CASH ALLOCATIONS	**158 012**	**158 012**	**125 109**	**441 133 (100%)**

Note: The allocations were approved by the State and Commonwealth Governments. Regional allocations (about 60 per cent of the State total) were based on three considerations: the number and values of NRM assets in each region; a weighting to compensate regions receiving little or no NAP funds; and an assessment of a region's capacity to deliver.

Delivery

Under bilateral arrangements for the NAP and NHT2 programs, a regional approach through designated, community-based regional NRM groups was a centrepiece of the governance and delivery arrangements.

Targeting funds to priority assets was its aim. In order to meet these requirements regional NRM groups were asked to develop a strategy addressing the priorities of both programs.

Regional strategies were developed over 12 months with full community consultation, technical advice and negotiations with government. On their completion, both governments jointly accredited these against national criteria.

For the first time the regional NRM groups were empowered with significant funding and influence over prioritisation and delivery of projects.

This was not without its challenges:

- A lack of capacity due to skills shortages. Many skilled staff and contractors left for more lucrative jobs in the booming mining sector.
- A delayed start compacted the program from seven to five years. This significantly increased the rate of expenditure and exacerbated the capacity problem.
- A rapid transition from local action groups handling small grants and local projects to regional NRM groups that had to lift their horizons and allocate millions of dollars annually. They often underestimated the time needed to adjust and effectively implement such arrangements.
- Poor baseline monitoring data and reduced monitoring density or frequency made analysis difficult and restricted the ability to make informed decisions across some areas of the State.

Table 3 **Some achievements of NAP and NHT Programs (2002–2009)**

On-ground benefits	Increased capacity for delivery
Avon River: Ninety per cent of channel fenced, reducing sedimentation.	**Six regional NRM strategies** for WA that combine community and government NRM priorities and determine high priority assets at a regional scale.
Collie River: Water salinity levels reduced by 150 mg/L; with continued reductions for potable water within 20 years.	**Governance systems** for regional scale deep drainage. Draft deep drainage design guidelines developed.
Ord River: 5500 ML of irrigation water re-used in the Ord. Nitrogen (164 kg), phosphorous (460 kg) and suspended solids (96 t) retained on farm and stopped from entering the Ramsar-listed wetland.	**Water allocation plans** developed for Bremer, Denmark, Marbellup and Walpole that include environmental water requirements and allocation limits.
Avon Region: 983 000 t of lime spread during the soil acidity project increasing annual lime sales from 0.6 Mt in 2004–05 to 1.1 Mt in 2008–09 or an additional 1 m ha being treated. Post-project (2008-09) 12% more farmers compared to pre-project, sampled top soils and 23% increased subsoil (20–30 cm) sampling thus implementing best management practices for maintaining productivity.	**Engagement** in planning and encouraging community ownership and leverage of one dollar for every public dollar invested.
Sequestration of carbon by 18 000 ha trees planted in the Strategic Tree Farming project is estimated at 3.9 Mt, which will offset annual emissions of approximately one million cars.	**Identification of community and government** priority NRM assets at a regional scale to inform future investment decisions for best value outcomes.
Rangelands Region: 5 m ha on 14 Kimberley pastoral, Indigenous and conservation properties conducted fire regimes for biodiversity (Gouldian Finch and Red-Backed Fairy Wren with Spinifex seed sources) and pastoral production benefits (cattle feed) in addition to limiting cultural site damage.	**Established baseline data** for estuarine and native vegetation condition, south-west marine habitat, pH, soil organic carbon and erosion soil condition in the agricultural area and groundwater salinity.
South West Region: Seventy sponges new to science were discovered in the south-west marine environment.	**Developed** over 60 new spatial data sets now available on the Shared Land Information Platform (SLIP) data service.
South Coast Region: One hundred land managers fenced 100 km of waterways, installed 39 stock crossings, established 400 ha of perennial pastures, and 100 ha of revegetation to protect riparian areas of the Wilson Inlet and reduce nutrient inputs.	**Marine survey** provided for the first time baseline information for managing marine biodiversity assets by undertaking 1400 km^2 of habitat mapping at 8 sites between the Abrolhos Islands and Recherche Archipelago.
South Coast Region: One hundred and twenty three Dibblers bred in captivity at the Perth Zoo for re-introduction into secure wild sites.	**Western Desert** animal and plant ID cards prepared in several Indigenous languages and used as a reference to assist field work by Aboriginal people.
Quantifying salinity risk by mapping aquifers in the Ord River area via digital elevation surveys and aerial electro-magnetic surveys to provide critical information for the Ord Stage 2 development planning.	**Salinity Investment Framework** developed and trialled in the Avon region, produced investment decisions determined using the priority (high value/high threat) assets approach. Agency statement of important natural resource assets prepared and made available to support investment planning and assessment.
Ord River dam capacity has reduced by 5% or 538 GL due to sedimentation. Sediment analysis has identified the source of sediment, enabling more targeted management.	**Coordination and integration** processes implemented by six regional NRM groups and supported partnerships for action, community ownership and development of regional priorities.
Lake Warden Recovery Catchment (Ramsar Wetland): On-ground works including 1 million trees planted, 4240 ha of perennial pastures sown, 150 km of fencing to protect remnant and revegetated areas, 15 km of surface water management structures and installation of the Wheatfield siphon to lower water levels to recover wading waterbird feeding habitat.	**Water Quality Improvement Plans** developed for Swan–Canning, Peel–Harvey and Vasse–Wonnerup river systems to provide a strategic approach to reducing nutrients in these systems.
Two rare Acacia species thought to be extinct in the central wheatbelt were found and protected: *A. leptoneura* last seen in 1837 in the Dowerin area and *A. torticarpa* last seen in 1945 in the Cunderdin area.	**Identified gaps in knowledge** of inland wetlands at risk. Evaluated the condition of significant wetlands. Preparing for guidance in future investment and management decisions.

Table 4 **Reported outputs* to 30 June 2008: implementing the State and Commonwealth NRM programs**

Action/Output	Total output	Expected benefits/impacts
Area (ha) covered by NRM Plans (including Monitoring and Evaluation Plans)	whole State	Six nationally accredited regional plans covering the entire State to provide a blueprint for action and partnerships to maintain and improve the condition of the State's natural resources and to facilitate attitudinal change within the community.
Area (ha) revegetated for landcare purposes	9783	Reduces salinity risks and rising groundwater; provides habitat for native animals; and improves water quality. Potential of 7 to 8 Mt of carbon dioxide sequestered.
Area (ha) of wetland, stream and vegetation protected by fencing	128 620	Repairs and stabilises waterways, reduces erosion, Eutrophication, salinity and sedimentation. Improves habitat for native plants and animals. Improves water quality.
Area (ha) vegetation rehabilitated/enhanced	5 509 694	Protection by fencing, covenanting and other treatments have preserved vegetation remnants and enhanced or preserved biodiversity values.
Area (ha) of soils treated (lime, gypsum, clay)	39 760	Addresses soil acidity, which affects more agricultural land than salinity. Significantly improves crop and pasture productivity with indirect benefits on salinity from increased water use.
Area (ha) protected by covenant/voluntary conservation agreement	21 093	Ensures long-term conservation of important areas of biodiversity outside the formal reserve system.
Area (ha) of drainage works	70 740	Rehabilitates agricultural land from rising groundwater and salinity; increases productivity and protects rural infrastructure.
Area (ha) treated for erosion control	74 140	Maintains agricultural productivity, and reduces siltation of waterways, estuaries and other wetlands.
Number of people engaged in NRM events and training	76 122	Increases people's knowledge, attitudes and skills to undertake NRM actions.
Number of new/enhanced monitoring programs	1362	Increases the understanding of the condition and trends of resource condition and effectiveness of practice change and other interventions.
Number of decision support tools created	181	Assist land managers to better understand impacts of land use and trade-offs between land uses on the resource base and assists to show the benefit of implementing best practice.
Number of community groups/projects assisted	2625	Supports collaborative and self-directed action by local action groups. Leverages private/external investment in practice change and improved resource condition.
Area (m ha) with plans and actions to protect from invasive pests	24.1**	Invasive pests threaten biodiversity and production values. Includes outputs such as management plans, baiting and community based weed control projects.
Area (ha) of tree crop established in the Strategic Tree Farming Project	17 982	Improved information about cost benefit of tree crops in medium rainfall zones, improved silviculture techniques and benefits of improved water quality and stabilising areas of salinity and water logging on farms. Demonstrated potential for carbon sequestration from tree crops and contributed to wood resources in four industry development cells.

* Monitoring specified information largely through the Commonwealth/State Bilateral Agreements.
** includes areas treated multiple times.

Distribution of funds

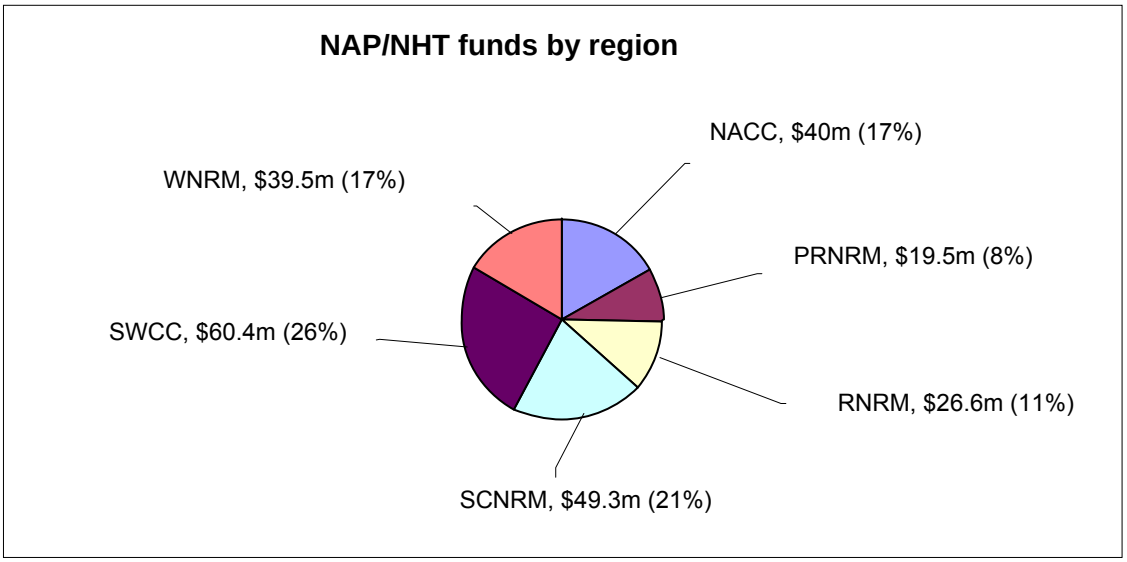

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Figure 1 **Summary of funding allocations to each NRM region**

The five regions (NACC; SCNRM; SWCC; PRNRM; WNRM) encompassing the south-west corner of the State (approximately 10 per cent of the State's land mass) received 89 per cent and the Rangelands NRM (approximately 90 per cent of the State's land mass) received 11 per cent of the total regional allocations (Figure 1).

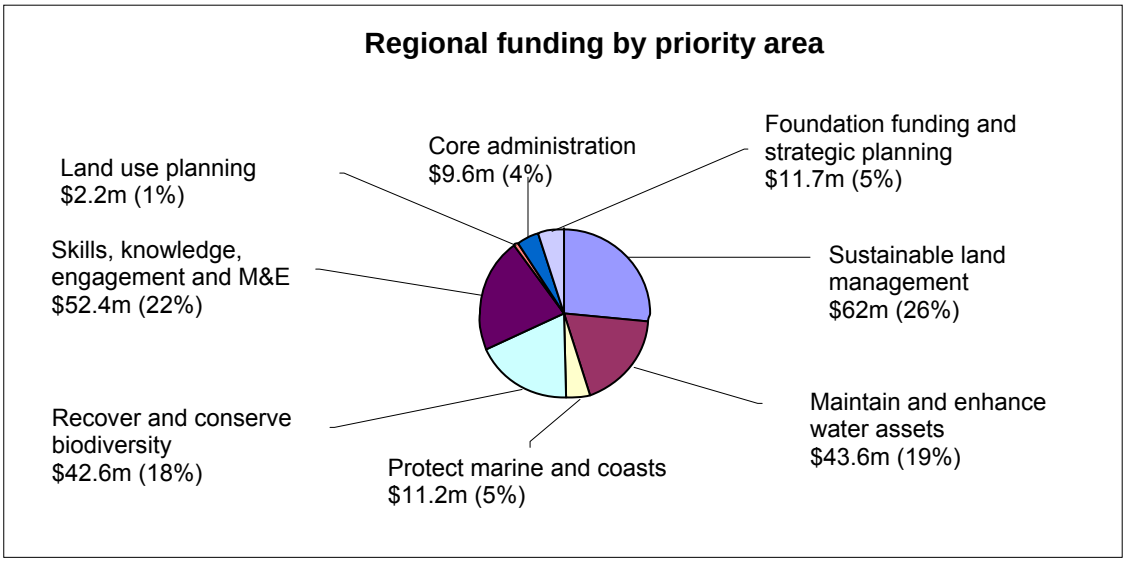


Figure 2 **Distribution of total regional funding across the State's priority areas**

All regional funding was allocated in accord with regional investment plans and approved by State and Commonwealth Ministers on the recommendation of the Joint Steering Committee.

Planning, administration, improvement of community skills, knowledge and engagement and M&E accounted for $75.9 million or 32.3 per cent of regional funds and on-ground activity accounted for $159.4 million or 67.7per cent of regional funds (Figure 2).

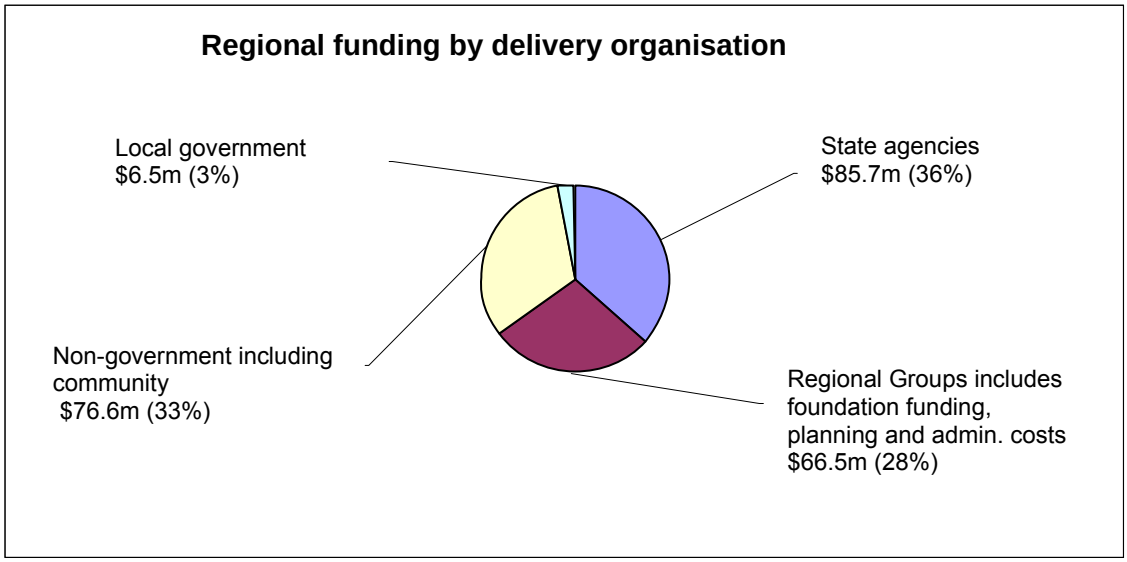


Figure 3 **Distribution of total regional funding by delivery organisations**

Once funding was approved, decisions on the most appropriate delivery organisation were then made by each regional NRM group within their jurisdiction.

Regional NRM groups were the delivery agents for 28 per cent, local governments and community groups for 36 per cent and State Government agencies for 36 per cent of funds (Figure 3).

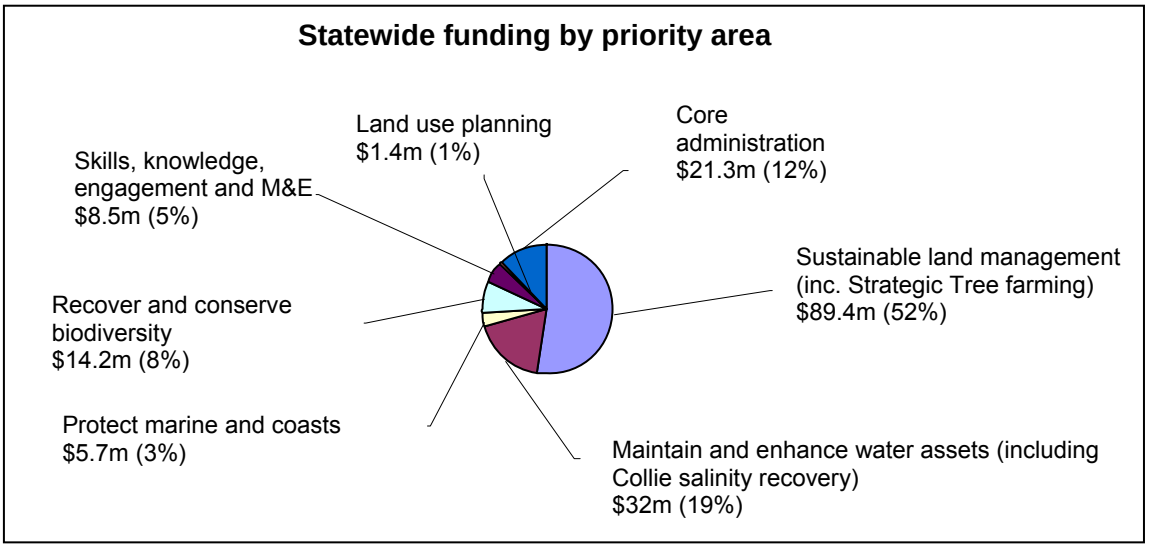


Figure 4 **Distribution of total state-wide funding to the seven NRM priority areas**

All funding was approved by Ministers from the State and Commonwealth Governments on the recommendation of the Joint Steering Committee.

Eighty-two per cent of funds were allocated to projects for the sustainable use, management and protection of the State's land, biodiversity and water assets. The remaining 18 per cent of funds was allocated to planning, administration and improvement of community skills, knowledge and engagement and M&E (Figure 4).

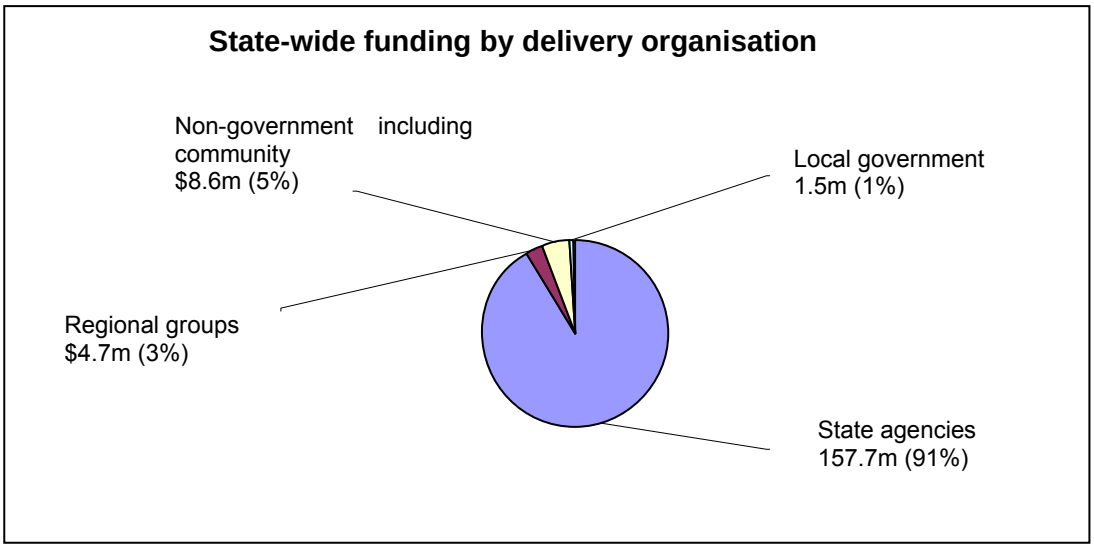


Figure 5 **Distribution of total state-wide funding by delivery organisations**

Decisions on the most appropriate delivery organisations were made by the Joint Steering Committee. Ninety-one per cent of funds

or $157.7 million was delivered by State Government agencies with the remainder, about $14.8 million, delivered by other organisations (Figure 5).

Key findings

During the course of the NAP and NHT programs, evaluations were carried out under the auspices of the Joint Steering Committee and valuable lessons have been learned. The insights from this work can be applied to new NRM programs to improve their effectiveness in the future.

The following points outline key findings:

- The NRM community totally underestimated the enormity of dealing with the threats to the condition of natural resource assets. This included a large amount of baseline and ongoing monitoring data as well as essential subsequent analysis.
- Current staffing and resource levels are not sufficient to maintain momentum in many key areas.
- There are numerous difficulties when treating long-term issues in NRM with short-term projects and funding arrangements.
- It is beyond the capacity of governments to fund all the actions required to address all NRM issues, but more government investment is important to leverage external resources. It is critical, therefore, to base a NRM program on prioritising where funds are to be expended to ensure high value assets do not continue to deteriorate and that key partners in the private sector are able to be engaged. However, some flexibility with investment decisions is required to ensure certain key foundation activities/ processes are supported that have no private sector interest. Trade-offs between priority and equity must be considered to ensure the continuing engagement of key partners and stakeholders.
- Involving the community, industry and other partners in planning and delivery decisions will leverage additional support for the State's investment.
- Rigorous and transparent asset planning, investment planning and decision-making, and performance evaluation and improvement processes are required to obtain optimum value from private and government investment.
- Community interaction and the subsequent integration of different values and knowledge have enabled a better return on investment.
- Local community knowledge is credible and adds value to the identification of priorities and decisions about the appropriateness of proposed activities.
- Program logic principles enable clear measurement assessment and reporting for evaluation purposes and can inform future investment decisions.
- To best inform future decision-making, data generation should be consistent, stored centrally and available to all users on the Strategic Land Information Platform (SLIP) which received catalytic funding through the Strategic Reserve sub-program.

Conclusions

Despite the issues of fine-tuning a new program, the NHT and NAP programs achieved positive results and valuable information that can be applied to future strategies for restoring and protecting Western Australia's internationally recognised valuable natural assets.

Given the current deterioration of natural resources and predictions of future decline combined with limited resources for NRM, it is clear that we must focus on cost-effectiveness and the protection or restoration of our high value, priority land, water and biodiversity assets.

It is critical that the State Government engages the broader community in NRM and ensures shared responsibility, particularly with the private sector. Achieving community support and ownership increases the willingness to participate in on-ground activities. Active community groups can provide local knowledge about appropriate interventions and the community's capacity to change– all invaluable for achieving NRM outcomes.

However, this must be undertaken in the context of a obtaining the greatest benefit for the State which not always an equitable situation from a community perspective.

The State Government has a key role in maintaining and expanding the engagement of local action/ landcare groups and supporting the development of their knowledge and skills. How this will be implemented in the future needs careful consideration. Without this commitment, the gains in community support and trust made by the Landcare movement and the NAP and NHT programs may be lost.

Introduction

State participation in NRM—a long term commitment

Western Australia has a long history of participating in national natural resource management (NRM) programs which have existed in the environment and primary industries portfolios from as early as the 1970s. These evolved to establish the successful Decade of Landcare during the 1990s which demonstrated the significant levels of enthusiasm that existed for community and industry participation in NRM. Western Australia was at the forefront of the landcare movement, winning numerous national awards and establishing in excess of 500 community-based landcare and volunteer environmental groups (Yule, Marriott, Nabben 2006).

Reviews of the National Landcare Program (NLP) and Natural Heritage Trust (NHT) which funded landcare during the 1980s and 1990s proposed a new way of doing business based on regional planning and investment in community priorities that would contribute to achieving national targets. The reviews led to an agreement between the Commonwealth and States/Territories in 2000 on the National Action Plan for Salinity and Water Quality (NAP) and an extension of NHT.

The Western Australian and Commonwealth Governments each committed $158 million to NAP for seven years and $200 million of cash and in-kind resources via NHT. This consolidated the gains of the previous 20 years and continued leveraging community industry and volunteer resources and effort to manage the State's land water and biodiversity assets by allowing on-ground actions identified in strategic planning and assessments to be implemented.

Participation in NAP and NHT led to an enormous effort in planning, which resulted in community, industry and government working cooperatively in NRM in Western Australia for the first time. This partnership approach has provided a legacy to support future effort in NRM. However, despite this cooperation and the ramped up funding that was available, there are very few examples of a positive change in the condition of the State's natural resources. Long-term funding and commitment are required as a minimum and even then this may not achieve the results. With few exceptions the massive efforts involved in delivering NAP and NHT programs have at best halted the degradation of these resources. This has reinforced the view of the State of Environment (SoE) Report that concluded that the condition of these resources continues to decline despite the best efforts of the community and government. In future programs it may be far more appropriate to have a target of halting the degradation and preventing further damage rather than aiming to restore the condition of assets using inappropriate and unattainable targets.

There have been some exceptions including reduced salinity levels in the Wellington Dam where activity has seen the reduction of water salinity by 150 mg/L to 950 mg/L and predictions of further reductions to the World Health Organisation safe potable water salinity of 500 mg/L within 20 years.

The cooperation between government and community throughout the delivery of these and other similar programs should not be underestimated. They built trust and encourage important attitudinal changes in the community's behaviour when making a living or enjoying recreational activity from our natural resources. As the Australian Public Service Commission 2007, iii) points out *it has become increasingly clear that a major barrier to governments delivering key policy outcomes is a disengaged and passive public.* The APSC goes on to say how increased behaviour change can be achieved by building on pre-existing policy initiatives and targeting stakeholders most ready for action. This is what successive NRM programs have been able to do very effectively.

However, there have been challenges and lessons learned that should not be ignored, given NAP's focus on adaptive management and continuous improvement. Probably the most significant has been the challenge in measuring and reporting on resource condition outcomes—such outcomes take many years to achieve and their incremental measurement is expensive. This is especially so where the aim of works is in reality to halt further damage.

During the delivery of the programs the State determined that it needed to identify the assets it most wanted to preserve. This resulted in the development of a clear list of priority assets for investment to guide agency and regional planning. The State now has the *Agency Statement of Important Natural Resource Management Assets* (Government of Western Australia 2007a) although this requires further refinement and analysis to determine which assets to tackle first.

Setting priorities is a complex process requiring:

- consideration of severity
- time critical nature
- consequence of threats
- feasibility of success and community industry
- government values.

While this process is time consuming it will ensure future investment is targeted.

It is important for the State to maintain its participation in NRM as a long-term commitment to achieving attitudinal change in the community. By building on the cooperation achieved, we can aim to hold back the degradation that is occurring to our priority natural assets. Where feasible, we aim to improve condition (often it takes more than 20 years to see improvements). State and Commonwealth efforts under and NHT have been important contributors to this long-term commitment as is Caring for our Country (CfoC), the Commonwealth's new national initiative.

The State Government has recognised the importance of continuing these works with an initial $30 million NRM program in 2009–10.

Why we invest

Assets, values and threats

Western Australia is the largest State in Australia and covers an area in excess of 2.5 million square kilometres—nearly 30 per cent of the continent. The State is bounded by over 12 000 kilometres of coastline, much of which is in relatively pristine condition.

Sustainable use and management of Western Australia's natural resources is essential for economic prosperity protecting our lifestyle and ensuring strong and vibrant communities. The United Nations' (2005) Millennium Ecosystem Assessment describes the services humans obtain from natural resources as:

- *provisioning services* such as food, water and fibre that give us secure access to resources and the basic materials for a good life
- *regulating services* that affect climate, floods, disease and water quality contributing to our health security from disasters and access to adequate nutritious food
- *cultural services* providing recreational, aesthetic and spiritual benefits that make us feel well and contribute to social cohesion and mutual respect.

Since European settlement much of Western Australia's wealth has come from its natural resources. For example, they currently support:

- $52.6 billion mining industries
- $1.5 to $2 billion water supply and waste management industry with assets of $12 billion
- $7.5 billion tourism industry
- $6.1 billion agricultural industry
- $0.6 billion recreational fishing industry
- $0.5 billion pearling and aquaculture industries
- $0.25 billion western rock lobster fishery which is Australia's most valuable fishery
- $1 billion forestry and wood processing industries.

The State's natural assets are also recognised nationally and internationally for their rich biodiversity wilderness areas and iconic features such as Purnululu, Ningaloo Reef, Shark Bay World Heritage Area and the forests of the South West. In fact, Western Australia contains five of the nation's fifteen biodiversity hotspots and the South West is one of the world's 25 biodiversity hotspots. These hotspots have been identified as the richest and most threatened reservoirs of plant and animal life on Earth.

The State boasts:

- 141 of Australia's 207 mammal species, 25 of which are unique to Western Australia
- 439 reptile species, 187 of which are unique to Western Australia
- more than 1 600 fish species
- hundreds of thousands of invertebrate species
- more than 12 000 species of vascular plants
- an unknown number of fungi lichens and other non-vascular plants.

However, the *State of the Environment Report* (Government of Western Australia 2007b) highlights that inappropriate development and misuse of natural resources is reducing their capacity to maintain this range of services and values. Major threats include introduced animals and weeds; Phytophthora dieback threatening biodiversity and the productivity of hardwood forests; degradation of remnant vegetation wetlands and stream fringing vegetation; and degradation of marine and coastal environments. Social and economic development since European settlement has had a number of unintended consequences for natural environment. Many natural assets are currently under threat of degradation or loss. It is only in relatively recent times that we have started to appreciate how sensitive our unique ecosystems are.

- There has been major loss of native habitat due to clearing for agriculture since settlement in the 1830s and continuing loss due to urban development, particularly in coastal regions.
- The habitat value of remaining vegetation is under threat from unsustainable grazing and agricultural practices, inappropriate fire regimes and weed and pest incursion.
- There are 339 threatened plant and 118 threatened animal species.
- Over 4 million hectares (National Land and Water Audit, Australia 2007) of agricultural land are affected by secondary salinity and there is the possibility that this area may double over the next 50 years.
- Nine per cent of birds, 7 per cent of reptiles and 16 per cent of amphibians are extinct or threatened.
- More than a third of the South West's waterways are brackish or saline and no longer supply potable water. They have significantly altered environments that struggle to support native fish.
- Many if not all wetland and woodland communities associated with Darling Plateau waterways and valley floors will be lost and some 450 plant and 400 animal species are at high risk of regional or global extinction due mainly to salinity and water-logging.

In 2007 the State invested $36 million on addressing biosecurity issues; an estimated additional $43 million is required (Biosecurity Council of Western Australia 2007).

Compounding these are increasing risks posed by climate change. The State's South West is projected to be one of the world's most vulnerable areas to a warming and drying climatic trend. Records show that to date:

- Over the past 35 years in the South West of the State annual rainfall has decreased by 10 to 15 per cent (Figure 6). CSIRO modelling predicts that average rainfall may further decline by 11 per cent by 2030. Compounding the problem, the volume of water taken from the streams and aquifers in Western Australia has more than doubled in the past 25 years and demand will double again by 2020.
- Changes in rainfall have also occurred in other parts of the State. In the Kimberley there has been up to 30 per cent more rainfall in since 1996 than the long-term averages.

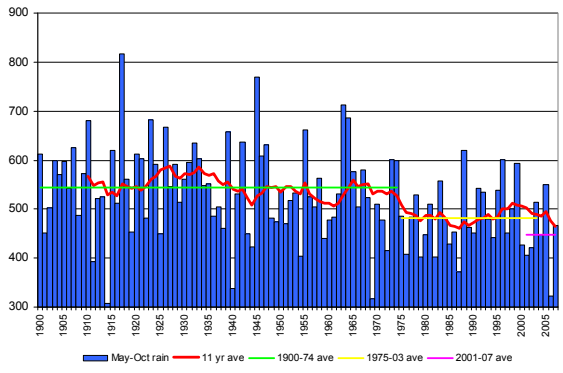


Figure 6 **Trends in May to October rainfall (mm) in the South West (Source: Bureau of Meteorology).**

In commenting on the SoE report, the EPA identified the following areas that required attention if our natural resources are to be managed into the future:

- Strategic leadership for environmental matters needs strengthening.
- Significant environmental improvements can be achieved when many individuals and communities modify their behaviours and attitudes to become more environmentally aware.
- Improve the monitoring of community behaviour and attitudes over time. This new information should greatly assist better decision-making.
- Knowledge of many aspects of WA environment is lacking. This impedes scientific understanding, prevents good decision-making and leads to ineffective environmental outcomes. In some areas more baseline environmental monitoring is required.
- Continuous improvement in managing the environment is essential for good outcomes.
- Full recognition of the total economic value of environmental assets and services needs to be incorporated into development decisions.

While Western Australians continue to enjoy a high standard of living there is a growing need for a better understanding that the environment underpins our economy and social infrastructure. Health and wellbeing are strongly linked to the condition of the environment and changes in collective and individual behaviour are needed to sustainably manage our natural resources.

Why participate in a national approach to NRM

Australia is a signatory to numerous international treaties, conventions and agreements on conservation and sustainable resource use. Commitments under these focus global attention on Australia's commitment to these ends, obliging the nation to develop programs that systematically and demonstrably address the impacts of resource-based industries on the environment.

The previous Commonwealth Government's decision to pursue a national approach to natural resource management (NRM) via the National Action Plan for Salinity and Water Quality (NAP) and Natural Heritage Trust (NHT) was designed to support this. An NRM Ministerial Council (2002; p 4) paper on the NAP stated:

> *The World Trade Organisation in November 2001 agreed to a comprehensive negotiating agenda on trade and environment and also reaffirmed its commitment to the objective of sustainable development. There is a growing international demand from consumers that products be derived from ecologically sustainable systems and processes with an increasing momentum for some form of environmental credentials to be required for future market access.*

It went on to say:

> *As a participant in the United Nations Conference on Environment and Development Agenda 21 Australia is obliged to encourage and assist government business and industry to adopt codes of conduct that promote best environmental practice and to report annually on their environmental record.*

National Action Plan for Salinity and Water Quality

The National Action Plan was a joint commitment of $1.4 billion over seven years between the Commonwealth and State/territory governments to seek regional solutions to salinity and water quality problems. At the time, salinity was identified as a major national threat. The Plan was agreed by the Council of Australian Governments (COAG) in November 2000 and stated:

- *At least 2.5 million hectares (five per cent of cultivated land) is currently affected by dry-land salinity—this could rise to 12 million hectares (22 per cent) at the current rate of increase.*
- *One third of Australian rivers are in extremely poor condition—within 20 years Adelaide's drinking water will fail World Health Organisation salinity standards in two days of five.*
- *Land and water degradation excluding weeds and pests is estimated to cost up to $3.5 billion per year (in addition dry-land salinity has adversely affected biodiversity e.g. CSIRO estimates a resultant reduction in bird species of 50 per cent in agricultural areas).*
- *Infrastructure (buildings, roads) is being severely damaged in many rural urban centres* (Commonwealth of Australia 2000 p 5).

NAP ensures that all levels of government, community groups, individual land managers and local businesses worked together to tackle salinity and improve water quality and had a number of new elements including:

Table 5 **The six elements of NAP**

Regional NRM plans incorporating regional targets for water quality and salinity in accordance with 10 national matters for targets
Funding to assist regional community based NRM groups to develop and implement integrated regional plans
Providing regional communities with advice and information for developing and implementing integrated management plans
Introducing changes to secure property rights for water; improving water pricing and establishing effective controls on land-clearing in salinity risk areas
Clearly defining how partnerships can work effectively to address salinity and water quality
Coordinating decision-making across governments.

The Natural Heritage Trust

Since 1996 the National Heritage Trust has invested in local, regional, State/territory and national NRM activities. In 2001 the Commonwealth extended the Trust for five years from 2002–03 to 2006–07. The 2004 budget boosted the Trust by $300 million and extended its funding until 2007–08. The delivery of the program was extended to June 2009 to allow for the completion of projects.

The Natural Heritage Trust Act 1997

The preamble to this Act (p 1) included:

- *The Parliament of Australia recognises the need for urgent action to redress the current decline and to prevent further decline in the quality of Australia's natural environment.*
- *There is a national crisis in land and water degradation and in the loss of biodiversity.*
- *There is a need to conserve Australia's environmental infrastructure, to reverse the decline in Australia's natural environment and to improve the management of Australia's natural resources.*
- *There is a need for the Commonwealth to provide national leadership and work in partnership*

with all levels of government and the whole community recognising among other things that many environmental issues and problems are not limited by State and territory borders.

- *There is a need to integrate the objectives of environmental protection, sustainable agriculture and natural resources management consistent with the principles of ecologically sustainable development.*
- *It is essential that government leadership be demonstrated and that the Australian community be involved in relation to these matters.*
- *The Commonwealth Government should work cooperatively with State Government to achieve effective outcomes in matters relating to environmental protection, natural resources management and sustainable agriculture. Those cooperative working relationships should involve entering into inter-governmental agreements which reflect the support of the states for the purposes of the Natural Heritage Trust of Australia Account and promote the development of complementary policies and programs.*
- *Australia's rural community should have a key role in the ecologically sustainable management of Australia's natural resources.*
- *Australia's natural environment is central to Australia's and Australian's health and non-material wellbeing and to Australia's present and future economic prosperity. Accordingly, present and future generations of Australians will benefit from the ecologically sustainable management of the natural environment.*
- *A comprehensive integrated response to these matters is necessary.*

The Framework for the extension of NHT in 2002 was based on lessons learnt from the Decade of Landcare and the first phase of the Trust and establishment of NAP. As a result the extension of the program was a much more targeted approach to NRM than seen previously in Australia. Its model for regional investment was based on that used for including bilateral and regional partnership agreements, investment against accredited regional plans, and the provision of foundation and priority funding.

The Trust had three overarching objectives:

1. **Biodiversity Conservation**—conserving Australia's biodiversity through the protection and restoration of terrestrial, freshwater, estuarine and marine ecosystems and habitat for native plants and animals.
2. **Sustainable Use of Natural Resources**—the sustainable use and management of Australia's land, water and marine resources to maintain and improve the productivity and profitability of resource-based industries.
3. **Community Capacity Building and Institutional Change**—support for individuals, landholders, industry and communities through skills, knowledge information and institutional frameworks to promote biodiversity, conservation and sustainable resource use and management.

A regional approach to NRM

In setting the agenda for NAP and NHT the national NRM Ministerial Council identified a regional approach which was highlighted during a review of the landcare programs during the 1980s and 1990s. The approach was designed to encourage greater community input into decisions and to focus investment via regional targets related to national matters for targets rather than on *ad hoc* projects. The approach was articulated in a 1999 national policy paper *Managing Natural*

Resources in Rural Australia for a Sustainable Future (Commonwealth of Australia, 1999) which advocated:

> *A regional approach offers a framework for planning and action for NRM industry and community development that suits specific circumstances. It means that social, economic and environmental dimensions of a region can be considered in an integrated way.*
>
> *The regional scale is also the most suitable scale for negotiating trade-offs and resolving conflict and for determining priorities and shared investment arrangements where there is a need for coordinated action over a large area involving many people.*

The approach was confirmed in the NAP Intergovernmental Agreement signed by all states/territories in 2000. In the bilateral agreement signed by Western Australia in 2003, a key part was the statement that *regional action is a fundamental element in achieving the outcomes of NAP and both Parties support integrated catchment management* (Commonwealth of Australia & Government of Western Australia s. 5.1). Critically therefore, it required broad representation of interests to make decisions as a prerequisite for funding.

To facilitate regional decision-making, Western Australia agreed that the five existing regional NRM groups—the Avon Catchment Council (ACC), Northern Agricultural Catchments Council (NACC), South Coast Regional Initiative Planning Team (SCRIPT), South West Catchments Council (SWCC) and Swan Catchment Council (SCC)—should form the basis for this approach. A sixth group (Rangelands Regional Group) was formed to cover the rangelands portion of the State.

The groups essentially grew from community goodwill and involvement in the landcare movement and have been extremely committed to facilitating community engagement and developing NRM strategies and investment plans. They comprise community, industry and agency representatives and as such provide forums for integrated planning and decision-making and for forming partnerships for action. They are constituted under the *Incorporated Associations Act 1987.*

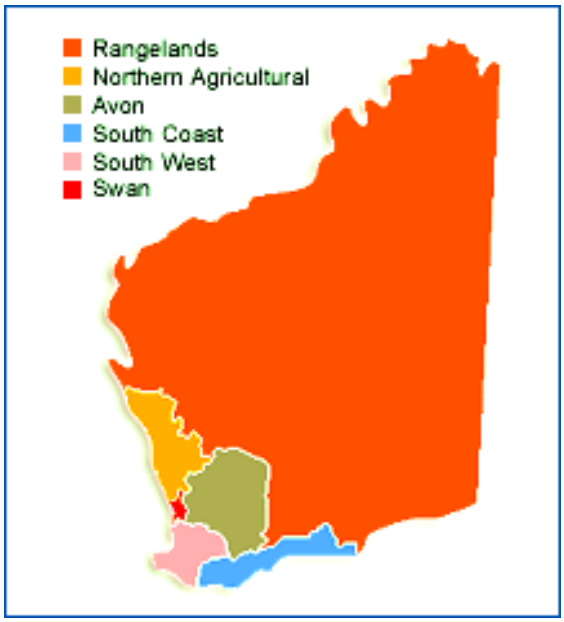


Figure 7 **Regional NRM group boundaries**

Avon Catchment Council is now known as Wheatbelt NRM (WNRM) and Swan Catchment Council as Perth Region NRM (PRNRM). Detail on the regional groups can be found at http://www.nrm.wa.gov.au/waRegionlNrmGroups.htm. See Appendix 5 for a summary of the six regional NRM strategies and priorities.

The regional approach was designed to implement a contemporary 'adaptive management' framework. This includes setting targets, taking appropriate action and then evaluating and continuously improving the management over time. In other words, to learn by doing is often described as '*plan ⇨ do ⇨ check ⇨ review*'.

To implement adaptive management, Western Australia adopted an 'assets-based' approach and methodology for

determining asset values via a Salinity Investment Framework. Through the Framework the State and regional groups undertook a value - threat assessment of natural resources classifying them as having high, medium or low value and being subject to high, medium or low threat. Assets deemed to have high value and subject to high threat were considered priorities.

Once these priority assets were identified, targets were set for their protection including 20- to 50-year resource condition targets (which had to be set for 10 nationally agreed matters) and three- to five-year management action targets.

Regional strategies, therefore, provided a comprehensive blueprint through which regions detailed the value of natural assets, the extent of threats against them, targets to protect them and priority actions to achieve targets. Strategies for all regions were accredited by the State and Commonwealth Governments according to nationally agreed criteria. They remain as a significant legacy about the State's assets and the values people have to support future planning.

As well as looking critically at assets and setting targets regional groups developed investment plans which detailed actions for investment by community, industry and government stakeholders. The plans identified funds needed for implementation and provided the basis for assessing performance and return on investment.

Developing the strategies and investment plans involved input from many stakeholders including government agencies with skills and expertise across the broad spectrum of NRM. In addition technical reference groups drawn from a wide range of government and non-government organisations were established for all regions. Scientists from the State agencies of DAFWA, DEC, DoW, DoF and FPC were integral to this process.

These plans were signed off by the State and Commonwealth Government Ministers responsible for primary industries and the environment.

Table 6 **Benefits of some of the framework elements of NAP and NHT**

NAP and NHT framework	Benefits	Improvements
20 yr Resource Condition Targets (RCTs)		Funding not consistent enough to enable measurement of achievement
Regional NRM strategies	Integrated NRM priorities from government and community. Endorsed by Governments (State and Commonwealth Ministers)	Required huge investment to develop and will need significant investment to update
State assets report	Identified important assets from a State perspective	Need to prioritise those important assets for investment and integrate with regional priorities
Bilateral negotiations	Made clear the roles and responsibilities of the parties	Prolonged negotiations led to only four years instead of seven to expend funds. This may have resulted in not being able to achieve some resource conditions changes that may have been achieved under a seven-year investment cycle.

The programs

How money was allocated

Western Australia invested $158 million under NAP which was matched by the Commonwealth Government. This $316 million investment was complemented by $200 million of joint cash and in-kind contributions between the Commonwealth, State, community, industry and agency partners via NHT.

Due to extended bilateral negotiations, the delivery of the program was reduced from seven years to four in Western Australia. A final reconciliation of NAP and NHT expenditure can be found at Appendix 1. A region-by-region breakdown of funding by outcomes, projects and delivery organisations can be found at Appendix 2.

Investments at the beginning of the programs were for priority projects that each regional NRM group or State agency identified as critical to continue the momentum gained from previous program delivery—called foundation funding. This was particularly relevant for community groups who had been very active in delivery. It was highly desirable to keep them engaged while the bilateral agreements between the State and Commonwealth Governments were discussed to ensure they were still able and willing to participate in the first delivery stages of the new programs.

This early stage involved each of the six regional NRM group leading the development of a NRM strategy and an investment plan (covering the whole State). This initial investment phase also saw state-wide effort to support regional planning. The Government of Western Australia prepared the *Agency Statement of Important Natural Resource Management Assets* (2007) which outlines key assets and a process for determining their value via the Salinity Investment Framework. It is a work in progress but indicates important fisheries, coastal and marine, agricultural, land, water resource and biodiversity assets. It is a key document for identifying future State NRM priorities.

Access to good information was also seen as critical for effective NRM and consequently a Shared Land Information Platform (SLIP) for accessing data and information products from State agencies was developed. SLIP benefits agencies and community stakeholders by ensuring the most current information is available for decision-making and enhances processes for data capture monitoring and reporting. SLIP is available at http://spatial.agric.wa.gov.au/slip/index.asp. As with the regional strategies and the Agency Statement, SLIP provides a legacy from NAP to support ongoing NRM planning and investment decisions.

NAP also provided funds for a number of state-wide priority projects jointly agreed between the State and Commonwealth Ministers. They included recovering potable water from the Collie River, large-scale strategic tree farming demonstrating effective catchment management and evaluating drainage techniques in the wheatbelt and assessing and mapping the southern coast's marine resources for the first time.

Additionally, a strategic reserve provided investment in large cross-regional or state-wide projects that filled a recognised gap. Again these projects were jointly agreed between the State and Commonwealth. Several strategic reserve projects were aimed at establishing benchmarks and infrastructure for resource condition monitoring so that future investments can be evaluated for effectiveness.

Forty-six per cent of NAP funds were delivered to regional NRM groups to deliver projects from their investment plans.

Non-regional group component of NAP and NHT

Figures 8 and 9 show the allocation of NAP and NHT funds for state-wide projects including strategic reserve; Strategic Tree Farming; Collie Salinity; Engineering Evaluation Initiative; and Catchment Demonstration Initiative projects.

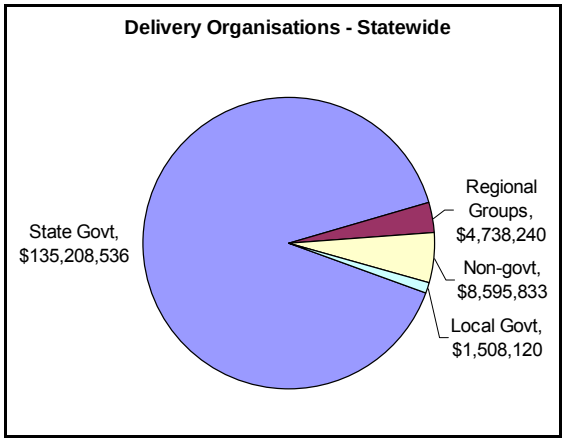


Figure 8 **Delivery organisations (state-wide) and funding distribution. The decisions were made by the Joint Steering Committee and approved by Commonwealth and State Ministers.**

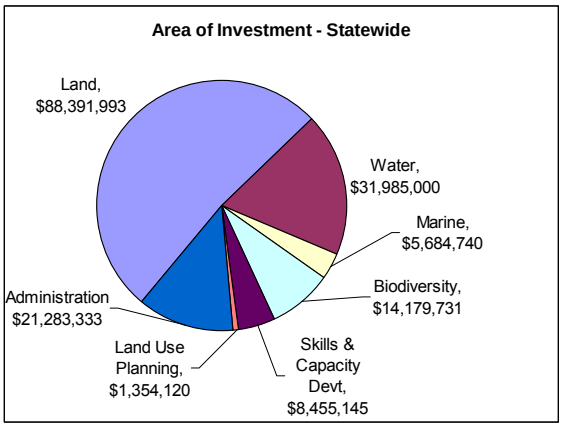


Figure 9 **Area of investment and funding distribution. Funds allocated to different asset areas. Land includes $64.4m for the Strategic Tree Farming project; and administration by Commonwealth and State Government and regional groups.**

Regional group component of NAP and NHT

Figures 10 to 15 show the allocation of NAP and NHT funds for all programs/ projects delivered via one of the six regional NRM groups and the delivery organisations

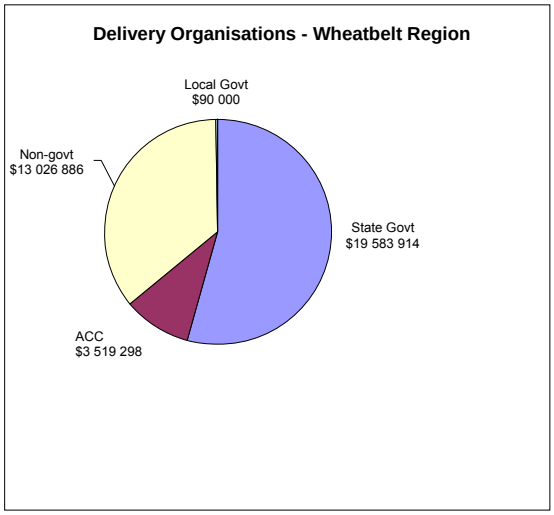


Figure 10 **Wheatbelt NRM region**

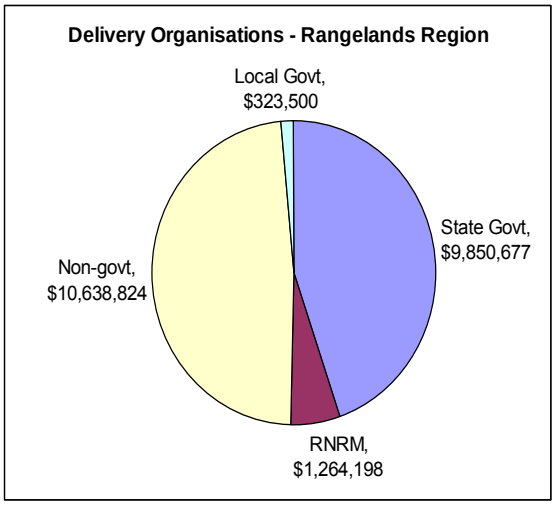


Figure 11 **Rangeland region**

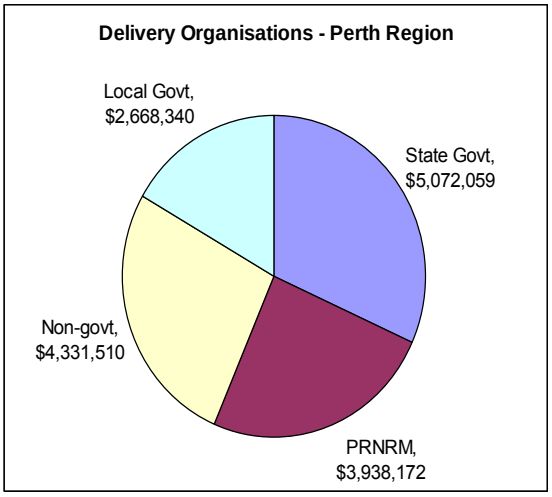


Figure 14 **Perth NRM region**

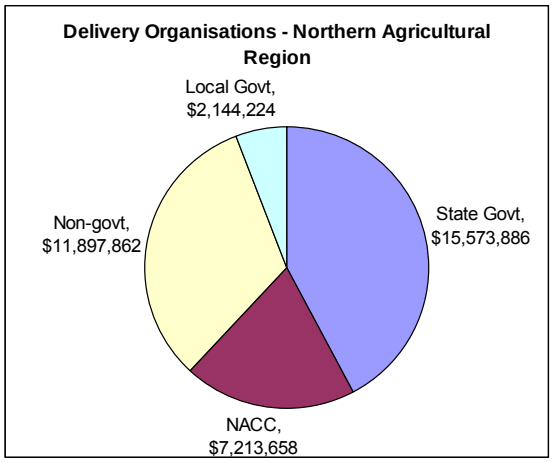


Figure 12 **Northern Agricultural region**

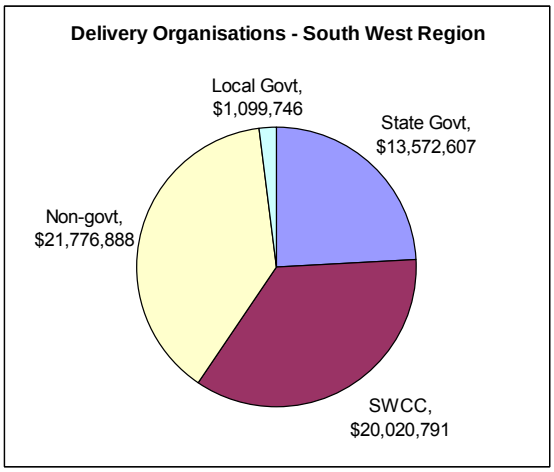


Figure 15 **South West region**

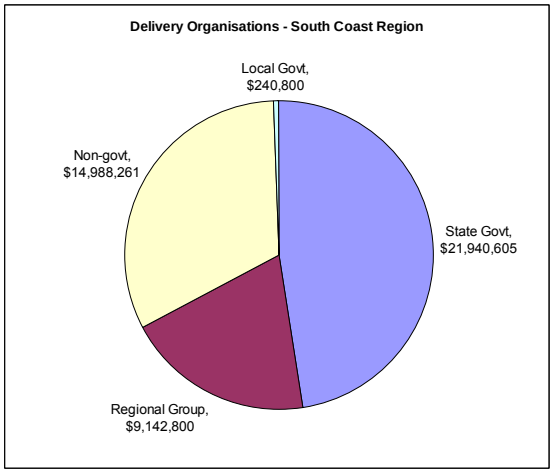


Figure 13 **South Coast NRM region**

Different decision-making processes occurred within each of the six regional NRM groups. However, there was some consistency behind the decisions including technical competency; track record; organisational capacity; regional presence and value for money. Mechanisms for awarding contracts included commissioning; open and closed tender processes.

Figures 16 to 21 show the allocation of NAP and NHT funds for all programs/ projects delivered via one of the six regional NRM groups and the priority asset area.

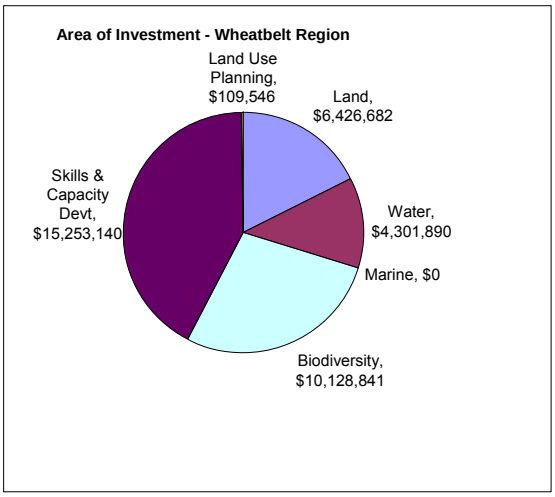


Figure 16 **Wheatbelt NRM region**

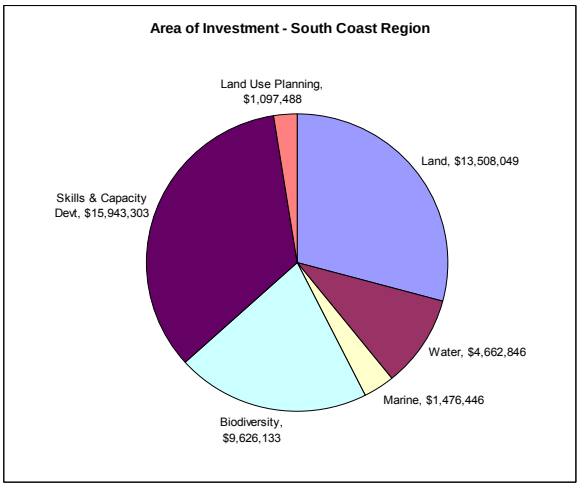


Figure 19 **South Coast NRM region**

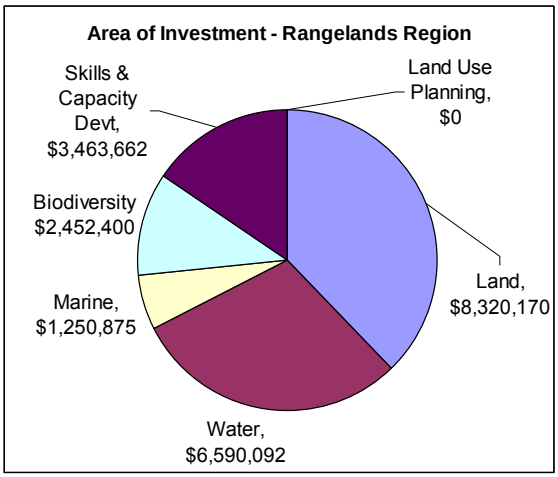


Figure 17 **Rangelands region**

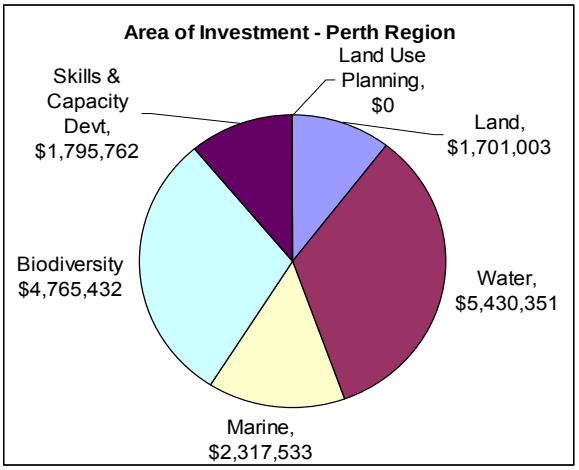


Figure 20 **Perth NRM region**

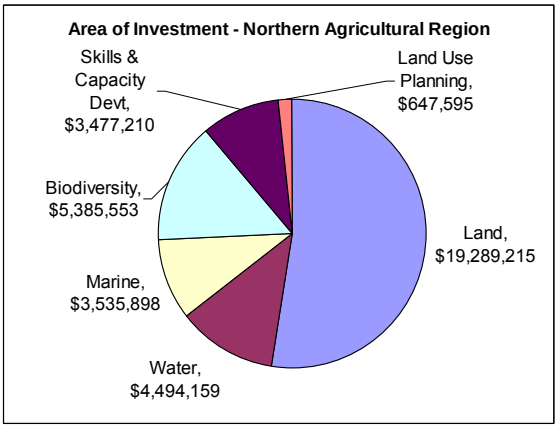


Figure 18 **Northern Agricultural region**

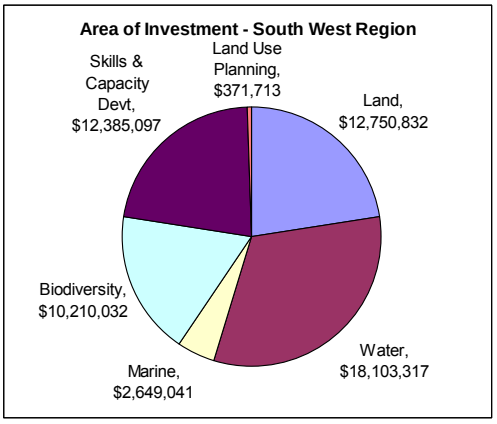


Figure 21 **South West region**

The decision-making process for allocation of resources included regional NRM groups developing and presenting Annual Investment Plans; technical assessment by State and Commonwealth Government and community technical expert panel; Joint Steering Committee recommending to State and Commonwealth Ministers; Ministers' sign off.

Tables 7 and 8 show the allocation of NAP and NHT funds for all major programs/projects. These were delivered via one of the following methods: regional delivery, state-wide or through the resource condition monitoring program. They totalled $385 million. Other costs include $11 750 000 for foundation activities at regional level including development of strategies and investment plans; direct funding to community groups; Commonwealth agency funding; schools universities and Non Government Organisations (NGOs).

Table 7 **Summary of major expenditure of NAP and NHT via delivery organisations and percentage**

Summary of project delivery organisations		
State Government (Note: $71 m of this was for delivery of the regional NRM group investment plans)	220 802 284	57.3%
Regional groups includes program administration monitoring and evaluation and knowledge management	71 122 290	18.5%
Non-government including community	8 074 730	22.1%
Local government	8 074 730	2.1%
Total	**385 255 368**	**100.0%**

Table 8 **Summary of major expenditure of NAP and NHT via priority asset areas and percentage**

Summary of project investment areas		
Land (includes strategic farming)	150 387 944	39.1%
Water (includes Collie)	75 567 655	19.6%
Biodiversity	56 748 122	14.7%
Marine and coastal	16 914 533	4.4%
Land-use planning	3 580 462	0.9%
Skills, knowledge, engagement and M&E	60 773 319	15.8%
Administration	21 283 333	5.5%
Total	**385 255 368**	**100.0%**

Total allocations for the whole of NAP and NHT programs

Table 9 summarises the total funds allocations for the major funding areas for NAP and NHT programs and the source of funding (Government of Western Australia NAP, Commonwealth Government NAP or NHT)

Table 9 **Total allocations for the whole of NAP and NHT programs in Western Australia**

Funding area	State NAP $	Commonwealth NAP $	Commonwealth NHT $	Total $
Regional group Foundations Funding	1 704 923	1 704 923	8 039 686	11 449 532
Regional group Priority Projects	1 579 688	1 579 688	12 861 323	16 020 697
Regional groups delivery of Investment Plans	71 883 752	75 131 438	57 433 500	204 448 690
Regional coordination	1 200 000		17 090 987	18 290 987
Core administration regional groups	4 416 667		2 650 000	7 066 667
Strategic Reserve	12 365 177	20 688 535	14 355 999	47 409 711
Strategic Tree Farming	32 200 000	32 200 000		64 400 000
Collie River Salinity Recovery	15 000 000	15 000 000		30 000 000
Engineering Evaluation Initiative	4 000 000			4 000 000
Catchment Demonstration Initiative	6 000 000			6 000 000
Others, including administration at State and Commonwealth level and reallocated interest	7 661 793	11 707 418	12 677 565	32 046 776
Total	**158 012 000**	**158 012 000**	**122 705 424**	**438 729 424**

Note: Includes facilitator and coordinator funds, priority projects, interest re-allocations and State and Commonwealth administration funds that were not included in Tables 1 and 2.

Monitoring, evaluation and reporting

Implementation plan

A monitoring and evaluation team in the Department of Agriculture and Food WA along with the Western Australian Monitoring and Evaluation Advisory Committee (WAMEAC) coordinated the NAP and NHT Monitoring and Evaluation Implementation Plan prepared in 2003. The underlying logic of the plan was that resource condition is changed by management actions ⇨ which are achieved by outputs ⇨ which in turn require investment. It was developed in accord with a nationally agreed approach and followed a standardised reporting process to enable aggregation of regional datasets to fit State and Commonwealth requirements. The Plan required:

- resource condition monitoring and reporting
- reporting on management actions outputs and finances
- common reporting structure (aggregation of regional data to State and Commonwealth needs)
- evaluations (regional and State scale).

Progress to date

Monitoring and reporting

In partnership with the Commonwealth the State has:

- funded eight resource condition monitoring projects that fill gaps in the State's resource condition monitoring network as identified in the State Evaluation Gap Analysis Project. The projects collected baseline data as well as developed or improved the methodologies for collecting and analysing the data and installed infrastructure. Examples include the ecologically significant invasive species project; inland aquatic resource condition indicators; and soil condition monitoring across the wheatbelt. These projects add significantly to the State's monitoring network and allow for assessments to occur that will inform future investments.
- prepared Government of *Western Australian Guidelines for Developing and Reviewing Asset Targets* (2008)
- worked with the six regional NRM groups to train them in program logic resulting in improved planning and target setting
- collected data from projects delivered by the six regional NRM groups that records the progress towards agreed management and resource condition targets
- collected and analysed project outputs and reported them to Treasury
- managed all contracts including financial and performance reporting
- undertaken on-ground reviews of regional group programs in line with requests from the Auditor General
- undertaken governance and management reviews of the six regional NRM groups and ensured compliance
- reported on the financial status and performance of all projects on a regular basis to the Commonwealth.

Data collection collation and access

The development of the Shared Land Information Platform (SLIP) has allowed for the management of information collected throughout NAP and NHT programs to be stored in a central location and to be easily accessible for future decision-making.

Evaluation

Western Australia formed a State Evaluation Committee which completed four evaluations in accord with an agreed State Evaluation Schedule:

- *The Delivery of Natural Resources Management in Western Australia: A Review*, (Government of western Australia 2006)
- *Strategic Reserve Gap Analysis* (Department of Agriculture and Food WA 2007)
- *Evaluation of the capability of community and State and Commonwealth agencies to implement two NRM programs* (Viv Read and Associates & Advanced Choice Economics 2007)
- *Evaluation of the effectiveness of the Regional Investment Planning, Approval and Review Processes* (URS Australia Pty Ltd 2008)
- A fifth evaluation of the impacts of investments on the natural resources was put on hold by the Joint Steering Committee and was not completed.

The Hicks Review findings included:

- leadership was imperative to success
- an NRM Framework and a State NRM Plan should be finalised
- the regional NRM groups should not be restructured.

The Gap Analysis reviewed the funding allocations at the time and recommended processes to address them.

The evaluation of capability to implement the programs found:

- the under-estimation of requirements to develop and implement the programs
- limitations in capacity must be recognised and addressed
- strong leadership was required
- there was limited capacity to measure the impacts that the investment was having on targeted resource condition outcomes.

The evaluation of the effectiveness of regional processes found:

- the lack of strategic documents including a State NRM Plan
- the need for more clarity and consensus regarding the regional delivery model
- communications and transparency were essential for good delivery

Further to these evaluations the Commonwealth Government conducted ten evaluations into the design and delivery of all sectors of NAP and NHT programs. They covered areas including weeds; salinity; coastal and marine; governance arrangements; and the bilateral agreements. These can be accessed at www.nrm.gov.au/me/evaluation/national.html

The WA Monitoring and Evaluation Advisory Committee also assisted regional groups to develop regional scale monitoring and evaluation plans including evaluation schedules at regional level. As a result regions were able to implement consistent monitoring and evaluation for all of their program and projects.

Cumulative NAP and NHT outputs

Governments are moving towards more rigorous outcome reporting to establish the success of a program. Currently there is a heavy reliance on output reporting.

An NRM project receives inputs—dollars and human resources—from government to complete activities that create products and services (outputs).

Ninety standard output codes were agreed nationally to standardise the measurement and reporting of NRM outputs to meet State and Commonwealth requirements. These codes were used to measure progress under NAP and NHT programs.

The State Government captured output data relating to these two funding programs from the six regional NRM groups and other proponents on a six-monthly basis. To date four years of data have been collected.

A summary of key reported outputs from NAP, NHT and NLP follows in Table 10.

It represents a sample of the products and services that were delivered through the NRM projects funded by NAP, NHT2 and NLP. These outputs are the intermediate steps towards achieving the intermediate and long-term outcomes of the NRM program. Table 10 below provides a snapshot of the aggregated output data received by the State for projects delivered during the period of July 2005 to June 2008.

Table 10 **Reported outputs through the implementation of State/Commonwealth NRM programs (1 July 2005–30 June 2008)**

Action/output	Actual July 2005-June 2008	Expected benefits/impacts
Area (ha) covered by NRM plans (including Monitoring and Evaluation Plans)	Whole State	Six nationally accredited regional plans covering the whole State provide a blueprint for action and partnerships to maintain and where possible improve the condition of the State's natural resources; to facilitate attitudinal change in the community. These plans are currently in abeyance since the Commonwealth Government's new emphasis on the Caring for our Country Program.
Area (ha) revegetated for landcare	9783	Reduces salinity risks and rising groundwater provides habitat for native animals and improves water quality. Potential of 3.8 to 4.5 million tonnes of CO2 sequestered.
Area (ha) of wetland, stream and vegetation protected by fencing	128 620	Repairs and stabilises waterways, reducing erosion, Eutrophication, salinity and sedimentation. Improves habitat for native plants and animals and water quality.
Area (ha) vegetation rehabilitated/enhanced	5 509 694	Protection by fencing, covenanting and other treatments have preserved vegetation remnants and enhanced or preserved biodiversity values.
Area (ha) of soils treated (lime, gypsum, clay)	39 760	Addresses soil acidity which affects more agricultural land than salinity. Significantly improves crop and pasture productivity with indirect benefits on salinity from increased water use.
Area (ha) protected by covenant/voluntary conservation agreement	21 093	Ensures long-term conservation of important areas of biodiversity outside the formal reserve system.
Area (ha) of drainage works	70 740	Rehabilitates agricultural land from rising groundwater and salinity; increases productivity; protects rural infrastructure.
Area (ha) treated for erosion control	74 140	Maintains agricultural productivity and reduces siltation of waterways, estuaries and other wetlands.
Number of people engaged in NRM events and training	76 122	Increases people's knowledge attitudes and skills to undertake NRM actions.
Number of new/enhanced monitoring programs	1362	Increases the understanding of the condition and trends of resource condition and effectiveness of practice change and other interventions.
Number of decision support tools created	181	Assists land managers to better understand impacts of land use on the resource base and to implement best practice.
Number of community groups/projects assisted	2625	Supports collaborative and self-directed action by local action groups and leverages private/external investment in practice change and improved resource condition.

Table 10 continued

Area (ha) with plans and actions to protect from invasive animal and plant pests	24 078 740 (includes areas treated multiple times)	Invasive pests threaten biodiversity and production values. Includes outputs such as management plans, baiting and community based weed control projects.
Area (ha) of tree crop established	17 982	Improved information about cost benefit of tree crops in medium rainfall zones; improved silviculture techniques and benefits of improved water quality and stabilising salinity and water-logging. Demonstrated potential for carbon sequestration from tree crops and contributed to wood resources in four industry development cells.

Table 11 **Examples of on-ground and increasing capacity to deliver outcomes**

Asset theme	Evidence
Water	
90% (> 500 km) of the Avon River channel fenced reducing sediment transport within the system—may be the longest continuous fencing of a river in Australia	
46 000 m^3 of sediment removed from six large pools in the Avon River recreating lost habitat and local amenity	
Construction and evaluation of 10 salinity engineering sites have allowed evaluation of drainage impact to be assessed. (117 km groundwater drainage; 3 groundwater pumping sites; 3 evaporation basins constructed)	The Beynon Rd site has a proven land salinity reduction over 100 ha. Drainage assessments were undertaken at all nominated sites (deep open drains and pumps). DoW is in the process of publishing the Reports.
Improving water quality in the Vasse-Wonnerup through the installation of urban drainage bio-retention rain gardens and storm water retrofitting	
Water re-use in the Ord irrigation system has seen water savings of 5500 ML per annum. By combining wet season crops, minimum tillage, controlled fertiliser applications and flocculants (for example. PAM and Gypflo) sediment and nutrients coming off the fields are minimised as well as improvements in soil structure occurring. Current practice is for bare fallow (for effective weed control) during the wet season when 80% of the annual rainfall occurs. Use of PAM reduced the amount of total suspended solids by 89% and Gypflo by 75%. It reduced the total suspended solids from 0.8 g/L to 0.1 g/L in 2006. Increased water efficiency over the duration of the trial was 71%.	The flow through system used in irrigation means that all waste water flows directly back into the river with sediment, nutrient and chemicals in the tail-water. By reducing the amount of tail-water leaving the properties, there is a reduction in soil sediment, nutrients and chemicals entering the Dunham and Lower Ord rivers. During the trial, 1614 kg of total nitrogen, 460 kg of total phosphorus and 95 681kg of total suspended solids were retained on farm in 2006. Reducing these flows positively impacts on the Ramsar wetland with less inundation and reduced sediment. Best management practice was not implemented even when showing the benefits. This was mainly due to the short-term profitability requirements of landholders.
Identification of the sediment flow into Lake Argyle indicates a reduction in storage of 30% (35 years of historical data) if the current rates continue over a 100-year period leading to an additional storage area of 3210 GL of freshwater for use.	The capacity of the Ord River Dam is 10 763 GL or 10 763 Mm3. Over the last 35 years the volume of sediment in the dam has built to 5% of the capacity. Further testing of the soft and coarse sediment should be conducted. Measurements should extend from 38 to 55 km (in the original river channels) from the dam wall to check on the sediment flowing into the dam. The sediment levels have not changed close to the dam wall, but further away from the wall the sediment build-up is greater up to the last flood lines. For example, 48 km from the dam wall the channel is 76% full of sediment. Most of the sediment is deposited between 25-64 kms from the dam wall and at 55 kms the old river channel is full. This equates to an increase of 4 m since the 1992 survey.
Reduced water salinity levels by 150 mg/L in the Collie River eventually reducing the level to potable water**.**	The engineering works trialled a pumping system over three years to test 'proof of concept'. Further engineering works will be constructed including a desalination plant.

Asset theme	Evidence
Land	
Landholders in the Avon Catchment increased salinity management options by 2300 ha saltbush, 628 ha perennial pastures, 80 ha tagasaste, 990 ha oil mallees and 350 ha brushwood and sandalwood.	The science is well understood in most of these areas. The regional impacts are still quite minor, but do form the basis for improved livestock and woody product industries.
Implementation of components of four Catchment Plans within the Catchment Demonstration Initiative. These components address salinity control leading to on-ground works: • perennial plantings • re-vegetation • fencing for biodiversity protection • engineering works • storage dams • salinity affected lands regenerated • community's working together for long term control of salinity.	To June 2009; 4 catchments covering 130 000 ha have engaged over 180 farmers to participate in the following catchments: Upper Coblinine - The Upper Coblinine Catchment Demonstration Initiative (CDI) completed the following activities that contributed towards surface water management including::installing 197 400 m3 of dam storage, 186 km of fencing, 23 km of banks on slopes and 25 km on the valley, planted 266 880 native seedlings, 1540 ha of Lucerne and salt-land pastures. In Addition72 new piezometers were installed.. By the end of the project in December 2009, it is expected that the following additional works will be completed: 75 220 native seedlings planted, 6.6 km of valley floor earthworks, and a further 364 ha of perennial pastures established. Fitzgerald River Catchment Demonstration Initiative - completed 2500 ha of perennial pastures, 1000 ha long seasoned annual pastures, 180 ha of saline lands re-vegetated, 70 ha of re-vegetation, 20 km of surface water management, over 1300 ha of soil amelioration , sodicand dispersive clay treatment and 75 km of fencing. Catchment landholder Geoff Bee won the GSDC Natural Resource Management award 2007; In addition the three deep drains were constructed and monitored,, collaboration with CSIRO, a Gatton Panic trial and Evergreen Southern Pasture Mix trial of - over-cropping occurred over two years as well as an acid/saline—soil rehabilitation trial. West Koojan-Gillingarra - Mixed perennial pastures (534 hectares) and fenced (4 km), and 195 ha of tagasaste. saltbush (17 ha) and native trees (13 ha) planted. A management agreement has been formalised for the protection of 750 ha of remnant native vegetation with 18 km of protective fencing erected Wallatin-O'Brien - Surface water management structures; groundwater management using: deep drains - 9.6 kms; two siphons , three slotted pipe drains – 500 m; pumping trials – one that is permanent, perennial pastures. Lucerne, salt-land species; Weeping Tagasaste trials; creek-line restoration and riparian zone rehabilitation, riffles, riparian zone rehabilitation, fencing of creek-lines and re-vegetation, fencing to protect remnant vegetation - 400 ha, monitoring and evaluation, new bores to complete network, monitoring, for ongoing salinity risk, 140 groundwater bores monitored monthly, data-loggers strategically placed and used at key sites, telemetry monitoring of deep drain courtesy ACC and DOW, Communications included a DVD, regular ongoing newsletters, media articles, series of salinity management options and summary sheets of each project: Also completed are planning templates for salinity options including timelines and budgeting, journal articles and research papers, research collaborations with CSIRO, GRDC, Edith Cowan University, Murdoch University, UWA, DOW, ACC. DEC and DAFWA

Asset theme	Evidence
Land continued	
	Works included geophysical surveys; helicopter electro magnetics, EM31, EM38 assessments and,.ground penetrating radar. The rollout phases showed increased use and emphasis on plant-based solutions to address recharge reduction. These included salt-land pasture planting, Lucerne, long season annuals and some other salt tolerant perennials. A detailed list of 25 fact sheets, including an overview and plan for each demonstration is available from the Shire of Kellerberrin website. http://www.kellerberrin.wa.gov.au/nrm/cdi.
Starling control south coast project has more clearly identified the number and range of Starling infestations in WA. In 2008-09 starlings trapped and destroyed included between 1 and 10; on 16 properties; between 10 and 20; on 7 properties and between 20 and 50 on 5 properties A total of approximately 350 starlings were destroyed.	Numbers of Starlings in Western Australia have been established and eradication of the infestation is possible.
Arterial deep-drainage system in the Fence Road Catchment, Dumbleyung Shire has been established to monitor effectiveness of the drains on salinity management	A 55 km long and 2 m deep arterial deep drainage system of was constructed in the Fence Road Catchment. Piezometers were installed in late November 2007 along transects perpendicular to the drains at three sites. Groundwater levels directly beneath the crops have, after almost two years (two wet seasons), not responded significantly to deep drain installation.
Salinity advice-more than 150 farm visits were completed and over 11 000 ha of salt affected land has been fenced out and will be managed more sustainably as a result.	A new approach enabling funding to hit the ground on projects that address salinity faster than the traditional methods of applying for grants
Principles and guidelines developed to manage soil erosion in downhill Tramline Farming systems.	Methodology now readily available for managing erosion on downhill tram lining in drier parts of the eastern wheatbelt.
18 000 ha of STF tree plantings	The sequestration of CO2-e by the almost 18 000 ha of STF plantings is estimated at 3.9 Mt, which would offset the annual emissions of more than one million cars, or about 5% of the estimated total 2007 emissions for Western Australia (71 Mt). In addition to this there are benefits from the displacement of fossil fuels (bio-energy) and carbon in harvested wood products.
Biodiversity	
5 million ha of Kimberley pastoral, indigenous and conservation properties in the rangelands now conduct more appropriate fire regimes leading to benefits in biodiversity, pastoral production and limiting damage to cultural sites. Other pastoral properties in the Kimberley and Pilbara are following this example of better fire management.	Both controlled and uncontrolled wild fires in late dry season were the norm prior to the EcoFire project and caused damage to large areas of the west Kimberley. The project was managed by the Australian Wildlife Conservancy. Trialled on nine pastoral properties initially with a further five added in subsequent years. It is now being considered for implementation over the broader Kimberley and Pilbara regions. Benefits to the Gouldian Finch and the Red-backed Fairy Wren through habitat preservation; seed yields from Spinifex used as a food source by seed eating birds and fauna won a WA Environmental Award. Further detail from www.australianwildlife.org.au

Asset theme	Evidence
Biodiversity continued	
Two rare acacia thought to be extinct in the central wheatbelt *Acacia leptoneura* last seen in 1837 in the Dowerin area and *Acacia torticarpa* last sighted in 1945 in the Cunderdin area found	New species and re-discovered species are continuing to occur.
123 dibblers bred at the Perth Zoo for re-introduction into secure wild sites established from information about the requirements for successful relocation.	Most of the relocated Dibbler did not survive reinforcing the need for complete feral animal (particularly foxes) to occur prior to translocation. The control program is on-going, but with a review of the Stirling Ranges location due to dieback.
Agreement to install a siphon pipe to lower the water-table in the lake system to allow for migratory birds to maintain their food source.	Recovery of 45 ha of *Melaleuca cuticularis* and *Melaluca brevifolia* shrublands and 150 ha of summer wading waterbird habitat within the Ramsar-listed Woody Lake Nature Reserve by lowering the water level via the siphon installation and pipe to Bandy Creek.
Coastal and marine	
Seventy sponges new to science discovered during the marine futures project.	
Coordinated rabbit control on the Swan Coastal plain areas from Rockingham to Sorrento to enable revegetation to dunes to prosper and reduce erosion.	
Successful rehabilitation of dunes at Injidup Beach by community groups	

Table 12 **Examples of increased capacity to deliver outcomes**

Increased capacity for delivery-including planning; tools; enhancing skills, knowledge and engagement; coordination and integration; and monitoring, evaluation and reporting
Planning
Six Regional NRM Strategies that bring together community and government aspirations and priorities and are used as the basis for developing the Investment Plans
Development of the Salinity Investment Framework to identify and prioritise resource spending in Western Australia to address the impacts of salinity
Completed a review of governance systems for drainage in the wheatbelt. Recommended governance strategies for various sized drainage systems
Development of Water Quality Improvement Plans (WQIP) for the Vasse–Wonnerup; Peel–Harvey; Swan–Canning river systems to provide a strategic approach to reducing nutrients in these systems
Development of six Regional Assessment Plans for GeoCatch
Development of water allocation plans for Bremer, Denmark, Marbellup and Walpole that include environmental water requirements and allocation limits. Environmental water requirements for Hill Lower Moore, Canning, Wungong and south-west rivers
Investigate acidic groundwater within the wheatbelt environment and from drainage discharge; refine and develop an acidic discharge mixing model and develop options for the treatment of acidic discharge in the Beacon and Wallatin Creek catchments
Development of an 'Interim Drainage Design Guidelines' manual to assist drainage planners in effective design
Tools
Dairy Catch and Nutrient Smart- GeoCatch to increase awareness management practices and industry partnerships
Water quality management decision support tools
Enhancing skills, knowledge and engagement
Local and regional community involved in planning resulting in ownership leveraging
Community committed to implementing government policy/programs
Increases in community governance capacity leading to social capital
Changing behaviour of community interactions with resources that result in positive impacts on the condition of these assets
Assets identified and prioritised at regional scale with subsequent investment decisions
Development of indicators of estuarine condition; establish baseline conditions; manage data for availability for all stakeholders in the future to aid maximising future investments
Provided foundation data on which all scales of decision-makers can build to assess current condition; determine if investments are changing the resource condition and set regional resource condition targets for native vegetation
Comprehensive mapping and assessment of south-west marine habitat extent/distribution and condition for use ,in future investment decisions
Identification of gaps in knowledge of inland wetlands at risk; evaluate the condition of significant wetlands in order to provide on-going guidance for future investments
Albany Senior High School students involved in conducting research into marine and coastal issues with resulting interest for students to pursue careers in science
Western Desert animal and plant ID cards produced in several Indigenous languages designed for field work as a reference tool
Quantify potential salinity risk by mapping aquifers in the Ord Region Irrigation Area via digital elevation surveys and aerial electro-magnetic surveys for consideration during the Ord Stage 2

Table 12 **continued**

Increased capacity for delivery–including planning; tools; enhancing skills, knowledge and engagement; coordination and integration; and monitoring, evaluation and reporting;
Enhancing skills, knowledge and engagement
Over 60 new spatial datasets are available from SLIP data services in a wide range of software including desktop GIS and Google Earth.
Monitoring, evaluation and reporting
Develop a framework that coordinates long-term, large scale monitoring of nutrients in inland aquatic environments state-wide to avoid duplication and maximise future investments.
Monitoring evaluation and reporting processes established and used to inform decisions
Long-term, large scale strategic approach to assessing and monitoring ecologically significant invasive species, building on current approaches and reducing duplication for informed decisions on rabbit control
Established baseline soil condition in agricultural areas with respect to pH, soil organic carbon and erosion to effectively manage the soil resource as well as determine the impacts of investments on the condition of the resource
Established baseline data on groundwater salinity to track the trends in salinity hazards and risks for future investment decisions
Establish a system for monitoring significant native species and ecological communities that will reduce duplication and maximise return on data collection investments. Significant native species and ecological communities can be used as indicators of outcomes of NRM investments.
Deliver a strategic assessment report that will inform and guide future investments for the Pilbara and Kimberley regions.
Coordination and integration
Regional NRM groups fulfilled a coordination role by building and managing partnerships with all stakeholders including government agencies to deliver outcomes.

What have we learned—key findings

Western Australian stakeholders in NAP and NHT have undertaken numerous reviews, audits, evaluations and observations as well as participated in several national reviews. They all provide valuable lessons about the effectiveness of NRM programs and how they can be improved in the future.

1. Size of the problem

Despite the learnings and progress made during earlier national programs, it was only after the implementation of NAP and NHT that the enormity of the problems facing the Western Australian community was realised. Even though NAP and NHT delivered a large increase in funding and a stronger focus of direction the problem was totally under estimated. It took a hundred years to create the problems facing our natural resources and the solutions will require long-term commitment to address them. Initially, for example, salinity restoration was believed to be achievable by planting back native vegetation to 10 per cent of the landscape. It is now understood that even with 100 per cent of the landscape replanted, recovery is not possible in some areas and in others the reversal of salinity may not be seen for many years.

With an increase in knowledge and review of the outcomes of the NRM program delivered in the last six years; a revision of expectations from any future program should occur; for example, limiting further degradation to priority assets in the most cost effective manner.

Key finding: The NRM community seriously underestimated the enormity of the issues facing the natural resources in Western Australia.

2. Leveraging

There will never be enough resources available from government to address the issues of the condition of natural resources. Community has willingly been involved in delivering government policy that deals with our natural resources. This has been particularly evident at regional NRM group level where planning and implementation of activities are best able to address the threats to the natural resources. Community members have also been enthusiastically involved in the delivery of projects. With a sense of ownership in both decision-making and activity, community have been willing to invest in the planning, decision-making and activities of the NAP and NHT programs. This has seen much leveraging and adding of value to governments' investment. It is estimated for every dollar of public funds spent around $2 (cash and in-kind) of private funds are leveraged.

Key finding: It is beyond the capacity of any government to fully fund activities required to address all NRM issues. However, by involving community in all planning and delivery decisions, community support can be leveraged to add value to government investments.

3. Assets-based focus versus geographical spread

The dilemma for government is where to best invest its resources to gain the most value. The choice it has is to either invest

across as broad a landscape as possible (or geographic spread) or focus it into specific highly valued public assets. It is not possible to save all of our natural resources. Government, community and industry simply do not have either the resources or the solutions required to achieve this. Therefore government investment should focus on the most significant assets for the community as a whole, for it to achieve the best value for its investment. Prior to investing its limited resources, government must identify the value of the asset to the community; determine the threats to it; and then consider the feasibility of a solution prior to committing its resources.

Clear asset condition targets are required to give direction for the State's investments in NRM. Agreed targets provide a common focus for community, industry and government when investing limited resources in addressing threats to priority assets.

The State of Western Australia was the first to recognise that to achieve any significant results NRM programs needed a targeted approach. It wanted to work on assets highly valued by community rather than the geographical spread approach.

However, the assets-based approach to NRM solutions raised conflict between the principles of priority and equity. All stakeholders will naturally want to focus on their own priorities whether or not they are highly valued by others. The original NHT program focused on empowering sectors of community to work together in groups to achieve local outcomes. It has been difficult for many to come to terms with the change in focus in the NHT extension and NAP program. Suddenly natural resources that they considered important were no longer priorities to the funding bodies. Government funding was always intended to be used to leverage stakeholders' resources such as cash, on-ground actions or expert local knowledge. With the perceived government withdrawal of support for local priorities and activities, the ability to leverage funds has been much reduced.

Key finding: It is critical to base a NRM program on prioritising expenditure to ensure assets highly valued by community do not continue to deteriorate. When government is looking to achieve the best value for its investments, it needs to consider trade-offs including between priority and equity if it wishes to keep all stakeholders engaged.

4. Integration

Prior to the delivery of NAP and NHT programs, very little interaction occurred between participants in NRM. Neither government agencies nor community groups considered others' opinions when looking for solutions. They focused on outcomes that addressed their individual concerns. This often resulted in duplication of effort, solutions that only addressed some of the causes and conflict with others, even though all involved had the best intentions.

In accord with the integration required by the new programs (for the first time in many cases) planning and delivery of projects considered all aspects of environmental values prior to decisions being made. Conflicts between economic, social and environmental values were identified and considered by all stakeholders during this process with varying degrees of success. This interaction raised the difficult issue of trade-offs or compromise during the decision-making process.

The design of the program delivery meant that regional NRM groups were required to manage this. In only a few instances prior to NAP and NHT had trade-offs been seriously considered. Regional NRM groups managed the process of considering all of the conflicting values and proposing solutions that considered trade-offs and desired outcomes best for the asset.

Key finding: Interaction and the subsequent integration of different values and knowledge have enabled better return on investment.

5. Community engagement

When decisions are made that some or all of the government investment into natural resource management should be focused on priority assets, local community knowledge plays a critical role in the final investment decisions. People who live near and make use of an asset are often best placed for any decision-making on the priority of that asset and the likely impact of proposed activities. To achieve the desired outcomes, the community's local knowledge should be considered equally to those views expressed by scientists. If community feels that its opinion is valued not only will this generate a sense of ownership but also is likely to result in leveraging resources to match any government investments.

Key finding: Community knowledge is credible and adds value to the identification of priorities and decisions about the appropriateness of activities.

Engaging community and industry stakeholders is essential to the success of any NRM program. In the agricultural region over 86 per cent or 18 million ha has been cleared for agriculture and is privately owned. In addition over 36 per cent of the State or 90 million ha is currently covered by pastoral leases. These are managed by private individuals and companies; aboriginal or government authorities; or mining companies. Much of the remainder of the State is controlled by aboriginal corporations. With much of the State owned or managed by non-government enterprises and many of the problems facing our natural resources occurring on this privately managed land; government needs to engage with these managers if it wants to see real changes in condition. The community offers local knowledge, resources and commitment if effective engagement occurs.

Key finding. People's interaction with natural resources impacts on the condition. Building community ownership of the natural resources in their 'patch' enables government to gain the most value for its investment.

6. Program logic

Prior to the development and delivery of NAP and NHT programs an array of processes were used by the six regional NRM groups and government agencies to identify priorities and the activities required to address any threats to them. With the increased knowledge gained from the development and implementation of the programs and projects early in the delivery of NAP and NHT it was realised that to get more value for an investment a consistent decision-making approach was required during the development of programs/projects. What was missing was the rationale behind a program including: what was understood to be the cause-and-effect; and the relationships between program activities, projects, outputs, intermediate outcomes and longer-term outcomes.

Establishing a program logic approach when developing investment proposals provided a clear guide for choosing what to measure, assess and report on for evaluation purposes. This information was used to reflect critically on progress, undertake adaptive management and inform future investment decisions. Program logic enables not only economic and environmental principles to be addressed but also the social paradigm to be considered. This allows for a better understanding of any reductions in resource condition as well as the impacts of investment decisions.

Only projects and programs developed and delivered during the latter stages of NAP and NHT were underpinned with

program logic, making it difficult to determine results from some of the earlier investments.

Key finding: Program logic principles enable clear measurement assessment and reporting for evaluation purposes and can inform future investment decisions.

7. Information generation and exchange

In the initial phase of NAP and NHT programs (including the development of the six Regional NRM Strategies and state-wide projects) it became apparent that baseline information on the condition of assets was often not available to inform funding decisions. Added to this were the issues of inconsistency of the data collection and storage (for example, different scales) and difficulty of accessing the information. This has resulted in the duplication of information and the inability to make best use of it to inform future decisions. Data generated is now centrally located where appropriate (SLIP); and in a consistent format for multiple users. It is now more accessible and easily shared.

Key finding: To best inform future decision-making data generation should be consistent, stored centrally where appropriate and available to all users.

Benefits of the regional approach

The major benefit of the regional approach has been the cooperation between the State and Commonwealth Governments and community stakeholders to develop six Regional NRM Strategies. For the first time in this State, the entire land mass and surrounding coastal and marine environment has strategic documentation that identifies priority assets and key threats to them as well as short-, medium- and long-term targets that address environmental, economic and social aspects of the natural environment. They include targets for land, water, biodiversity, coastal and marine as well as capacity building and contain a monitoring and evaluation plan to measure results. Each of the strategies was approved by the State and Commonwealth Governments and have investment plans to implement priority activities as agreed by the two governments. These Strategies and Investment Plans attempted for the first time to integrate all asset classes and subsequently tackle the areas of conflict arising from differing priorities, the trade-offs required as a result; and attracting resources from non-government sources. For the first time natural resource management was tackled in an integrated manner and not in 'silos' as has been the norm previously.

As a result of several reviews undertaken by the Commonwealth Government there was support for the retention of the regional approach. *A Framework for Future NRM Programs* (Commonwealth of Australia, 2006) recommended retaining the regional model. This was endorsed by the NRM Ministerial Council in November 2006. In addition, a national review overseen by Kim Keogh (2006) overwhelmingly supported retention of the regional approach.

Queensland, South Australia, New South Wales and Victoria continue to pursue a regional approach to NRM and are developing institutional arrangements and State funding programs accordingly.

The Department of Agriculture and Food commissioned a review on behalf of the Government of Western Australia, *The Delivery of Natural Resources Management in Western Australia: A Review*, 2006, written and prepared by Stuart Hicks.

In addition the Minister for Agriculture and Food and Forestry commissioned a review of the regional approach to delivering NRM with the *Natural Resource Management Review Western Australia*, 2009 English, Hartley, and Warner.

Both supported retaining a regional approach. The government's response to the Minister's review this year agreed that regional groups should remain the principal point of community engagement in NRM.

The strengths of the regional approach identified in State and national reviews are that it:

- encourages community participation in planning and decision-making. This is a function of good government and society now expects to be consulted on matters affecting it and be able to work in partnership with governments
- improves effectiveness by bringing decision-making and action closer to those affected
- leads to better understanding of the natural assets valued by the community and their priorities
- leads to greater ownership of problems and solutions and an increased willingness to change
- balances scientific information and values with local knowledge and values. Thus the social and economic realities of achieving change are acknowledged
- facilitates regional coordination and co-funding of action.

Challenges

Even though these reviews highlighted the benefits of retaining a regional approach they also identified challenges. In an already complex field, encouraging integration and the conflicts that emerge about values and approaches to solving problems, and the inevitable communication difficulties this brings, the task of managing the process is even more difficult.

The Commonwealth and State Governments required the regional community to drive an integrated process and deliver a program that government itself had been unable to achieve. It expected that regional NRM groups made up mainly of enthusiastic and committed community people who had a passion for the natural environment could develop and deliver a program where conflicting values, science and problem solving approaches differed. They were expected to change the deteriorating condition of the natural resources by using a coordinated approach. Regional NRM groups achieved considerable success in coordinating local communities with the scientific community. In the main this was due to their enthusiasm and commitment. No government has been able to achieve this level of cooperation across scientific disciplines and community interest in the past.

The 2009 English, Hartley and Warner review commissioned by the Minister for Agriculture and Food highlighted that, while significant progress had been made at regional level, certain problems persist. Improvements needed in future programs include engaging all interest groups, accountability and monitoring and reporting.

Several audits of regional NRM groups were undertaken during the delivery of NAP and NHT programs with particular emphasis on corporate governance. These reviews identified issues that could have potentially created risk for government especially in contract and financial management. Regional NRM groups worked hard to address the issues and in the main complied. An unintended consequence was to create a system that not only was complex but also replicated processes and systems available elsewhere. The State ended up with program administration that was complex, replicated at various scales and had high transaction costs.

In addition a key point of the Report to the Australian Government Interdepartmental Committee by State and territory Treasuries (2007) on NRM states that while the regional model is supported, greater flexibility could be applied to ensure investment is directed more strategically at high priority activities which

could involve greater flexibility to allocate funds between regional and State level projects. The dilemma this creates is the conflict between priority and equity as a principle and practicality of program delivery. With leveraging of resources, 'ownership' of the activities and assets, and governments inability to fully fund a NRM program on its own, compromise is required. Determining trade-offs and a balanced approach is most likely required for government to obtain the best value for its investments. Resources (funds and knowledge) from government will not be enough to achieve its desired outcomes.

The WA Department of Treasury and Finance (2007) reported concerns with the delivery of the program via a mainly regional approach. These included:

- that it can lead to 'equitable' allocations to a large number of projects spread across regions rather than being concentrated on projects that independent experts had indicated would deliver the greatest public benefit
- that community engagement processes often highlight that their priorities are 'local' rather than regional and may focus on treating symptoms rather than causes and on private rather than public assets. If not considered appropriately this could result in investments being non-strategic.
- that there is duplication of administrative and management functions across regional groups
- that it heightens risks in relation to accountability for performance of public expenditure and financial management.

One of the criticisms of the regional delivery approach has been that despite the processes undertaken in the development of programs and projects, more than 60 per cent of the total funds available for the programs were still delivered by State Government agencies. This has resulted at times in funding going from the government to regional NRM groups and then back to government to deliver, adding to the transaction costs and reducing the funds that 'hit the ground'. While this process has added to the cost and seen possible delays in delivery it has been the result of a consultative decision-making process that considered all aspects of NRM. It was an open and accountable process that used a considered approach to determine who was best to deliver rather than making an assumption. This process was challenging for the regional NRM groups but resulted in more accountability in decision-making.

Accountability

Since 2007, successive State Cabinets have insisted that accountability and transparency must be improved before extending the State's involvement in NRM programs.

For example, audits by Department of Agriculture and Food WA highlight inconsistencies between the broad on-ground outcomes approved via investment plans and the actual outcomes, making it difficult to report on effectiveness. The department's monitoring and evaluation team also assessed expenditure against on-ground outcomes via case studies. They found a number of issues that made it difficult to draw conclusions about tangible on-ground impacts from investment.

A report by the Australian National Audit Office (ANAO) (2008) on NAP and NHT found that transparency and accountability needed attention in the management of Commonwealth funds by the states/territories. It highlighted concerns about the quality and measurability of targets and found that most regional targets were inadequate. The report suggested it was not possible to report meaningfully on the extent to which outputs contribute to the outcomes sought by government and that monitoring and evaluation is generally lacking. With regard to regional governance the ANAO report suggested the current model presents some risks and that future arrangements must match the level of risk.

Investment priorities

Determining investment priorities has also been somewhat problematic although this has been as much an issue at State level as at regional level.

For example, the State Evaluation Committee's evaluation three (2007) on community and government capacity to implement NAP and NHT noted the following:

capacity deficiencies in regional strategy and investment planning and implementation remain and need to be addressed – specifically regarding project planning and design. Evaluation respondents perceived a need for fewer but larger scale projects that are developed with access to science-based information for delivery at a scale that will improve resource condition.

The report suggests that a project planning and design unit, supported by a high level of technical, economic and project design capacity, be resourced and established. It would develop large-scale projects that are technically feasible and economically reasonable for implementation through regional NRM organisations according to the targets of the regions. Consideration of this and other recommendations should occur after the State identifies the role of the regional NRM groups in any new program. Much of the criticism levelled at these organisations is because they are the financial managers for the program. By clearly identifying where these organisations can add value to the planning, development and delivery of future NRM programs the best use of their time and skills will be achieved. A URS Australia Pty Ltd report for Department of Agriculture and Food WA (2008), *Evaluation of the effectiveness of the Regional Investment Planning Approval and Review Processes,* also highlighted deficiencies at regional and State levels with investment planning. In particular, there is a lack of clarity about State NRM priorities that leads to inherent problems for regional planning. It also highlighted poor communication and transparency regarding investment decisions, uncertainty about responsibilities and some lack of accountability for expenditure.

Improvements

In response to the reviews and key learnings, Department of Agriculture and Food WA in consultation with other NRM agencies has developed ways to support improved planning and allocation of funds under future programs. It has:

- prepared the *Western Australian Guidelines for Developing and Reviewing Asset Targets* (Government of Western Australia 2008) to assist agencies and other NRM stakeholders establish targets for priority natural resource assets
- established a set of interim state-wide asset targets for land, water, biodiversity and coastal and marine resources as well as a process for refining them by NRM agencies
- drafted a policy and guidelines for integrated state-wide NRM planning including regional community input to identify and prioritise the State's natural resource assets for investment
- prepared a draft policy and guidelines for a State NRM investment framework to guide the allocation of State funds—this includes work with the University of Western Australia's Centre for Environmental Economics and Policy on its Investment Framework for Environmental Resources (INFFER)
- drafted a policy on requirements for a comprehensive State monitoring evaluation and reporting framework.

What's next?—the way forward

Caring for our Country and State NRM program

NAP and NHT ceased on 30 June 2008 although some investments continued to completion after this time. The Commonwealth has continued a national approach to NRM, replacing NAP and NHT with Caring for our Country (CfoC) which will provide $2.5 billion nationally for five years to June 2013. Western Australia's share via the regional component was $29.4 million for the transition year of 2008–09 and a further $24.1 million annually for the remaining four years. The regional component is to directly address priorities identified in each annual CfoC Business Plan. In addition, the State and other interested organisations can apply for funds for projects that directly address priorities within these plans mainly via the competitive component of the program.

Caring for our Country is different to NAP and NHT in some key areas—notably it has a much reduced emphasis on regional strategies and no longer requires matching funds from the State. Instead of regional investment plans directing the flow of funds, the Commonwealth now releases an annual business plan describing its priorities and calling on a broad range of stakeholders to jointly invest in them.

In May 2009 State Cabinet allocated $30 million to a NRM program for 2009–10 noting this should be used to leverage Commonwealth Caring for our Country funds where mutual priorities exist.

The Western Australian NRM Ministerial Council (WANRMMC) has agreed on State priorities for its State NRM program for 2009-10 with NRM agencies developing proposals to deliver against these. As Chair of WANRMMC, the Minister for Agriculture and Food wrote to members of the Council directing that investment must be strategic, move across portfolios and find new ways of delivering to regional communities. He also stated projects must be designed for substantial delivery by non-agency parties.

Funding beyond 2009–10 will be the subject of future Cabinet decisions in light of other budgetary considerations.

Considerations for future programs

With the advent of the Caring for our Country program and the one year State NRM program, the role of the six regional NRM groups is changing. The groups are still delivering a big component of the CfoC program on behalf of the Commonwealth. The major difference to previous programs is that their applications for funding must address priorities identified by the Commonwealth rather than setting regional priorities for funding themselves. The State NRM program for 2009–10 also distributes funds differently–projects must address government determined priorities. The State must clarify the role, if any it wishes the regional NRM groups to provide when it delivers future programs. These roles could include the following.

- Community engagement to:
  - determine their priorities for future planning purposes
  - integrate technical and local knowledge for informed decision-making
  - balance public intervention with private enterprise and initiatives
  - leverage investment including dollars, skills, knowledge and ability to do the physical work

  - build capacity for community's continued involvement
  - act like a community agency.
- Communications processes to:
  - coordinate a one-stop-shop for NRM services
  - facilitate and provide a communications network.
- Facilitate the process for considering cross jurisdictional and boundary issues and subsequent trade-offs.
- Facilitate the development of partnerships leading to ownership of challenges and solutions.
- Address contentious issues and suggest ways forward in areas where local involvement will assist, for example, deep drainage.
- Independently monitor, evaluate and report on projects delivered within their region.
- Facilitate a process that judges different assets and recommends priorities to government.
- Facilitate the retention and regaining of trust between community and government in NRM.
- Manage the delivery of projects rather than actually deliver them. For example, the Wheatbelt NRM Ecoscape program was managed by WNRM but delivered by three separate organisations.

From the various reviews undertaken during NAP and NHT it was identified that clear and consistent standards should be defined and used in the future. Much work has been done by the Natural Resources Commission NSW in identifying standards for quality natural resource management (available on http://www.nrc.nsw.gov.au). The aim of standards is to give confidence to the public government and others that investments in NRM are cost effective, protect the natural resources and maximise benefits.

Often activity has not taken place because the science does not fully provide confidence that the results anticipated will be achieved. All information should be considered relevant and credible in the decision-making processes, whether it is generated from scientists or practitioners. In determining a new program the State should also consider the do-nothing scenario. If there is a lack of confidence in the science, conflicting opinions or the source of that information is dubious, then it may be best to do nothing. If however an informed decision can be made using all current information available, then activities can be developed accordingly.

With NAP and NHT programs producing more capacity building benefits than measurable outcomes, the current practice of using mainly biophysical indicators to measure success should be revisited. If a concerted effort is to be placed in restricting future degradation to priority assets then a review on the indicators used to measure success should occur. Additionally timeframes for determining success should be reviewed in light of the long-term nature of the solutions.

In determining a way forward for natural resource management in Western Australia, the benefits received by community and government from funding a NRM program external to the State agencies' programs must be identified. Government typically invests over $350 million a year through its agencies that deliver components of natural resource management. Are there any advantages of funding NRM in other ways? Here are some useful observations to consider:

- Government agencies have legislative responsibilities that must be funded from their core funding allocations.
- Government agencies are involved in 'direct intervention' of threats to assets—they are trying to fix it.
- Government agencies tend to work in isolation in their prioritisation and decision-making processes.

- External NRM programs tend to be more focused on 'indirect intervention', as change management merchants where extension and demonstration are used to change behaviour via knowledge management.
- External NRM programs tend to be involved in a smaller amount of 'direct intervention' of the threats to the assets.
- External NRM programs use third party facilitation (regional NRM groups is an example) to ensure open prioritisation and decision-making processes occur.
- External NRM programs can determine the best mix of delivery mechanisms to achieve value for the investments.

One of the legacies of NAP and NHT programs was the development of six approved Regional NRM Strategies covering the whole State. These identified the priorities of the regional communities. To ensure that government identifies and acts upon those assets most valued by its community, these documents should be linked to the State assets document and provide justification for any strategic state-wide documents it produces. Priorities for all sectors of the NRM community (State Government and its agencies; Commonwealth Government; community) need to be considered. These priorities should include tangible on-ground and intrinsic outcomes.

Cabinet approved the 2009–10 State NRM Program on the condition that where appropriate it leveraged funds from the Commonwealth CfoC program. Few opportunities to do this presented themselves during the delivery of the State program. However, this condition should be considered when developing future programs. In addition, the State should consider during the development of any future program leveraging opportunities from the broad range of NRM stakeholders.

The lead Minister reminded other members of WANRMMC of the need to consider different approaches to achieve the best value for the investment. Options include a purely assets based approach (for example, Collie Salinity project), a threats based approach (for example, dieback management) or a combination of both. The outcome should be the delivery of a practical program that achieves government's vision for NRM in the State. The community's capacity and willingness to participate and what priority should be placed on them is critically important, whether seeking long-term solutions involving recovery enhancement and prevention or simply seeking to halt further degradation.

Many intrinsic outcomes have been achieved throughout the delivery of NAP and NHT with less tangible changes to the condition of the resources. This should in no way be conceived as having failed. Resource condition monitoring processes and benchmarking; community's continued enthusiasm in partnering government in delivering programs addressing its policy; Strategic NRM Plans for the whole State; the rediscovery of once thought extinct plant species; an integrated approach to solutions in natural resource management and the reduction to the salinity levels in the Wellington Dam are just a few examples of the successes and legacies of the program.

Without a continuation of a State NRM program much that was gained during the previous program will be lost; this would be a tragedy. What the State Government needs to do is to determine what principles should underpin a new program to build on the gains made and addresses the key findings from previous programs, to ensure that it develops a program specific to Western Australian community needs.

Case studies

This series of case studies highlights key outputs, achievements and future impacts of regional and state-wide projects funded under NAP and NHT. Greater detail on each of the case studies can be found at Appendix 4.

Case study 1: Soil acidity in the Avon River basin

SOIL ACIDITY AVON RIVER BASIN

PRIORITY ASSET AND THREATS

Agricultural land – Wheatbelt WA

Soil acidification of top and sub-soils

Loss of productivity and nutrient leaching into waterways

RESOURCES

$2.2m NAP ($1.1M WA)

$0.23m

$1m cash farmers, $0.25m in-kind farmers

PROJECT DESCRIPTION

A combination of incentives and extension were used to encourage practice change to increase the testing of subsurface soil pH and improve the management of soil acidity.

A regional database of soil pH to a depth of 30 cm was developed to provide baseline data for future monitoring

An education program to raise awareness and understanding of the causes, effects and management of soil acidity was delivered.

A management guide was produced. New lime demonstration sites were established and existing long-term sites were monitored.

OUTPUTS

248 farmers who manage 840 000 ha (12% of the Avon River basin) received 'farm specific' lime recommendations.

18 000 topsoil samples and 20 000 subsurface samples assessed for pH. 80% of topsoil samples were below pH 5.5 and 45% of subsurface samples below pH 4.8.

Improved maps of the current status and risk of soil acidity

Overall initial cost and surety of return on investment were identified as key barriers to the adoption of liming.

62 presentations to 1600 farmers, consultants, advisors and tertiary students.

63 publications and 700 copies of the information were distributed.

16 long-term demonstration sites were monitored and six new sites were established.

Soil acidity: a guide for WA farmers and consultants (DAFWA Bulletin 4784) was produced

BENEFITS AND OUTCOMES

Improved information and knowledge has led to:

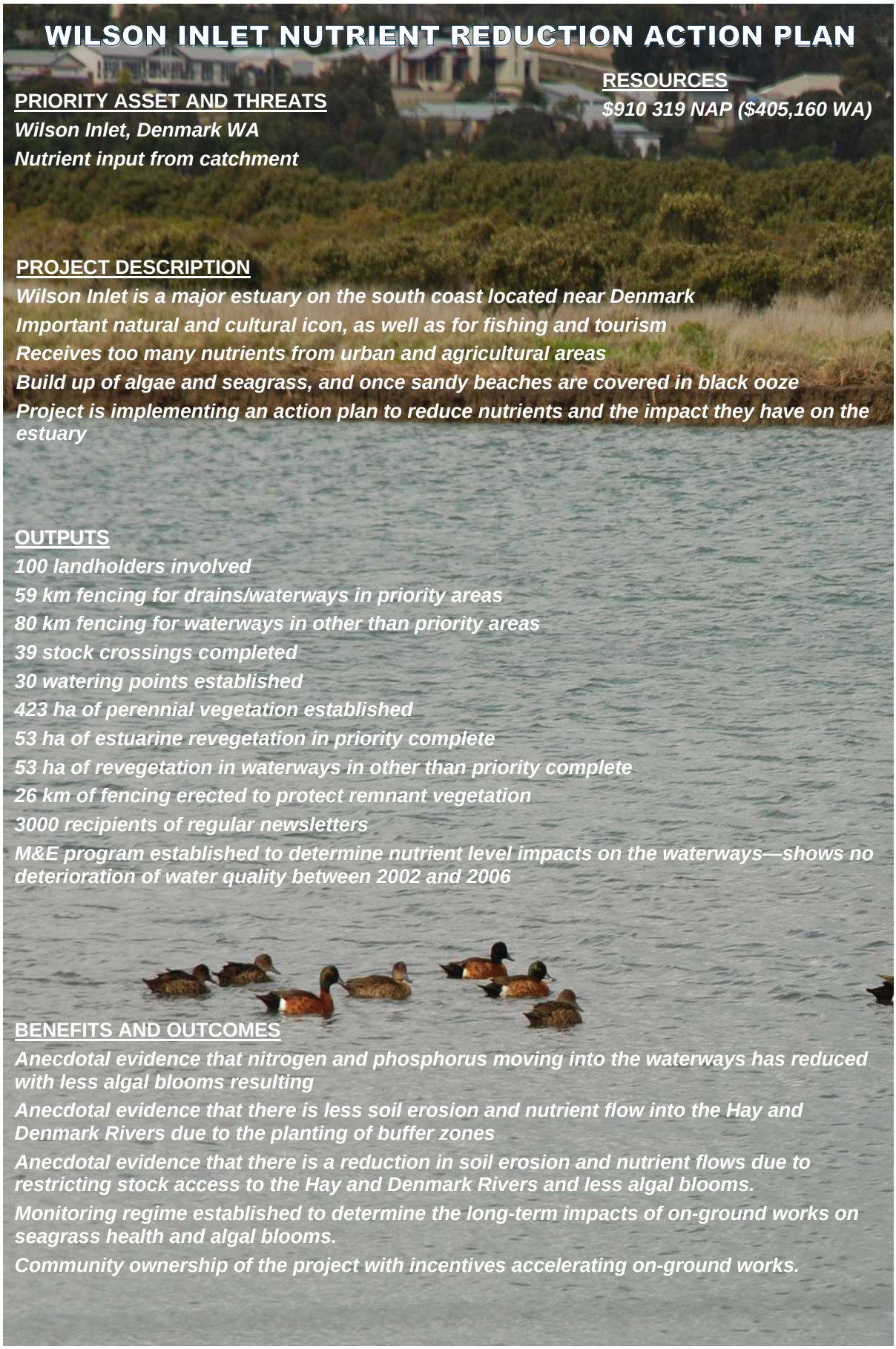
- *increased subsurface soil testing for pH*
- *more lime being applied*
- *better estimates of the impact of soil acidity ($300-400 million loss pa)*
- *better estimates of the amount of lime required to reach soil pH targets (12 million tonnes of lime over the next 10 years in the Avon River basin)*
- *confirmation that project methods can measure resource condition change and that it is improving slowly where lime has been applied*

Future projects are better placed to target barriers to adoption of liming, monitor resource condition change within the Avon River Basin and transfer methodology to other areas of the wheatbelt.

Before the incentives program 32 % of topsoil sample sites were also sampled at 10–20 cm and 2 % at 20-30 cm. Post incentives, 44 % of topsoil sample sites were also sampled at 10-20 cm and 25 per cent at 20-30 cm; proportions are in line with recommendations.

Pre-project lime use was 600 000 tonnes applied to WA wheatbelt (2004-05) and reached a record 1.1 million tonnes in 2008/09 (final year of project). An extra 983 000 tonnes of lime was applied (or almost an extra one million hectares of land limed) during the project.

Case study 2: Wilson Inlet nutrient reduction action plan



Case study 3: Resource condition monitoring-soil

RESOURCE CONDITION MONITORING-SOIL

PRIORITY ASSET AND THREATS

Soil Health in the wheatbelt

Degradation through wind and water erosion; soil acidification; soil carbon change

RESOURCES

$688 000 NAP ($344 000 WA) Department of Agriculture and Food provided the infrastructure, systems and skills, in addition to a full time manager and two research officers (80% and 40%)

PROJECT DESCRIPTION

Three global challenges surround soil and its degradation: food crisis; trends in land degradation; and soil health

Benchmarking values for key natural resources; the existence of and rate of degradation; and the condition at any given time are required. Currently these are unknown

Four degradation processes are being addressed: wind and water erosion; soil acidification and soil carbon change

OUTPUTS

Appraisal of nationally preferred water erosion model-unsuitable for WA

Field methods developed for monitoring wind erosion

Laboratory methods tested for soil acidification

Atmospheric dust sampler installed

Databases for wind erosion; soil acidification and soil carbon change established

10 permanent roadside wind erosion transects established along 2,000 km of roads

Field standard operating monitoring protocols developed

Laboratory analytical methodologies tested for soil acidification and soil carbon change

Soil monitoring networks designed for soil acidification and soil carbon

Quality information available at appropriate scale for effective soil resource management

Broadscale soil condition monitoring to:

- *Assess current condition of land-based natural resources*
- *Determine whether on-ground investments are producing natural resource condition changes at sufficient scale to make a difference*
- *Set and report on achievement of regional resource condition targets*
- *Contribute data to the State.*

BENEFITS AND OUTCOMES

Better understanding of the current status of soil health to allow changes to be monitored.

Enhanced ability to monitor soil health

Purchase and installation of DustTrak system (atmospheric sample) for on going monitoring of dust in the air.

No useful water erosion model available with the unsuitability of the nationally preferred system for WA conditions

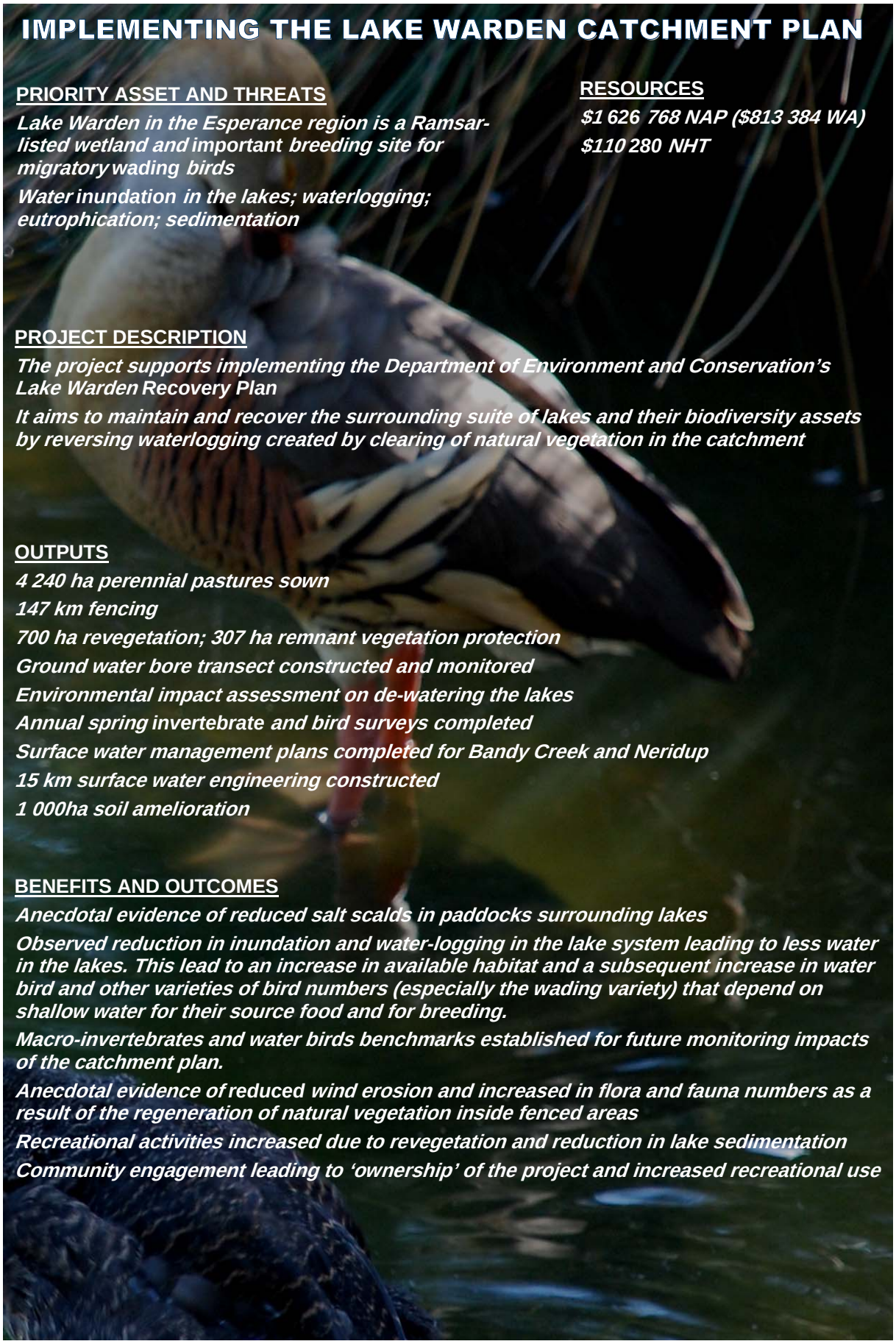
Baseline information on wind erosion hazard available for use in determining the impacts of future works.

Increased capacity of DAFWA staff to monitor soil condition

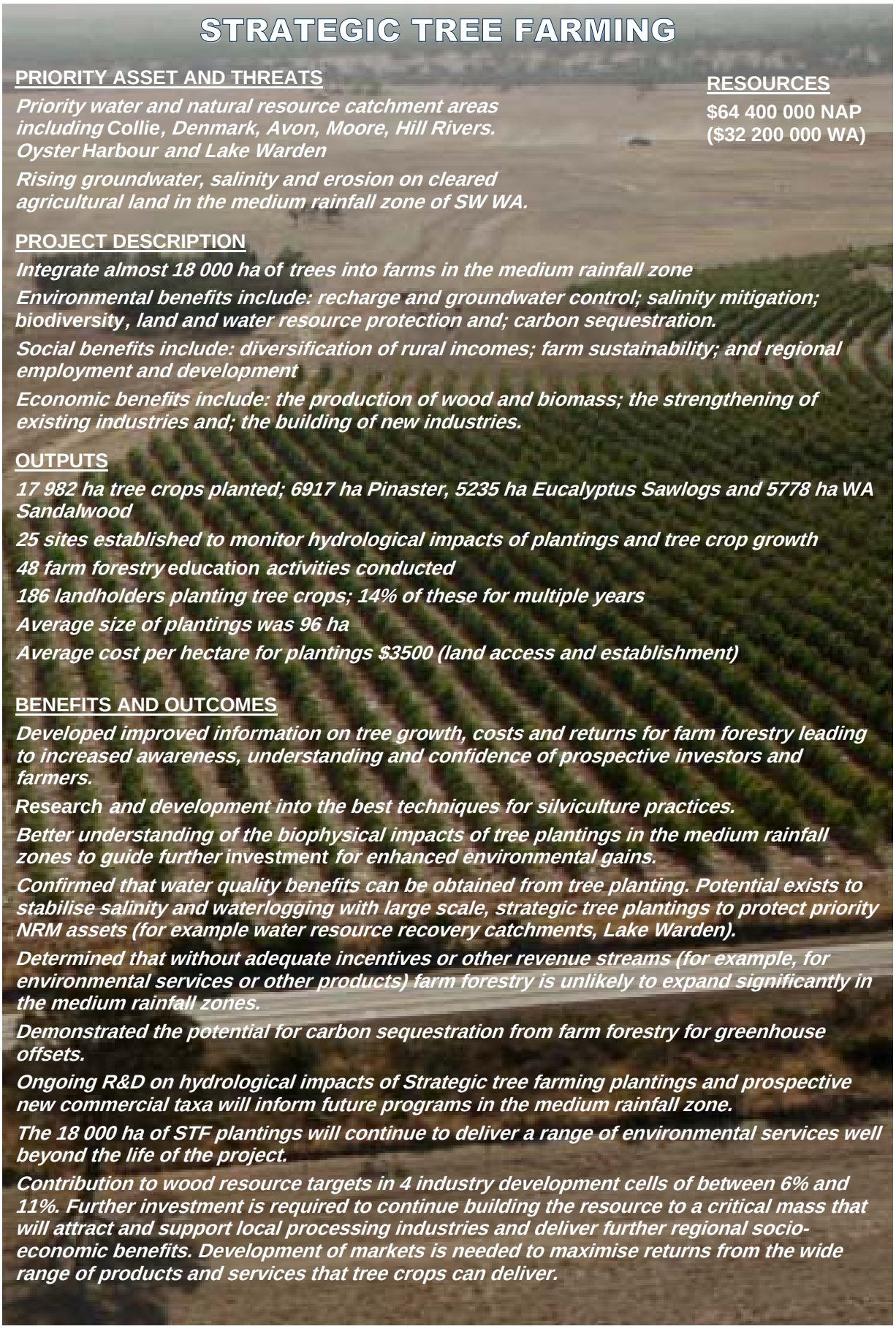
Case study 4: A commercial oil mallee industry

Case study 5: Collie River/Wellington Dam salinity recovery

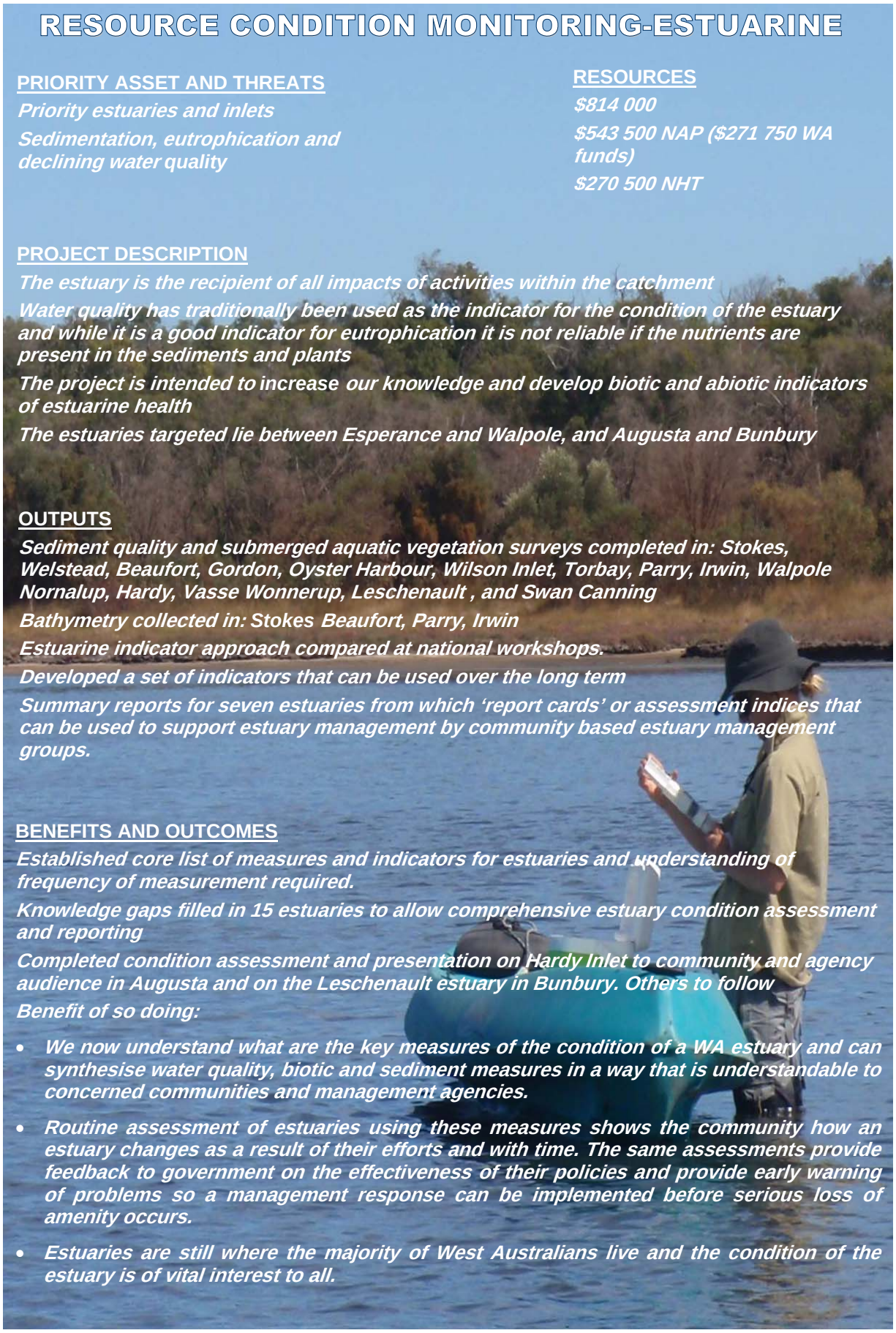
Case study 6: Implementing the Lake Warden catchment plan



Case study 7: Strategic tree farming



Case study 8: Resource condition monitoring-estuarine



RESOURCE CONDITION MONITORING-ESTUARINE

PRIORITY ASSET AND THREATS

Priority estuaries and inlets

Sedimentation, eutrophication and declining water quality

RESOURCES

$814 000

$543 500 NAP ($271 750 WA funds)

$270 500 NHT

PROJECT DESCRIPTION

The estuary is the recipient of all impacts of activities within the catchment

Water quality has traditionally been used as the indicator for the condition of the estuary and while it is a good indicator for eutrophication it is not reliable if the nutrients are present in the sediments and plants

The project is intended to increase our knowledge and develop biotic and abiotic indicators of estuarine health

The estuaries targeted lie between Esperance and Walpole, and Augusta and Bunbury

OUTPUTS

Sediment quality and submerged aquatic vegetation surveys completed in: Stokes, Welstead, Beaufort, Gordon, Oyster Harbour, Wilson Inlet, Torbay, Parry, Irwin, Walpole Nornalup, Hardy, Vasse Wonnerup, Leschenault , and Swan Canning

Bathymetry collected in: Stokes Beaufort, Parry, Irwin

Estuarine indicator approach compared at national workshops.

Developed a set of indicators that can be used over the long term

Summary reports for seven estuaries from which 'report cards' or assessment indices that can be used to support estuary management by community based estuary management groups.

BENEFITS AND OUTCOMES

Established core list of measures and indicators for estuaries and understanding of frequency of measurement required.

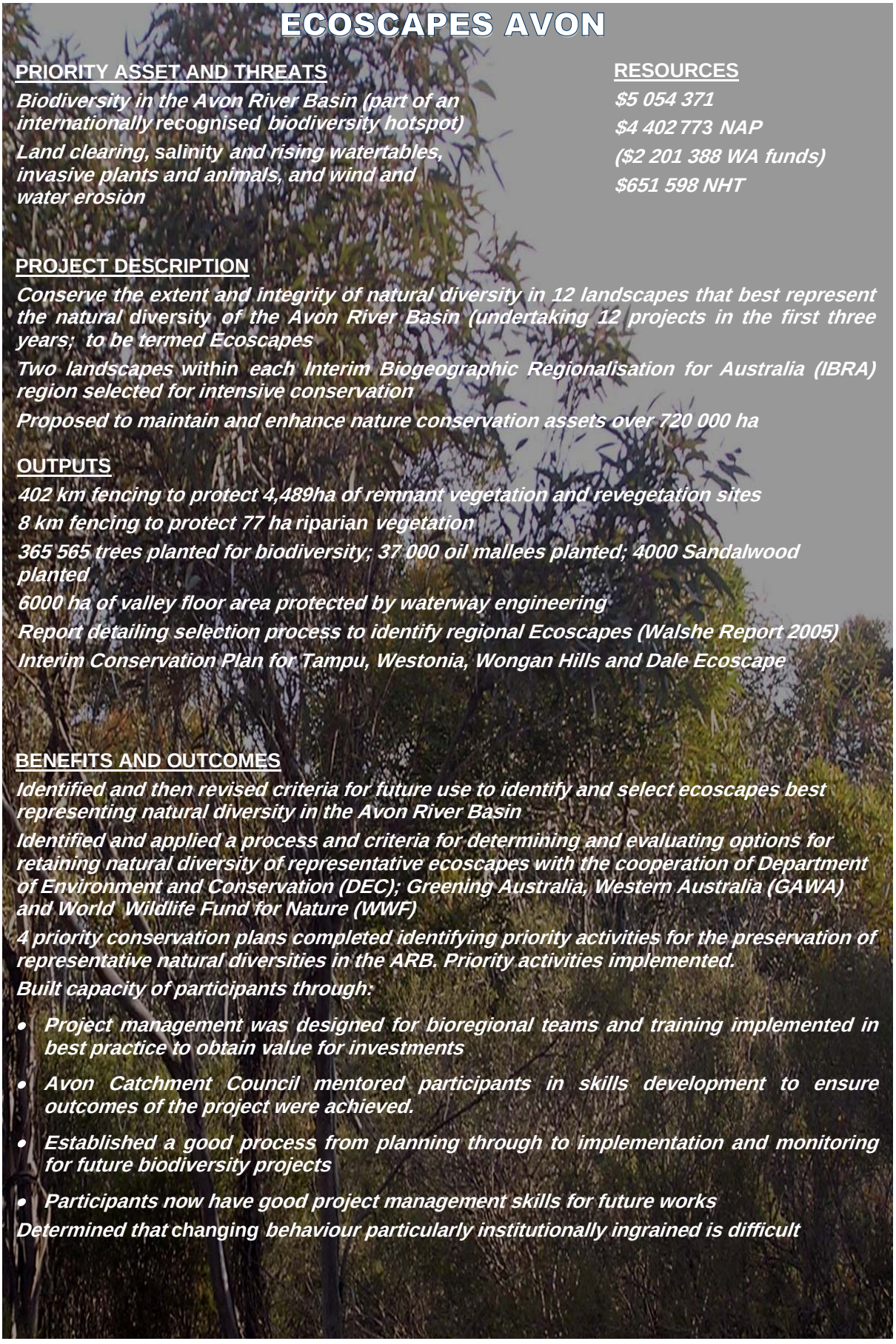
Knowledge gaps filled in 15 estuaries to allow comprehensive estuary condition assessment and reporting

Completed condition assessment and presentation on Hardy Inlet to community and agency audience in Augusta and on the Leschenault estuary in Bunbury. Others to follow

Benefit of so doing:

- *We now understand what are the key measures of the condition of a WA estuary and can synthesise water quality, biotic and sediment measures in a way that is understandable to concerned communities and management agencies.*
- *Routine assessment of estuaries using these measures shows the community how an estuary changes as a result of their efforts and with time. The same assessments provide feedback to government on the effectiveness of their policies and provide early warning of problems so a management response can be implemented before serious loss of amenity occurs.*
- *Estuaries are still where the majority of West Australians live and the condition of the estuary is of vital interest to all.*

Case study 9: Ecoscapes-Avon



ECOSCAPES AVON

PRIORITY ASSET AND THREATS

Biodiversity in the Avon River Basin (part of an internationally recognised biodiversity hotspot)

Land clearing, salinity and rising watertables, invasive plants and animals, and wind and water erosion

RESOURCES

$5 054 371

$4 402 773 NAP

($2 201 388 WA funds)

$651 598 NHT

PROJECT DESCRIPTION

Conserve the extent and integrity of natural diversity in 12 landscapes that best represent the natural diversity of the Avon River Basin (undertaking 12 projects in the first three years; to be termed Ecoscapes

Two landscapes within each Interim Biogeographic Regionalisation for Australia (IBRA) region selected for intensive conservation

Proposed to maintain and enhance nature conservation assets over 720 000 ha

OUTPUTS

402 km fencing to protect 4,489ha of remnant vegetation and revegetation sites

8 km fencing to protect 77 ha riparian vegetation

365 565 trees planted for biodiversity; 37 000 oil mallees planted; 4000 Sandalwood planted

6000 ha of valley floor area protected by waterway engineering

Report detailing selection process to identify regional Ecoscapes (Walshe Report 2005)

Interim Conservation Plan for Tampu, Westonia, Wongan Hills and Dale Ecoscape

BENEFITS AND OUTCOMES

Identified and then revised criteria for future use to identify and select ecoscapes best representing natural diversity in the Avon River Basin

Identified and applied a process and criteria for determining and evaluating options for retaining natural diversity of representative ecoscapes with the cooperation of Department of Environment and Conservation (DEC); Greening Australia, Western Australia (GAWA) and World Wildlife Fund for Nature (WWF)

4 priority conservation plans completed identifying priority activities for the preservation of representative natural diversities in the ARB. Priority activities implemented.

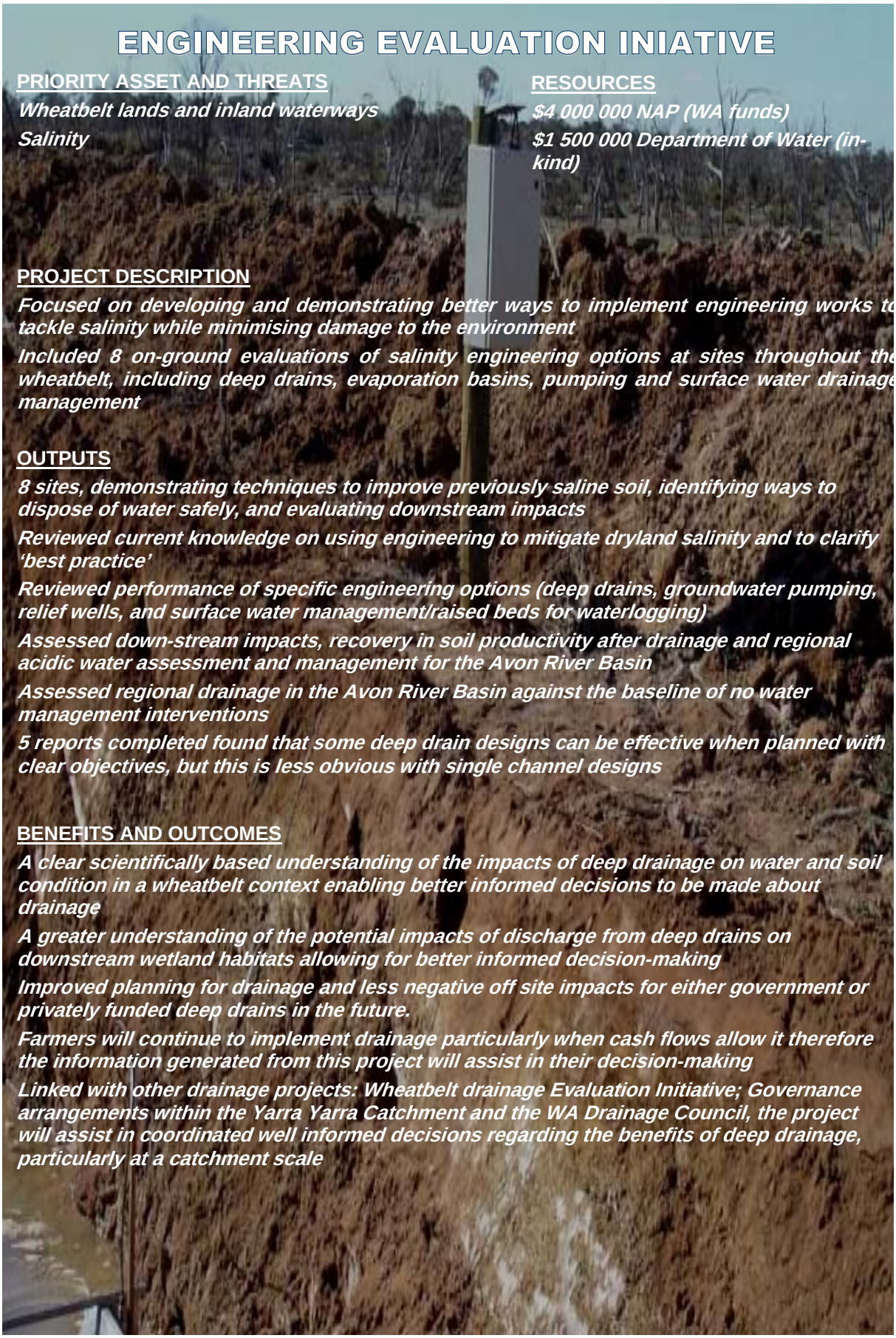
Built capacity of participants through:

- *Project management was designed for bioregional teams and training implemented in best practice to obtain value for investments*
- *Avon Catchment Council mentored participants in skills development to ensure outcomes of the project were achieved.*
- *Established a good process from planning through to implementation and monitoring for future biodiversity projects*
- *Participants now have good project management skills for future works*

Determined that changing behaviour particularly institutionally ingrained is difficult

Case study 10: EcoFire-Kimberley rangelands

Case study 11: Engineering Evaluation Initiative



ENGINEERING EVALUATION INIATIVE

PRIORITY ASSET AND THREATS

Wheatbelt lands and inland waterways

Salinity

RESOURCES

$4 000 000 NAP (WA funds)

$1 500 000 Department of Water (in-kind)

PROJECT DESCRIPTION

Focused on developing and demonstrating better ways to implement engineering works to tackle salinity while minimising damage to the environment

Included 8 on-ground evaluations of salinity engineering options at sites throughout the wheatbelt, including deep drains, evaporation basins, pumping and surface water drainage management

OUTPUTS

8 sites, demonstrating techniques to improve previously saline soil, identifying ways to dispose of water safely, and evaluating downstream impacts

Reviewed current knowledge on using engineering to mitigate dryland salinity and to clarify 'best practice'

Reviewed performance of specific engineering options (deep drains, groundwater pumping, relief wells, and surface water management/raised beds for waterlogging)

Assessed down-stream impacts, recovery in soil productivity after drainage and regional acidic water assessment and management for the Avon River Basin

Assessed regional drainage in the Avon River Basin against the baseline of no water management interventions

5 reports completed found that some deep drain designs can be effective when planned with clear objectives, but this is less obvious with single channel designs

BENEFITS AND OUTCOMES

A clear scientifically based understanding of the impacts of deep drainage on water and soil condition in a wheatbelt context enabling better informed decisions to be made about drainage

A greater understanding of the potential impacts of discharge from deep drains on downstream wetland habitats allowing for better informed decision-making

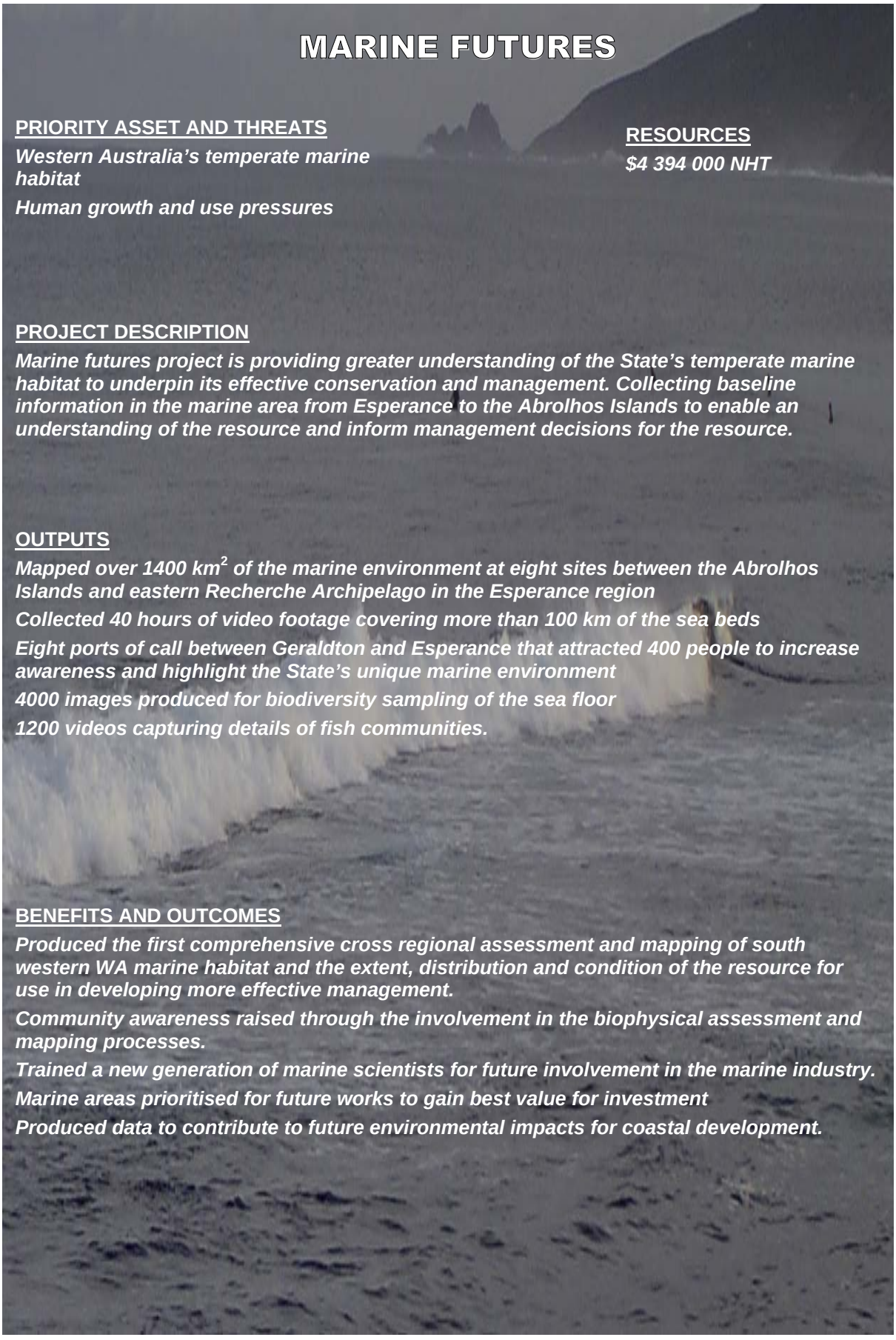
Improved planning for drainage and less negative off site impacts for either government or privately funded deep drains in the future.

Farmers will continue to implement drainage particularly when cash flows allow it therefore the information generated from this project will assist in their decision-making

Linked with other drainage projects: Wheatbelt drainage Evaluation Initiative; Governance arrangements within the Yarra Yarra Catchment and the WA Drainage Council, the project will assist in coordinated well informed decisions regarding the benefits of deep drainage, particularly at a catchment scale

Case study 12: NRM land use planning-enviroplanning

Case study 13: Marine futures



Appendix 1. Final reconciliation of NAP and NHT programs

Table 13 **Reconciliation of funds 2002-2009**

State NAP FUNDING	Total $	Actual revenue $	Returned funds $	Actual expenditure June 09 $	Returned funds reallocated $	Scheduled expenditure $
Regional landcare coordinators	1 200 000	1 200 000		1 200 000		
Catchment demonstration initiative	6 000 000	5 472 987	27 982	5 472 987		457 406
Engineering evaluation initiative	4 000 000	4 000 000		4 000 000		
CALM biodiversity adjustment projects	2 350 000	2 350 000		2 350 000		
Bush bank	1 000 000	1 000 000		1 000 000		
Salinity investment framework	366 000	366 000		366 000		
National market based instruments pilots program	443 738	409 721		409 721		
National projects	3430	3 430		3430		
National projects - 001	15 292	15 292		15 292		
Foundation funding	1 704 923	1 728 316	43 787	1 745 937	17 621	
Regional priority projects	1 579 688	1 591 990	146 070	1 709 580	117 590	
Regional investment - post accreditation (Alinta Gas)	11 284 312	10 658 570	526 463	11 063 508	486 230	
Regional investment - post accreditation	60 599 440	60 511 660	1 503 845	64 046 145	798 834	
Strategic reserve (Alinta Gas)	178 647	154 044		154 044		
Strategic reserve	12 186 530	6 476 168		6 589 397		394 132
Collie River salinity recovery catchment	15 000 000	15 000 000		15 000 000		15 000 000
Strategic tree farming	32 200 000	32 200 000		32 200 000		
Notional administration	1 500 000	1 500 000		1 500 000		
State NRM Office core administration	1 983 333	1 983 333		1 983 333		
Regional core administration	4 416 667	4 416 667		4 416 667		
Adjustment payment from Australian Government				-2 566 000		
Financial year totals	**158 012 000**	**151 038 178**	**2 248 148**	**152 660 041**	**1 420 275**	**15 851 538**

Table 13 **continued**

Commonwealth NAP FUNDING	Total $	Actual revenue $	Returned funds $	Actual expenditure June 09 $	Returned funds reallocated $	Scheduled expenditure $
Foundation funding	1 704 923	1 728 315	43 787	1 745 937	17 622	
Priority projects	1 579 686	1 591 987	146 070	1 709 579	117 592	
Regional investment - post accreditation	75 131 438	76 672 239	1 953 084	77 505 631	1 207 840	
Strategic reserve	20 688 535	12 814 778		11 527 436		1 054 135
National market based instruments pilots program	443 738	443 738		409 721		
National projects	13 680	13 680		13 680		
Collie River salinity recovery catchment	15 000 000	15 000 000		5 000 000		10 000 000
Strategic tree farming	32 200 000	32 200 000		32 200 000		
AG NRM team administration	7 900 000	7 900 000		7 900 000		
AG communications	1 000 000	1 000 000		1 000 000		
Reduction in matching funding	2 350 000	2 350 000		2 350 000		
NAP Interest		2 887 088		2 887 088		
Financial year totals	**158 012 000**	**154 601 825**	**2 142 942**	**144 249 072**	**1 343 054**	**11 054 135**

Commonwealth NHT funding	Total $	Actual revenue $	Returned funds $	Actual expenditure June 09 $	Returned funds reallocated $	Scheduled expenditure $
Foundation funding	8 039 686	8 086 480	227 581	8 261 720	175 240	
Facilitators and coordinators	14 394 589	14 670 464	1 343 174	15 737 763	1 067 299	
Priority projects - NHT	12 861 323	13 201 727	413 896	13 106 567	9698	
Regional investment - post accreditation	57 433 500	57 437 665	1 142 924	58 140 935	839 115	
Strategic reserve	14 355 999	13 370 290	1759	12 076 670		
Regional core administration	2 650 000	2 650 000		2 650 000		
Regional competitive component	7 460 124	8 060 124	14 233	7 008 477		
Regional facilitators	2 696 398	2 779 078	212 551	2 655 700		
Private forestry development committees	1 443 333	1 443 333		1 443 333		
Statewide component	1 370 472	1 378 660	8188	1 578 426		
NHT Interest		2 031 239		2 031 239		
Financial year totals	**122 705 424**	**12 ,109 060**	**3 364 308**	**124 690 830**	**2 091 352**	

Table 13 continued

Commonwealth NLP funding	Total $	Actual revenue $	Returned funds $	Actual expenditure June 09 $	Returned funds reallocated $	Scheduled expenditure $
Community grants	15 891 286	16 116 498	1 371 228	15 755 616		
Coordinators	1 747 500	1 747 500		1 642 992		
NLP interest	349 500	349 500	495	349 005		
Financial year totals	**17 988 286**	**18 213 498**	**1 371 723**	**17 747 613**		
NLP administration				**480 000**		

Appendix 2. Region-by-region breakdown of NAP and NHT funds

Table 14 **Wheatbelt Catchment Council (formerly Avon Catchment Council)**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Sustainable management of land resources	Salinity management	3 341 736		3 341 736	Oil Mallee Association of WA Inc (OMA) Saltland Pastures Association (SPA) URS Australia (URS) Department of Water (DoW) Sinclair, Knights, Mertz (SKM) GHD Australia (GHD) Forest Products Commission (FPC) Greening Australia WA (GAWA) AVONGRO Wheatbelt Tree Cropping (AVONGRO) WA Channel Management Group Inc
	Protection of community assets	411 708		411 708	GHD DAFWA
	Protection of transport assets	513 394		513 394	GHD
	Soil acidity – identification of contributing land management practices	790 576		790 576	DAFWA
	Sustainable industries – awareness of soil health, limiting factors and contributing management practices.	1 369 268		1 369 268	University of Western Australia (UWA)
	TOTAL NHT Sustainable management of land resources		**0**		
	TOTAL NAP Sustainable management of land resources	**6 426 682**			
	TOTAL Sustainable management of land resources			**6 426 682**	
Maintain and enhance the condition of water assets	Water management and self-sufficiency	982 482		982 482	GHD; local governments
	Healthy ecosystems	2 311 819	328 402	2 640 221	DoW; World Wildlife Fund For Nature Australia (WWF)
	Avon River waterway management	679 187		679 187	DoW
	TOTAL NHT Maintain/enhance the condition of water assets		**328 402**		
	TOTAL NAP Maintain/enhance the condition of water assets	**3 973 488**			
	TOTAL Maintain/enhance the condition of water assets			**4 301 890**	

Table 14 **Continued …**

NRM Outcome area/ strategy	Project	Funding source		Total	Delivery organisation
		NAP $	NHT $	$	
Recover and conserve biodiversity	Natural diversity – saving native species and communities at risk	1 449 544	1 652 402	3 101 946	Department of Environment and Conservation (DEC)
	Fire management for biodiversity outcomes		180 000	180 000	DEC
	Conserving regional ecoscapes	4 402 773	651 598	5 054 371	GAWA; DoW; DEC
	Our patch – local bushcare management	1 075 630	716 894	1 792 524	GAWA; local governments
	TOTAL NHT Recover and conserve biodiversity		**3 200 894**		
	TOTAL NAP Recover and conserve biodiversity	**6 927 947**			
	TOTAL Recover and conserve biodiversity			**10 128 841**	
Improve land-use planning processes to achieve NRM outcomes	Avon River waterway management	109 546		109 546	DoW
	TOTAL NHT Improve land-use planning processes to achieve NRM outcomes		**0**		
	TOTAL NAP Improve land-use planning processes to achieve NRM outcomes	**109 546**			
	TOTAL Improve land-use planning processes to achieve NRM outcomes			**109 546**	
Enhance skills, knowledge and engagement and M&E	Water management and self sufficiency	421 064		421 064	DAFWA; local Communities
	Salinity management	853 684		853 684	OMA SPA URS DoW SKM GHD FPC GAWA AVONGRO WA Channel Management Group Inc
	Healthy ecosystems	1 416 921	201 278	1 618 199	DoW; WWF
	Avon River waterway management	1 402 193		1 402 193	DoW
	Community engagement in NRM and program delivery coordination	2 024 600	534 360	2 558 960	Wheatbelt NRM Inc.

Table 14 **Continued …**

NRM Outcome area/ strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
	Natural diversity – inventory and information management.	1 192 320	1 108 543	2 300 863	DEC
	Natural diversity – saving native species and communities at risk	483 181	550 801	1 033 982	DEC
	Fire management for biodiversity outcomes		20 000	20 000	DEC
	Ballardong Noongar recording of traditional knowledge for natural resource management project		637 111	637 111	Kulbardi Productions (MurdochLink) Gundi Corporation, Mulong Pty Ltd
	Groundwater source identification assessment and monitoring	1 030 831		1 030 831	
Enhance skills, knowledge and engagement and M&E	Conserving regional ecoscapes	435 439	64 444	499 883	GAWA; DoW; DEC
	Our patch – local bushcare management	106 381	70 902	177 283	GAWA; local governments
	Protection of community assets	545 752		545 752	DAFWA; GHD
	Protection of transport assets	220 026		220 026	GHD
	Biosecurity – spatial distribution of priority environmental pests		41 250	41 250	GHD
	Soil acidity–identification of contributing land management practices	1 405 469		1 405 469	DAFW
	Sustainable industries – awareness of soil health limiting factors and contributing management practices	409 002		409 002	UWA
	TOTAL NHT Enhance skills, knowledge and engagement and M&E		**3 228 689**		
	TOTAL NAP Enhance skills, knowledge and engagement and M&E	**11 946 863**			
	TOTAL Enhance skills, knowledge and engagement and M&E			**15 175 552**	
Core administration and regional strategy development	Foundation funding for strategy development	856 198	856 199	1 712 397	
	Core administration funding			1 600 000	
	TOTAL NHT Core administration and planning		**856 199**		
	TOTAL NAP Core administration and planning	**856 198**			
	TOTAL Core administration and planning			**3 312 397**	
	TOTAL NHT – Whole program		**6 757 985**		
	TOTAL NAP– Whole program	**29 384 526**			
	TOTAL PROGRAM			**36 142 511**	**Does not include core administration or foundation funding**

Table 15 **Northern Agricultural Catchments Council (NACC)—NAP/NHT2 projects and investment 2002–2009**

NRM Outcome area/ strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Sustainable management of land resources	Targeted investment program (TIP)	4 652 358		4 652 358	NACC
	Farming to the climate	441 224		441 224	Department of Agriculture and Food (DAFWA)
	Healthy farms	464 224	4544	468 768	Mingenew Irwin Group (MIG)
	Integrating innovative farming systems and catchment management	1 131 545		1 131 545	West Midlands Natural Resource Group (WMNRG)
	Salinity rehabilitation and extension	828 027		828 027	DAFWA
	Whiteout	1 784 224		1 784 224	Department of Environment and Conservation (DEC)
	Re-vegetation of natural drainage lines and protection of remnant vegetation in the East Moore Catchment	762 668		762 668	Moore Catchment Council (MCC)
	Control of rising groundwater in the Koojan Gillingarra region	480 989		480 989	MCC
	Rural towns liquid assets	651 974		651 974	DAFWA
	An understanding of the environmental benefits and risks associated with the introduction of perennial pastures	714 283		714 283	DAFWA
	Determining optimum grazing rotations to maintain perennial pastures	540 563		540 563	DAFWA
	Developing incentives to revegetate by establishing a commercial successful oil mallee industry	1 199 224		1 199 224	Yarra Yarra Regional Catchment Management Council (YYRCMC)
	Brushwood industry development on saline land	1 231 224		1 231 224	MCC
	Acacia saligna for fibrewood in the northern agricultural region		121 200	121 200	Trees Midwest
	Drought proofing in the north eastern wheatbelt		250 000	250 000	Midwest Oil Mallee Association (MOMA)
	Soil stabilisation solutions for the Nangetty Valley	315 688		315 688	MIG
	Yarra Yarra catchment rehabilitation program	167 548		167 548	YYRCMC
	Yarra Yarra operations and coordination program for catchment rehabilitation	3 136 340		3 136 340	YYRCMC
	Drainage benchmarking	411 368		411 368	DAFWA
	TOTAL NHT Sustainable management of land resources		**375 744**		
	TOTAL NAP Sustainable management of land resources	**18 913 471**			
	TOTAL Sustainable management of land resources			**19 289 215**	

Table 15 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Improve land-use planning processes to achieve NRM outcomes	Local government engagement in NRM planning and management in the NAR	379 195		379 195	WA Landskills
	Feasibility study on Yarra Yarra to demonstrate catchment governance and planning concepts	268 400		268 400	YYRCMC
	TOTAL NHT Improve land-use planning processes to achieve NRM outcomes		**0**		
	TOTAL NAP NHT Improve land-use planning processes to achieve NRM outcomes	**647 595**			
	TOTAL NHT Improve land-use planning processes to achieve NRM outcomes			**647 595**	
Maintain and enhance the condition of water assets	Working with wetlands	192 824		192 824	NACC
	Waterways management	1 404 772		1 404 772	Department of Water (DoW)
	Conservation of the Gingin Brook	439 224		439 224	Gingin Land Conservation District Committee (GLCDC)
	Chapman River upper catchment integrated management	577 224		577 224	Shire of Chapman Valley
	Hydrogeological survey of groundwater quality in the NAR	449 735		449 735	DoW
	Classification and evaluation values and threat assessment of wetlands in the northern agricultural region		130 000	130 000	DEC
	Estuarine water and sediment quality investigations in the northern agricultural region		90 000	90 000	DEC
	Towards sustainable water resource management in the northern agricultural region		355 460	355 460	DoW
	Development of a river action plan for the Moore River – Mogumber to Regan's Ford	138 548		138 548	DoW
	Restoration, maintenance and enhancement of priority wetlands in the NAR	542 824		542 824	DEC
	Groundwater-use vision for the mid-west	173 548		173 548	DoW
	TOTAL NHT Maintain/enhance the condition of water assets		**575 460**		
	TOTAL NAP Maintain/enhance the condition of water assets	**3 918 699**			
	TOTAL Maintain/enhance the condition of water assets			**4 494 159**	

Table 15 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Protect and enhance the marine and coastal environment	Long-term monitoring of the effects of marine protected areas on reef fish assemblages at the Houtman Abrolhos Islands		393 732	393 732	University of WA (UWA)
	Implementation of the Abrolhos Islands waste management strategy		423 732	423 732	Western Rock Lobster Council (WRLC)
	Foraging ecology and ecotrophic role of Australia Sea Lions in marine ecosystems		263 602	263 602	Department of Fisheries (DoF)
	Coastal assessment and restoration	369 276	1 383 295	1 752 571	DEC
	The central west coast marine biodiversity and conservation program		345 000	345 000	DEC
	Creel census to determine recreational fishing catch and effort within the Abrolhos Islands area		158 000	158 000	DoF
	Characterisation of baseline sediment quality on the mid-west coast of WA		41 261	41 261	DEC
	TOTAL NHT Protect and enhance the marine and coastal environment		**3 166 622**		
	TOTAL NAP Protect and enhance the marine and coastal environment	**369 276**			
	TOTAL Protect and enhance the marine and coastal environment			**3 535 898**	
Recover and conserve biodiversity	Woodland watch	530 676	283 000	813 676	World Wildlife Fund for Nature Australia (WWF)
	Back from the brink	677 676	1 044 948	1 722 624	DEC
	Stop the rot	404 676	682 084	1 086 760	DEC
	Carnaby's Cockatoo extension		84 763	84 763	Birds Australia (BA)
	Hidden treasures	1 042 743	213 227	1 255 970	DEC
	The northern agricultural region flora information project (NARFIP)		131 300	131 300	DEC; NACC
	Community protection and management of biodiversity assets in the northern agricultural region		152 460	152 460	WWF
	Conservation and management of roadside vegetation across the region		138 000	138 000	WA Landskills Inc
	TOTAL NHT Recover and conserve biodiversity		**2 729 782**		
	TOTAL NAP Recover and conserve biodiversity	**2 655 771**			
	TOTAL Recover and Conserve Biodiversity			**5 385 553**	

Table 15 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total	Delivery organisation
		NAP $	NHT $	$	
Enhance skills, knowledge and engagement and M&E	A coordinated approach to the dissemination and collection of NRM data in the Yarra Yarra sub-region		83 000	83 000	YYRCMC
	Regional monitoring and evaluation–resource condition, actions outputs	1 297 440		1 297 440	NACC
	Mogumber community	372 743		372 743	South West Aboriginal Land and Sea Council (SWLSC)l
	Yued Booja environmental audit of cultural-spiritual sites and land use practices	532 743		532 743	SWLSC
	Engagement of Yamatji people in NRM	179 195	367 899	547 094	NACC
	Region-wide education extension and awareness activities	332 743	59 899	392 642	NACC
	Developing capacity building for rivercare	133 548		133 548	DoW
	Facilitating agreement on coastal management		118 000	118 000	WA Landskills Inc
	TOTAL NHT Enhance skills, knowledge and engagement and M&E		**628 798**		
	TOTAL NAP Enhance skills, knowledge and engagement and M&E	**2 848 412**			
	TOTAL Enhance skills, knowledge and engagement and M&E			**3 477 210**	
Core administration and planning	Foundation funding including regional strategy development	815 000	815 000	1 630 000	
	Core administration			$1 600 000	
	TOTAL NHT Core administration and planning		**815 000**		
	TOTAL NAPT Core administration and planning	**815 000**			
	TOTAL Core administration and planning			**3 230 000**	
	TOTAL NHT – Whole program		**7 476 406**		
	TOTAL NAP – Whole program	**29 353 224**			
	TOTAL WHOLE PROGRAM			**36 829 630**	**Does not include core administration or foundation funding**

Table 16 **Perth NRM (formerly Swan Catchment Council)—NAP/NHT2 projects and investment 2002–2009**

NRM Outcome area / strategy	Project	Funding Source		Total $	Delivery Organisation
		NAP $	NHT $		
Sustainable management of land resources	Small and Medium Enterprises (SME) tracking, auditing and benchmarking		110 000	110 000	Perth Region NRM Inc (PRNRM)
	SME air emission study		50 000	50 000	Department of Conservation and Environment (DEC)
	Multi-user decision support tool		130 000	130 000	Ellen Brockman ICM
	Linking best management practices with property planning in intensive agriculture		120 000	120 000	Vegetables WA (VWA)
	Program implementation framework		736 000	736 000	PRNRM
	Linking best management practices with grape growers and orchardists		104 257	104 257	Ian Kininmonth Environmental Knowledge Systems Australia
	Linking best management practice with vegetable growers		271 975	271 975	VWA
	Wooroloo salinity management		104 257	104 257	Eastern Metropolitan Regional Council (EMRC)
	Small to medium enterprises air emission study		40 518	40 518	DEC
	Waterwise on farm		33 996	33 996	PRNRM
	TOTAL NHT Sustainable management of land resources		**1 701 003**		
	TOTAL Sustainable management of land resources			**1 701 003**	
Protect and enhance the marine and coastal environment	Coastal condition evaluation		100 000	100 000	Greening Australia WA (GAWA)
	Marine fauna mapping		290 000	290 000	Department of Fisheries (DoF)
	Program implementation framework		568 000	568 000	PRNRM
	Beach health		234 442	234 442	Department of Water (DoW)
	Coastal seed		24 931	24 931	APACE Nursery
	Coastcare (north metro)		166 357	166 357	Town of Cottesloe
	Coastcare (south metro)		166 358	166 358	Town of Kwinana
	Local government coastcare incentives		181 317	181 317	PRNRM
	Coastal evaluation		100 000	100 000	GAWA
	Marine indicators		486 128	486 128	Murdoch University; DoF; DEC
	TOTAL NHT Protect and enhance the marine and coastal environment		**2 317 533**		
	TOTAL Protect and enhance the marine and coastal environment			**2 317 533**	

Table 16**Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Recover and conserve biodiversity	Perth biodiversity		1 788 846	1 788 846	Western Australian Local Government Association (WALGA)
	Threatened ecological communities of the Swan coastal plain		910 686	910 686	DEC
	Predictive mapping tool for threatened species and communities		161 000	161 000	DEC
	Western Swamp Tortoise recovery plan		119 000	119 000	DEC
	Recovery of threatened flora of the Swan region		200 000	200 000	DEC
	Recovery of threatened terrestrial fauna of the Swan region		93 000	93 000	DEC
	Program implementation framework		587 000	587 000	PRNRM
	Stop dieback – the biological bulldozer		240 242	240 242	PRNRM
	Ecological linkages		212 820	212 820	University of Western Australia (UWA)
	Invasive species		240 018	240 018	DEC
	Private landholder incentives		212 820	212 820	World Wildlife Fund For Nature Australia (WWF)
	TOTAL NHT Recover and conserve biodiversity		**4 765 432**		
	TOTAL Recover and conserve biodiversity			**4 765 432**	
Enhance skills, knowledge and engagement and M&E	Biodiversity action learning		523 864	523 864	GAWA
	Skills for nature conservation		329 912	329 912	GAWA
	Behavioural change for natural diversity		229 702	229 702	WALGA
	Dieback working group		106 000	106 000	PRNRM
	Water education, training and technical support		364 000	364 000	DoW
	Coastal and marine indigenous		33 996	33 996	GAWA
	Wetlands indigenous		208 288	208 288	PRNRM
	TOTAL NHT Enhance skills, knowledge and engagement and M&E		**1 795 762**		
	TOTAL Enhance skills, knowledge and engagement and M&E			**1 795 762**	

Table 16 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total	Delivery organisation
		NAP	NHT		
Maintain and enhance the condition of water assets	Water quality partnership (SERCUL)		212 820	212 820	South East Region Council for Urban Landcare (SERCUL)
	Water quality partnerships (north metro)		212 820	212 820	North Metropolitan Conservation Group (NMCG)
	Water quality monitoring and evaluation framework		1 379 163	1 379 163	DoW
	Swan – Canning tributary foreshore assessment		211 234	211 234	DoW
	Swan – Canning foreshore assessment		220 910	220 910	Swan River Trust (SRT)
	Superficial aquifer health		260 658	260 658	GHD Australia (GHD)
	Sustainable landscaping strategy		212 820	212 820	NMCG; PRNRM
	Avon Upper Swan salinity and nutrient management		641 407	641 407	Ellen Brockman ICM
	Ribbons of Blue/Water-watch		45 329	45 329	DEC
	Swan Alcoa landcare		45 329	45 329	PRNRM
	Wetland Watch		618 320	618 320	WWF
	Canning environmental flows		247 541	247 541	DoW
	Program implementation framework		1 122 000	1 122 000	PRNRM
	TOTAL NHT Maintain and enhance the condition of water assets		**5 430 351**		
	TOTAL Maintain and enhance the condition of water assets			**5 430 351**	
Core administration and planning	Foundation funding for regional strategy development		1 854 846	1 854 846	
	Core administration			1 600 000	
	TOTAL NHT Core administration and planning		**1 854 846**		
	TOTAL Core administration and planning			**3 454 846**	
	TOTAL NHT – Whole program		**16 010 081**		
	TOTAL NAP– Whole program		**0**		
	TOTAL PROGRAM			**16 010 081**	**Does not include core administration or foundation funding**

Table 17 **Rangelands NRM WA—NAP/NHT2 projects and investment 2002–2009**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
	Property and paddock scale management in the east Kimberley	911 140		911 140	Department of Agriculture and Food (DAFWA)
	Delivery of best management practices to Ord catchment land managers	748 000		748 000	DAFWA; Ord Land and Water (OLW)
	Innovations in flood furrow irrigation systems in the Ord River irrigation area	348 268		348 268	Ord Irrigation Council (OIC)
	Demonstrating sustainable farm management practices in the Ord	285 000		285 000	DAFWA
	Mapping aquifer systems in the Ord River Irrigation Area (ORIA) Stage 1 and 2	1 740 000		1 740 000	OIC
	Weaber Plains catchment erosion remediation demonstration activity	150 000		150 000	Shire of Wyndham East Kimberley (SWEK)
	Weeds and waterways in the Ord catchment	110 000		110 000	Yawoorroong Aboriginal Corporation (MG Corp)
	Improving monitoring of biocides in the ORIA	50 000		50 000	OIC
Sustainable management of land resources	Developing and implementing best-practice management for fire tolerant Mesquite in Australia – Kimberley/Pilbara		545 707	545 707	Pilbara Murchison Management Committee (PMMC)
	Ecologically sustainable rangelands management (ESRM) – Gascoyne		1 200 000	1 200 000	DAFWA
	Fire management in the Kimberley (EcoFire Stage 1, 2 & 3)		822 625	822 625	Australian Wildlife Conservancy (AWC)
	Management of Mesquite – Kimberley/Pilbara/Gascoyne – Murchison		539 130	539 130	PMMC
	Prickly acacia control in the Durack River area		170 000	170 000	DAFWA
	Management of invasive plant species – Parkinsonia on the DeGrey and Shaw Rivers		294 800	294 800	DeGrey Land Conservation District Committee (DeGrey LCDC)
	Management of vertebrate pests in the southern rangelands – wild dogs DNA		100 000	100 000	DAFWA
	Vertebrate pest management in the desert – camels		200 000	200 000	DAFWA
	Environs Kimberley community weed		105 500	105 500	Environs Kimberley
	TOTAL NHT Sustainable management of land resources		**3 977 762**		
	TOTAL NAP Sustainable management of land resources	**4 342 408**			
	TOTAL Sustainable management of land resources			**8 320 170**	

Table 17 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Maintain and enhance the condition of water assets	Demonstrating sustainable farm management systems in the Ord	197 000		197 000	DAFWA
	Sediment survey of Lake Argyle	190 000		190 000	Department of Water (DoW)
	ORIA groundwater drainage and discharge evaluation	647 400		647 400	Commonwealth Scientific and Industrial Research Organisation (CSIRO); DoW; OIC
	Key management actions for Lake Kununurra	643 000		643 000	OLW; SWEK
	Biomass growth survey of irrigation network in the Ord	89 000		89 000	OIC
	Water quality monitoring trial in the Ord irrigation area	178 000		178 000	OIC
	The response of the lower Ord River and estuary to catchment flows and loads	668 001		668 001	CSIRO; DoW
	Weeds and waterways in the Ord catchment	30 250		30 250	Warringarri Catchment Group
	Extension of sediment survey of Lake Argyle	40 000		40 000	DoW
	Best management practices for soluble pesticide use in the ORIA	102 000		102 000	OLW
	Lower Ord River ecological monitoring – baseline habitat mapping	61 612		61 612	DoW
	Long term sediment and salinity monitoring of the ORIA	75 179		75 179	OIC
	Improving water quality in the Ord catchment by the provision of improved management tools	231 100		231 100	DAFWA
	New methods to reduce water transport of invasive weeds to the Ord River system	100 000		100 000	OIC
	Monitoring water use efficiency on the Packsaddle component of the ORIA	86 000		86 000	OIC
	Establishing priorities for wetland conservation and management, Kimberley region		81 000	81 000	World Wide Fund For Nature Australia (WWF)
	Pesticide risk assessment in aquatic organisms		193 050	193 050	DoW
	Managing the cumulative impacts of development		126 000	126 000	DoW
	Catchment management and action in the Fitzroy River catchment		499 500	499 500	UWA
	Catchment management and action in the Fortescue catchment		346 000	346 000	DoW
	Catchment management and action in the Roderick / Wooramel catchment		456 000	456 000	DoW
	Carnarvon Artesian Basin rehabilitation		770 000	770 000	DoW

Table 17 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Maintain and enhance the condition of water assets	Scoping study for a fish-way on the Camballin Barrage		130 000	130 000	Environs Kimberley
	Gascoyne catchment rehabilitation		650 000	650 000	DAFWA
	TOTAL NHT Maintain and enhance the condition of water assets		**3 251 550**		
	TOTAL NAP Maintain and enhance the condition of water assets	**3 338 542**			
	TOTAL Maintain and enhance the condition of water assets			**6 590 092**	
Protect and enhance the marine and coastal environment	Sustainable management of tourism and recreation on the rangelands coastal and marine environment (on-ground works)		323 500	323 500	Shire of Ashburton; Carnarvon Heritage Group; Environs Kimberley; Town of Port Hedland; PMMC; Rangelands NRM (RNRM)
	Addressing human use threats to coastal and marine values		410 000	410 000	University of Western Australia (UWA)
	Addressing human use threats to cultural natural resource values (saltwater 2)		120 000	120 000	Department of Indigenous Affairs (DIA); Kimberley Land Council (KLC)
	Coastal and marine co-ordination and education		127 000	127 000	Dept of Fisheries (DoF)
	Research angler – Gascoyne		270 375	270 375	DoF
	TOTAL NHT Protect and enhance the marine and coastal environment		**1 250 875**		
	TOTAL NAP Protect and enhance the marine and coastal environment	**0**			
	TOTAL Protect and enhance the marine and coastal environment			**1 250 875**	
Recover and conserve biodiversity	Riparian condition assessment in the Ord catchment	50 000		50 000	DEC
	Measuring impact through benchmarking biodiversity	200 000		200 000	DEC
	Implementing targeted biological investigations of under surveyed areas of the rangelands		138 000	138 000	DEC
	Community turtle conservation through cross-regional collaboration		498 000	498 000	DEC
	Biodiversity southern rangelands		725 000	725 000	DEC
	Biodiversity northern rangelands		777 400	777 400	DEC
	Indigenous engagement and biodiversity program development in the Western Deserts of WA rangelands		64 000	64 000	Western Desert Lands Aboriginal Corporation (WDLAC)
	TOTAL NHT Recover and conserve biodiversity		**2 202 400**		
	TOTAL NAP Recover and conserve biodiversity	**250 000**			
	TOTAL Recover and conserve biodiversity			**2 452 400**	

Table 17 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Enhance skills, knowledge and engagement and M&E	Coordination and management	278 600		278 600	OIC
	Aboriginal NRM values assessment of Lake Argyle	40 000		40 000	DoW
	Legacy project	50 000		50 000	RNRM
	Regional NRM facilitator funding for 2003–08		714 198	714 198	RNRM
	Building partnerships to improve rangeland management and pastoral management and pastoral profitability in semi-arid Australia		1 540 000	1 540 000	Curtin University; Rural Business Solutions Pty Ltd; Rural Solutions SA
	Community coastal works in WA rangelands		15 000	15 000	KLC
	Communications and marketing services		52 000	52 000	The Hub Marketing
	Aboriginal engagement across the rangelands (indigenous facilitators)		500 000	500 000	RNRM
	Monitoring and evaluation program		107 500	107 500	Hydrosmart
	Our country – our future (adopt a school)		16 364	16 364	Geraldton Regional Education Centre
	Pilbara plan – collaborative plan of government, industry and community		150 000	150 000	DEC
	TOTAL NHT Enhance skills, knowledge and engagement and M&E		**3 095 062**		
	TOTAL NAP Enhance skills, knowledge and engagement and M&E	**368 600**			
	TOTAL Enhance skills, knowledge and engagement and M&E			**3 463 662**	
Core administration and planning	Foundation funding including regional strategy development		2 915 000	2 915 000	
	Core administration			1 600 000	
	TOTAL NHT Core administration and planning		**2 915 000**		
	TOTAL NAP Core administration and planning				
	TOTAL Core administration and planning			**4 515 000**	
	TOTAL NHT – Whole program		**13 777 649**		
	TOTAL NAP– Whole program	**8 299 550**			
	TOTAL - WHOLE PROGRAM			**22 077 199**	**Does not include core administration or foundation funding**

Table 18 **South Coast NRM (formerly South Coast Regional Initiative Planning Team SCRIPT)—NAP/NHT2 projects and investment 2002–2009**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Sustainable management of land resources	Tree cropping and native plant industries	0	1 800 128	1 800 128	Green Skills Inc South East Forest Foundation Inc (SEFF) Forest Products Commission (FPC) Greening Australia WA (GAWA) Centre of Excellence in Natural Resource Management (CENRM) Department of Agriculture and Food WA (DAFWA) Timber 2020 Inc
	Profitable perennials	2 616 886	100 000	2 716 886	DAFWA, Department of Environment and Conservation (DEC) GAWA Wilson Inlet Catchment Committee Inc (WICC) South Coast Natural Resource Management (SCNRM) Gillamii Centre Inc Future Farm Industries CRC (FFI CRC)
	Sustainability indicators and accreditation for sustainable production	171 638	0	171 638	Advanced Choice Economics Pty Ltd
	Soil health initiative: Healthy Hectares	1 490 869	0	1 490 869	DAFWA Esperance Land Conservation District Committee (ELCDC) SCNRM
	Coordinating control of invasive species	54 542	428 200	482 742	DAFWA Oyster Harbour Catchment Group Inc (OYCG) Shire of Plantagenet Shire of Esperance University of Western Australia (UWA)
	Implementing land management risk containment strategies	3 799 795	0	3 799 795	DAFWA OHCG WICC ELCDC Mitchell AgCo Pty Ltd
	Integrated engineering solutions for water management	822 540	0	822 540	DAFWA The Western Australian Agricultural Authority North Stirling Pallinup Natural Resources Inc (NSPNR)

Table 18 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Sustainable management of land resources	Managing invasive species (note: some coastal works included)	644 179	1 503 083	2 147 262	DAFWA, Department of Fisheries (DoF), DEC Ficifolia Consulting Viv Read and Associates Glevan Consulting Denmark Weed Action Group Inc Albany Bushcarers Group Shire of Esperance Esperance Weeds Action Group (Inc) SCNRM
	Program management	76 189	0	76 189	SCNRM
	TOTAL NHT Sustainable management of land resources		**3 831 411**		
	TOTAL NAP Sustainable management of land resources	**9 676 638**			
	TOTAL Sustainable management of land resources			**13 508 049**	
Maintain and enhance the condition of water assets	Implementing water resource management and protection plans	3 547 557	147 363	3 694 920	Fitzgerald Biosphere Group Inc (FBG) WICC Department of Water (DoW) Albany Plantation Forest Company of Australia Pty Ltd Green Skills Inc SCNRM R & RD Burton
	Bandy Creek surface water management planning to protect Lake Warden system	150 000	0	150 000	ELCDC SCNRM
	Water source and allocation planning	598 257	0	598 257	DoW
	Program management	219 669	0	219 669	SCNRM
	TOTAL NHT Maintain and enhance the condition of water assets		**147 363**		
	TOTAL NAP Maintain and enhance the condition of water assets	**4 515 483**			
	TOTAL Maintain and enhance the condition of water assets			**4 662 846**	

Table 18 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Improve land-use planning processes to achieve NRM outcomes	Catchment land-use planning and best management practices	1 097 488	0	1 097 488	DAFWA FFI CRC FBG OHCG ELCDC University of Western Australia (UWA) WICC The Oil Mallee Association of WA Inc (OMA) Green Skills Inc City of Albany Shire of Denmark
	TOTAL NHT Improve land-use planning processes to achieve NRM outcomes		**0**		
	TOTAL NAP Improve land-use planning processes to achieve NRM outcomes	**1 097 488**			
	TOTAL Improve land-use planning processes to achieve NRM outcomes			**1 097 488**	
Protect and enhance the marine and coastal environment	Managing impacts on our coastal and marine environment	306 530	374 648	$681 178	SCNRM. DEC SCNRM
	Community coastal works in WA – south coast	0	30 000	30 000	SCNRM
	Fisheries management: fisheries ecosystems and stewardship	154 501	476 294	630 795	DoF Centre for Fish and Fisheries Research (Murdoch University) Ocean Watch Australia Ltd
	Program management	58 841	75 632	134 473	SCNRM
	TOTAL NHT Protect and enhance the marine and coastal environment		**956 574**		
	TOTAL NAP Protect and enhance the marine and coastal environment	**519 872**			
	TOTAL Protect and enhance the marine and coastal environment			**1 476 446**	

Table 18 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Recover and conserve biodiversity	Implementing biodiversity catchment, management and recovery plans and strategies	1 476 420	1 274 832	2 751 252	DEC Birds Australia FBG
	Protection, restoration and revegetation	4 646 006	0	4 646 006	GAWA CENRM Marlak Pty Ltd FBG ELCDC Ravensthorpe Agricultural Initiative Network Inc (RAIN) DEC; DAFWA SCNRM
	Statewide seed conservation strategy for threatened species, threatened communities and biodiversity hotspots	0	259 500	259 500	DEC SCNRM
	Securing a future for the Dibbler – implementation of the Dibbler recovery plan	0	333 375	333 375	DEC SCNRM
	Arresting Phytophthora dieback in Western Australia	0	1 390 000	1 390 000	SCNRM Joanna Young Dieback Treatment Services State Steady Consulting Gary Muir – WOW Wilderness Ecoprojects DEC Perth Region NRM (PRNRM) Green Skills Inc; Ecosystem Solutions Pty Ltd Cranmill Environmental Services Ecoedge Environmental Pty Ltd Woodman Environmental
	TOTAL NHT Recover and conserve biodiversity		**3 503 707**		
	TOTAL NAP Recover and conserve biodiversity	**6 122 426**			
	TOTAL Recover and conserve biodiversity			**9 626 133**	
Enhance skills, knowledge and engagement and M&E	Water resource information collection	633 161	65 692	698 853	DoW
	Land hydrological assessment	256 300	0	256 300	DAFWA
	Land systems, soil and salinity mapping	889 422	0	889 422	DAFWA

Table 18**Continued ...**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
	Biodiversity mapping, management systems and databasing	960 996	0	960 996	DEC PRNRM
	Coastal and marine systems: documenting marine systems and communities	0	373 867	373 867	DEC SCNRM GidgeVision
	Identifying cultural values in NRM	153 307	556 448	709 755	UWA GAWA DAFWA Gnowangerup Aboriginal Corporation (GAC) Albany Aboriginal Corporation National Trust of Western Australia DEC
	Water: estuary, river, wetland and groundwater monitoring	1 024 826	69 870	1 094 696	DoW
	Benchmarking, monitoring and evaluating marine resource condition	0	20 072	20 072	SCNRM
	Biodiversity monitoring	0	21 000	21 000	DEC WWF
Enhance skills, knowledge and engagement and M&E	Land condition and water quality monitoring	1 492 543	0	1 492 543	DAFWA Commonwealth Scientific and Research Organisation (CSIRO) FFI CRC
	Regional monitoring and benchmarking for invasive species management	0	121 316	121 316	DEC DAFWA
	Water resources regional and subregional planning	290 000	0	290 000	DoW
	Risk assessment and contingency planning for climate change and seasonal variability	358 511	244 999	603 510	DAFWA DEC Coffey Environments
	Building complementary frameworks for NRM	261 363	0	261 363	DAFWA
	NRM decision support for managing change and sharing information and ideas	1 050 282	0	1 050 282	DAFWA GAWA FPC
	Building cultural understanding in NRM	537 668	$548 874	$1 086 542	GAC Great Southern TAFE Department of Indigenous Affairs (DIA) DEC, DAFWA Bay of Isles Aboriginal Corporation

Table 18 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Enhance skills, knowledge and engagement and M&E	Coordination and support, monitoring and evaluating, reporting and reviewing	2 933 948	612 465	3 546 413	Synovate Pty Ltd Viv Read and Associates Curtin University of Technology; Alcoa Research Centre for Stronger Communities TressCox Lawyers DLA Phillips Fox Green Skills Inc SCNRM
	Esperance Indigenous NRM capacity building	0	65 000	65 000	SCNRM
	Restoring connections between people and land in South Western Australia	0	1 292 506	1 292 506	SCNRM
	Program management	526 399	582 468	1 108 867	SCNRM
	TOTAL NHT Enhance skills, knowledge and engagement and M&E		**4 574 577**		
	TOTAL NAP Enhance skills, knowledge and engagement and M&E	**11 368 726**			
	TOTAL Enhance skills, knowledge and engagement and M&E			**15 943 303**	
Core administration and planning	Foundation funding including regional strategy development	690 080	669 081	1 338 161	
	Core administration			1 600 000	
	TOTAL NHT Core administration and planning		**669 081**		
	TOTAL NAP Core administration and planning	**690 080**			
	TOTAL Core administration and planning			**2 938 161**	
	TOTAL NHT – Whole program		**13 013 632**		
	TOTAL NAP– Whole program	**33 300 633**			
	TOTAL PROGRAM			**46 314 265**	**Does not include core administration or fFoundation funding**

Table 19 **South West Catchments Council—NAP/NHT2 projects and investment 2002–2009**

NRM Outcome area / strategy	Project	Funding source		Total	Delivery organisation
		NAP	NHT		
Sustainable management of land resources	Water management in agricultural landscapes	362 409	29 034	391 443	Department of Agriculture and Food WA DAFWA)
	Integrating perennials for improved agricultural sustainability	655 933	52 550	708 483	South West Catchments Council (SWCC)
	Healthy soils and improved nutrient management	756 619	60 616	817 235	DAFWA
	Better land management	920 504	73 746	994 250	SWCC
	Keeping the salt from our towns	367 621	0	367 621	DAFWA
	Living with salinity	1 190 547	0	1 190 547	DAFWA
	Engineering a better future with salinity	2 087 244	0	2 087 244	SWCC
	Demonstrating salinity options in targeted sub catchments	896 924	0	896 924	Blackwood Basin Group (BBG)
	New industries for new opportunities to manage salinity	180 989	0	180 989	SWCC
	Managing salinity with woody perennials	1 458 848	0	1 458 848	Trees South West
	Integrated on-ground NRM in the Swan coastal plain and western Jarrah Forest areas	112 905	39 506	152 411	Peel-Harvey Catchment Council (PHCC)
	Integrated on-ground NRM in the lower southwest and Warren	63 311	22 153	85 464	BBG
	Integrated on-ground NRM in the wheatbelt-wool-belt	313 061	109 543	422 604	BBG
	Securing the resource – regional mallee planting to support integrated wood processing full scale commercialisation investment in upper catchment regions of the South West Catchments Council (SWCC)	841 860	0	841 860	Oil Mallee Association (OMA)
	Scoping perennial (non-tree) options for targeted salinity containment in medium rainfall zone valleys and Salinity Investment Framework (SIF) identified assets	43 826	9805	53 631	DAFWA
	Engineering evaluation initiative program (EEI) supplementary project – impact of integrated farm to catchment scale surface water management and drainage on farm productivity	43 826	9805	53 631	BBG
	Development and implementation of targeted on-ground incentive methods for containment of dryland salinity	350 607	78 444	$429 051	BBG
	Sustainable production from pastures sprinkler-irrigated with brackish water from Wellington Dam	39 938	5 502	45 440	DAFWA
	Demonstrating potential for reliable water supplies for intensive sustainable agriculture in the medium rainfall zone of the SWCC area	85 716	11 808	97 524	DAFWA
	Review and analysis of the SIF (Phase 1 & 2); and development of an asset prioritisation and investment decision support tool	302 645	41 690	344 335	SWCC
	Liquid assets/rural towns	224 699	0	224 699	DAFWA

Table 19 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Sustainable management of land resources	Ground truthing of SIF analysis on road infrastructure at a local government level (Wagin)	139 100	0	139 100	Wagin Shire
	Feasibility of developing nutrient budgeting software in WA	307 988	27 319	335 307	DAFWA
	Dairy effluent nutrient & water best management practices (DairyCatch)	30 288	2687	32 975	GeoCatch
	Nutrient smart – fertiliser management on farms	168 724	14 966	183 690	GeoCatch
	Adapting existing modelling processes to set receiving and land use water quality targets for intensive industries	98 399	$8 728	107 127	SWCC
	Prioritised on-ground works for weed control for south west region	0	108 399	108 399	DAFWA
	TOTAL NHT Sustainable management of land resources		**706 301**		
	TOTAL NAP Sustainable management of land resources	**12 044 531**			
	TOTAL Sustainable management of land resources			**12 750 832**	
Maintain and enhance the condition of water assets	Water for the environment	769 024	257 913	1 026 937	SWCC
	Healthy waterways and estuaries	1 603 995	537 944	2 141 939	Cape to Cape Catchment Group
	Healthy wetlands	1 116 114	374 319	1 490 433	SWCC
	Improving water quality in the Peel-Harvey Estuary and associated rivers	1 327 486	0	1 327 486	PHCC
	Improving water quality in the Scott River and Hardy Inlet	722 694	0	722 694	BBG
	Improving water quality in the Leschenault Estuary system	1 185 543	0	1 185 543	Leschenault Catchment Council (LCC)
	Improving water quality in the Vasse-Wonnerup system	956 516	0	956 516	GeoCatch
	South west waterway health and water quality recovery strategy	224 533	75 303	299 836	SWCC
	Hotham–Williams–Murray rivers salinity recovery	425 545	0	425 545	PHCC
	Blackwood River salinity recovery	1 110 493	0	1 110 493	BBG
	Tone and Upper Warren Rivers salinity recovery	1 787 286	0	1 787 286	DoW
	Integrated on-ground NRM in the Swan coastal plain and western Jarrah Forest areas	225 810	79 013	304 823	PHCC
	Integrated on-ground NRM in the Lower southwest and Warren	126 623	44 307	170 930	BBG
	Integrated on-ground NRM in the wheatbelt-woolbelt	626 121	219 086	845 207	BBG
	Quantitative assessment of recreational angling in the Blackwood Estuary and Harvey Inlet	0	95 170	95 170	Murdoch University
	Reviving Five Mile Brook	81 577	25 763	107 340	City of Bunbury
	Environmental water provisions in water allocation: assessing the ecological social and economic value of priority water resources in the SW region	522 483	0	522 483	DoW

Table 19 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Maintain and enhance the condition of water assets	Best practice stormwater management in Capel Busselton and Augusta-Margaret River Shires	108 606	0	108 606	Geocatch
	Local government water resource management	214 001	0	214 001	PHCC
	Nutrient water and sediment catchment models to support investment decision-making	160 777	32 258	193 035	DoW
	Supporting decisions that link land use and management with water quality outcomes. Part A.	133 981	26 882	160 863	DAFWA
	Fish migration patterns in the Blackwood River. Decision support for Environmental Water Resources (EWR) studies in the SW of WA	64 262	12 893	77 155	DoW
	SW regional waterway health sub-strategy	116 129	57 968	174 097	SWCC
	On-ground river restoration in the Upper Blackwood catchments	327 809	0	327 809	BBG
	Blackwood River water quality recovery plan – salinity	128 390	0	128 390	BBG
	Peel waterways foreshore protection and rehabilitation	113 513	46 045	159 558	Shire of Mandurah
	Peel–Harvey rivercare action: improving water quality and ecological function of waterways within the Peel–Harvey catchment	279 071	113 203	392 274	Serpentine Jarrahdale LCDC (SJLCDC)
	Lower Vasse River cleanup – on-ground works	37 177	15 080	52 257	GeoCatch
	River action planning – plans and restoration of priority waterways in the Geographe Capes Leschenault and Warren catchments	401 587	162 900	564 487	GeoCatch
	River action planning (Lower Blackwood component)	76 353	30 972	107 325	Lower Blackwood LCDC
	Wetland mapping classification and evaluation program for priority areas SW WA	103 539	66 349	169 888	DEC
	Lower Swan coastal plain wetlands – best management practices (BMPs) for farmers and priority wetland action	189 148	121 207	310 355	GeoCatch
	Geogrup/Black Lakes: a best practice wetlands management in the SW	32 766	20 996	53 762	South West Land and Sea Council (SWALSC)
	Development and implementation of the Toolibin Lake recovery plan	61 600	39 473	101 073	DEC
	The Ramsar-listed Peel–Yalgorup system – developing a plan	55 046	35 274	90 320	PHCC
	Design and operation of coastal drainage systems	157 501	39 900	197 401	DAFWA
	TOTAL NHT Maintain and enhance the condition of water assets		**2 530 218**		
	TOTAL NAP Maintain and enhance the condition of water assets	15 573 099			
	TOTAL Maintain and enhance the condition of water assets			**18 103 317**	

Table 19 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Protect and enhance the marine and coastal environment	Understanding coastal and marine environments	208 911	648 864	857 775	UWA
	On-ground action to protect priority coastal and marine assets	113 663	353 028	466 691	DEC
	Communities caring for our coastal and marine assets	190 394	591 350	781 744	SWCC
	Contaminants in the nearshore marine environment – identify threats and community values and set resources condition targets	14 092	15 532	29 624	DoW
	Benchmarking the influence of changing catchment management practices on seagrasses in Geographe Bay	10 249	11 296	21 545	GeoCatch
	Benchmark study on marine communities of the SW for long-term monitoring including proposed sanctuary zones of the Capes Marine Reserve	72 768	80 200	152 968	UWA
	Review gap analysis and risk assessment of existing coasts and marine information for the SW region	13 580	14 967	28 547	SWCC
	Remote sensing data for benchmarking the nearshore marine environment in the Geographe Bay	91 011	100 306	191 317	GeoCatch
	Establishing a marine reference group for the SW region	0	17 300	17 300	SWCC
	Developing a strategic planning framework for coasts and marine management in the SW region	0	17 300	17 300	SWCC
	Rehabilitation works at internationally acclaimed Surfers Point Margaret River	0	22 223	22 223	Augusta–Margaret River Shire
	Implementation of on-ground actions in coastal management plans and community group support	0	62 007	62 007	SWCC
	TOTAL NHT Protect and enhance the marine and coastal environment		**1 934 373**		
	TOTAL NAP Protect and enhance the marine and coastal environment	**714 668**			
	TOTAL Protect and enhance the marine and coastal environment			**2 649 041**	
Recover and conserve biodiversity	Regional biodiversity planning	755 165	420 737	1 175 902	SWCC
	Implementing salinity biodiversity recovery plans	708 229	394 586	1 102 815	DEC
	Protection of targeted dry-land ecosystems at threat from salinity	547 551	305 065	852 616	DEC
	Threatened species and communities	787 227	438 599	1 225 826	DEC
	Swan coastal plain – priority ecosystem recovery	211 782	117 993	329 775	LCC
	Busselton-Augusta – biodiversity hotspot recovery	273 264	152 248	425 512	GeoCatch
	Protecting our region from weeds, pests and disease	0	956 662	956 662	SWCC

Table 19 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Recover and conserve biodiversity	Integrated on-ground NRM in the Swan coastal plain and western Jarrah Forest area	225 810	79 013	304 823	PHCC
	Integrated on-ground NRM in the lower Southwest and Warren	126 623	44 307	170 930	BBG
	Integrated on-ground NRM in the wheatbelt–wool-belt	626 121	219 086	845 207	BBG
	Conservation of the habitat of 'highest priority' threatened species and communities within the south west region through conservation covenants	68 062	48 111	116 173	National Trust
	The preservation of critical habitat for the 'endangered' Carnaby's Black Cockatoo in the Badgebup and Kwobrup catchments of the Katanning landcare zone	38 379	27 129	65 508	Katanning Land Conservation District Committee (KLCDC)
	Conserving threatened species and communities in the south west NRM region	314 346	222 199	536 545	DEC
	Recover two threatened fauna species through captive bred reintroductions into Dryandra Woodland	18 276	12 918	31 194	DEC
	The Red-Tailed Phascogale – an endangered and iconic species informing landscape management between Donglocking and Wagin	74 112	52 387	126 499	Wagin Woodanilling Land Conservation District Committee (WWLCDC)
	Assisting recovery actions for the Margaret River Marron (*Cherax tenuimanus*)	68 126	48 155	116 281	DoF
	Peel-Harvey regional ecological linkages	82 644	67 178	149 822	Green skills
	Aquatic faunal biodiversity in the Beaufort River catchment	25 292	20 559	45 851	DAFWA
	Conservation of priority remnant vegetation within the Swan coastal plain bioregion	57 234	46 522	103 756	LCC
	Haddleton biodiversity recovery catchment – determining baseline hydrogeological and hydrological processes	53 434	43 434	96 868	DEC
	Development and implementation of natural biodiversity management guidelines for the Tarin Rock representative landscape area	52 247	42 469	94 716	DEC
	Protecting Dryandra Woodland and linking priority public and private remnant vegetation	30 636	24 902	55 538	PHCC
	Busselton–Augusta biodiversity hotspot rescue	70 414	57 236	127 650	GeoCatch
	Looking after the good bits in Jarrah forest and Warren bioregions	54 913	38 537	93 450	Warren Catchments Council (WCC)
	Protecting priority remnant vegetation in the Avon wheatbelt and mallee IBRA regions within the south west region	95 987	67 363	163 350	BBG
	Feral fox control buffers around DEC fauna reconstruction areas in Shire of West Arthur	0	18 072	18 072	LCC

Table 19 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Recover and conserve biodiversity	Geographe and Cape to Cape catchments weed and feral management	0	65 225	65 225	GeoCatch
	Control of feral pig populations in fauna reconstruction areas in the shires of West Arthur, Boyup Brook, Williams and Collie	0	36 384	36 384	LCC
	Assisting fauna movement from Perup Forest core conservation area in the Southern Jarrah Forest bioregion	0	70 676	70 676	WCC
	Reducing threats to Quokkas in the Northcliffe–southern Warren bioregion	0	45 744	45 744	WCC
	Determining the distribution and raising the profile of the Western Ringtail Possum in the Leschenault catchment	16 077	18 712	34 789	LCC
	Development of a regional biodiversity strategy and planning framework	96 116	111 871	207 987	SWCC
	SW local government biodiversity	285 773	90 250	376 023	Western Australian Local Government Association (WALGA)
	Assessment prioritisation and management planning for biodiversity conservation for the Shire Augusta–Margaret River reserves and implementation of a demonstration conservation	31 815	10 048	41 863	Augusta–Margaret River Shire
	TOTAL NHT Recover and conserve biodiversity		**4 414 377**		
	TOTAL NAP Recover and conserve biodiversity	**5 795 655**			
	TOTAL Recover and conserve biodiversity			**10 210 032**	
Enhance skills, knowledge capacity and engagement and M&E	Integrating Nyungar knowledge and NRM action	512 100	50 682	562 782	SWCC
	Supporting the regional NRM community	1 514 046	149 843	1 663 889	SWCC
	Communication and training	1 547 610	153 165	1 700 775	SWCC
	Future financing – exploring third party investment for SWCC NRM	75 956	7 517	83 473	SWCC
	Salinity management – assessment and decision-making	1 241 704	122 890	1 364 594	SWCC
	Spatial data management in the south west	425 528	81 304	506 832	SWCC
	What to count and why to count it! Supporting operational (project-level) M and E in the south west	974 422	186 180	1 160 602	SWCC
	Implementation of M and E framework	572 138	109 316	681 454	SWCC
	Community engagement in the development and enhancement of regional herbaria and their role in biodiversity conservation within the SW NRM region	71 813	83 584	155 397	DEC

Table 19 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Enhance skills knowledge and engagement and M&E continued	Biodiversity assets assessment – training natural resource management and local government officers to use the Peel–Harvey biodiversity decision support system	16 832	19 592	36 424	PHCC
	Ecological management – capacity building for improved biodiversity outcomes	59 662	69 441	129 103	SWCC
	Extension and diversification of the volunteer fisheries liaison officer (VFLO) program in the SW	0	46 280	46 280	DoF
	Community awareness program: educating and engaging local communities in the management of the marine and coastal resources of the SW catchments	0	100 101	100 101	DEC
	Regional training program for coastal management	0	11 919	11 919	SWCC
	Farm forestry development officer – SW region	161 040	0	161 040	Trees South West
	Sustainable land management learning events for small landholders	82 717	18 507	101 224	DAFWA
	Adoption by land managers and community for predicted climate change impacts in the Peel–Harvey and south west catchments	14 024	3 138	17 162	PHCC
	Demonstration of sustainable grazing of salt lands (adaptation to salinity) in medium–high rainfall farming systems	85 599	0	85 599	DAFWA
	Scoping the potential for future saline aquaculture enterprises in low-medium rainfall areas	85 600	0	85 600	BBG
	Reviewing existing productive use of saline land and water options for scoping future regional projects	85 600	0	85 600	DAFWA
	Assessment of the impact of agricultural intensification on nitrogen and phosphorus levels in shallow and deep groundwater on the coastal plain	49 280	4 272	53 552	BBG
	Current status and 25 year trends for soil acidity, fertility and salinity in the Peel–Harvey and coastal catchments	180 366	15 636	196 002	DAFWA
	Resource condition, target setting, monitoring and evaluation systems for dry-land salinity	197 142	17 091	214 233	DAFWA
	Monitoring and evaluation, target setting and reporting frameworks for the SW region	428 200	144 600	572 800	SWCC
	Regional Indigenous land management facilitation	155 513	54 594	210 107	SWCC
	Incorporating Indigenous knowledge and cultural protection into NRM practice in the Blackwood	85 187	29 906	115 093	BBG
	Establishment of a regional geographic information system (GIS) co-ordination service to support the strategic management of the natural resources across the SW region of WA	84 820	54 984	139 804	BBG
	Regional NRM training needs assessment and priority training	34 580	22 417	56 997	SWCC

Table 19 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Enhance skills, knowledge and engagement and M&E	Community NRM group support and engagement	374 261	162 891	537 152	SWCC
	Development and delivery of a regional communications plan	81 612	35 520	117 132	SWCC
	Innovative community engagement methodologies for the SW region	37 427	16 289	53 716	SJLCDC
	Subregional catchment planning for Leschenault Cape to Cape Warren and the updating of the GeoCatch subregional catchment plan	129 898	41 600	171 498	LCC
	Monitoring and evaluation framework for water–establishing condition Developing targets and measuring progress	377 700	105 500	483 200	DoW
	River restoration training in the Peel–Harvey catchment	49 180	9 867	59 047	SJLCDC
	Water quality monitoring waterways (including receiving estuaries) Protection and restoration and community capacity building in the SW region (Ribbons of Blue)	243 671	121 632	365 303	DEC
	Development of skills, knowledge and networks of weed action groups	0	108 401	108 401	DAFWA
	'Water-wise on the farm' irrigation management training	191 210	0	191 210	DAFWA
	TOTAL NHT Enhance skills, knowledge and engagement and M&E		**2 158 659**		
	TOTAL NAP Enhance skills, knowledge and engagement and M&E	**10 226 438**			
	TOTAL Enhance skills, knowledge and engagement and M&E			**12 385 097**	
Improve land-use planning processes to achieve NRM outcomes	Assisting local government to support NRM	230 797	22 842	253 639	WALGA
	Developing NRM and local government planning partnerships in dryland areas of the SW region	57 104	18 034	75 138	BBG
	Analysis and comparison of regional NRM strategy and Local Government Association planning documents	32 631	10 305	42 936	Martin and Associates
	TOTAL NHT Improve land-use planning processes to achieve NRM outcomes		**51 181**		
	TOTAL NAP Improve land-use planning processes to achieve NRM outcomes	**320 532**			
	TOTAL Improve land-use planning processes to achieve NRM outcomes			**371 713**	
Core administration and planning	Foundation funding including regional strategy development	1 151 596	1 151 594		
	Core administration			1 600 000	
	Total NHT Core administration and planning		**1 151 594**		
	Total NAP Core administration and planning	**1 151 596**			
	Total Core Administration and Planning			**3 903 192**	

Table 19 **Continued …**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
	TOTAL NHT – Whole Program		**11 795 109**		
	TOTAL NAP– Whole Program	**44 674 923**			
	TOTAL PROGRAM			**56 470 032**	**Does not include core administration or foundation funding**

Appendix 3. Statewide breakdown of NAP and NHT funds

Table 20 **Statewide strategic reserve—NAP/NHT2 projects and investments 2002–2009**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation and funding source
		NAP $	NHT $		
Sustainable management of land resources	Tackling acid sulfate soils on the Western Australian coast	1 601 550	788 450	2 390 000	Department of Water (DoW) State funds $658 275 strategic reserve includes $285 000 NAP interest and $140 000 NHT interest
	Narrogin wood trial	3 000 000		3 000 000	Verve Energy strategic reserve State funds $1 500 000
	Yilgarn salinity engineering design plan (Warralakin)	1 104 539		1 104 539	DoW State funds $302 270 strategic reserve $500 000 NAP interest
	WA oil mallee industry plan	95 000		95 000	Forest Products Commission (FPC) and Oil Mallee Company (OMC) strategic reserve NAP interest
	Wheatbelt drainage–framework for implementation	2 840 000		2 840 000	DoW strategic reserve no State contribution
	Resource condition monitoring: land salinity component	3 640 000		3 640 000	University of Western Australia (UWA) State funds $1 610 000 strategic reserve resource condition monitoring (RCM) $285 000 NAP interest
	Resource condition monitoring soil condition monitoring	215 762	215 763	431 525	Department of Agriculture and Food (DAFWA) State funds $107 881strategic reserve RCM
	Engineering evaluation initiative	4 051 245		4 051 245	DoW State funds only includes $490 000 interest
	Catchment demonstration initiative	6 000 000		6 000 000	DAFWA State funded only
	Localised land resource maps and land-use information for farmers to improve sustainability		73 684	73 684	DAFWA
	SIF Avon and state-wide	366 000		366 000	Department of Environment and Conservation (DEC) lead, State agencies and Wheatbelt NRM
	Strategic tree farming	64 400 000		64 400 000	FPC State funds $32 200 000
	TOTAL NHT Sustainable management of land resources		**1 077 897**		
	TOTAL NAP Sustainable management of land resources	**87 314 096**			
	TOTAL Sustainable management of land resources			**88 391 993**	

Table 20 **Continued**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation and funding source
		NAP $	NHT $		
Maintain and enhance the condition of water assets	State-wide waterways and wetlands frameworks, coordination and support	986 000		986 000	DEC State funds $493 000 strategic reserve
	Collie River salinity recovery	30 000 000		30 000 000	DoW strategic reserve $15 000 000 State funds from Water Corporation
	Resource condition monitoring: estuarine monitoring	543 500	270 500	814 000	DoW State funds $271 750 strategic reserve RCM $270 500 NHT interest
	Baseline water quality trends and target setting		70 000	70 000	DoW
	Wetlands–collation of data into Geographic Information System (GIS)		115 000	115 000	DEC
	TOTAL NHT Maintain and enhance the condition of water assets		**455 500**		
	TOTAL NAP Maintain and enhance the condition of water assets	**31 529 500**			
	TOTAL Maintain and enhance the condition of water assets			**31 985 000**	
Protect and enhance the marine and coastal environment	Securing WA marine futures		4 394 000	4 394 000	South Coast NRM managed with Department of Fisheries (DoF); DEC partners strategic reserve $160 000 interest
	Actions for the prevention and management of introduced marine pests		674 600	674 600	DoF strategic reserve
	Community coastal works–all regions		98 240	98 240	6 regional NRM groups strategic reserve
	Resource condition monitoring scoping coastal and marine		232 900	232 900	DoF strategic reserve RCM interest
	Implementation of the marine community monitoring program WA		115 000	115 000	DEC
	Providing on-line information on the State's marine plants		170 000	170 000	DEC
	TOTAL NHT Protect and enhance the marine and coastal environment		**5 684 740**		
	TOTAL NAP Protect and enhance the marine and coastal environment	**0**			
	TOTAL Protect and enhance the marine and coastal environment			**5 684 740**	
Recover and conserve biodiversity	Ramsar sites	670 000	330 000	1 000 000	DEC State funds $335 000 strategic reserve
	Cane toad management initiative		600 000	600 000	DEC strategic reserve
	WA native fish strategy	140 000		140 000	DoF strategic reserve no State contribution
	Lake Warden engineering phase 1	500 000	89 778	589 778	DEC strategic reserve no State contribution, includes $89 778 NHT interest
	Strategic risk mapping of dieback on crown lands		250 000	250 000	DEC strategic reserve interest

Table 20 **Continued**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation and funding source
		NAP $	NHT $		
Recover and conserve biodiversity	Kimberley Island biodiversity protection from cane toads		2 700 000	2 700 000	DEC strategic reserve
	Stamp out Starlings		246 000	246 000	South Coast NRM strategic reserve
	Resource condition monitoring: significant native species and ecological communities	641 100	1 275 507	1 916 607	DEC State funds $320 550 strategic reserve RCM
	Resource condition monitoring: native vegetation monitoring	393 800	583 000	976 800	DEC State funds $196 900 strategic reserve RCM includes $583 000 NHT interest
	Resource condition monitoring: ecologically significant invasive species		206 070	206 070	DAFWA strategic reserve RCM interest NHT
	Resource condition monitoring inland aquatic gaps	2 000 000		2 000 000	DoW strategic reserve RCM no State contribution
	Protection of native vegetation from Phytophthora dieback in WA		64 000	64 000	Shire of Kalamunda
	Implementation of recovery actions for the State's most threatened flora and ecological communities that occur across more than one region		87 700	87 700	DEC
	Determination of response of rare and poorly known WA native species to salinity and water-logging		32 976	32 976	DEC
	Plant species influences on phosphite effectiveness for the control of *Phytophthora cinnamoni* threatening rare flora		19 800	19 800	DEC
	Bush bank	1 000 000		1 000 000	DEC all State funded
	Land purchase and Land for Wildlife	2 350 000		2 350 000	DEC all State funded
	TOTAL NHT Recover and conserve biodiversity		**6 484 831**		
	TOTAL NAP Recover and conserve biodiversity	**7 694 900**			
	TOTAL Recover and conserve biodiversity			**14 179 731**	
Enhance skills, knowledge and engagement and M&E	M&E coordination	1 031 025	263 500	1 294 525	DAFWA strategic reserve $263 512 State includes $270 000 NAP interest
	NRM skills development	276 857		276 857	DAFWA / Wheatbelt NRM strategic reserve $138 429 State funds
	NRM on aboriginal managed lands		145 000	145 000	Department of Indigenous Affairs (DIA) strategic reserve
	Shared information platform (SLIP) NRM focus area	2 004 480	990 520	2 995 000	DAFWA lead and cross agencies strategic reserve State NAP $852 241 includes $300 000 NAP interest and $151 000 NHT interest

Table 20 **Continued**

NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation and funding source
		NAP $	NHT $		
Enhance skills, knowledge and engagement and M&E	Regional landcare coordinators	1 200 000		1 200 000	DAFWA State funded
	Coordination of skills development and training for NHT2 State and regional personnel		125 500	125 500	DAFWA
	Accredited natural resource management plan legal service		60 000	60 000	Environmental Defenders Office
	Engaging local government		90 000	90 000	Western Australian Local Government Association (WALGA)
	A monitoring and evaluation database for NHT and NAP activities in WA		80 000	80 000	DAFWA
	State strategic marine facilitator funding for 2003–2008		270 000	270 000	DEC includes $30 000 interest
	Accreditation and review processes for NRM investment	34 980		34 980	DAFWA NAP interest
	Capacity building for river and wetland restoration		37 000	37 000	DoW
	Evaluation 3 community and State capacity to implement NRM investment	42 020		42 020	DAFWA NAP interest
	Strategic marine facilitators		240 000	240 000	University of Western Australia (UWA)
	State coordinator for farm forestry extension and community support		117 500	117 500	Trees South West
	South east tree foundation support		368 611	368 611	South East Tree Foundation
	Great southern private forests		368 611	368 611	Great Southern Private Forest Development Committee
	Trees south west support		368 611	368 611	Trees South West
	Private forests northern		131 250	131 250	Moore Catchment Council / Trees Midwest
	Private Forests Avon		206 250	206 250	Greening Australia WA (GAWA)
	Insurance initiative	3430		3430	DEC State funded
	TOTAL NHT Enhance skills, knowledge and engagement and M&E		**3 862 353**		
	TOTAL NAP Enhance skills, knowledge and engagement and M&E	**4 592 792**			
	TOTAL Enhance skills, knowledge and engagement and M&E			**8 455 145**	

Table 20 **Continued…**

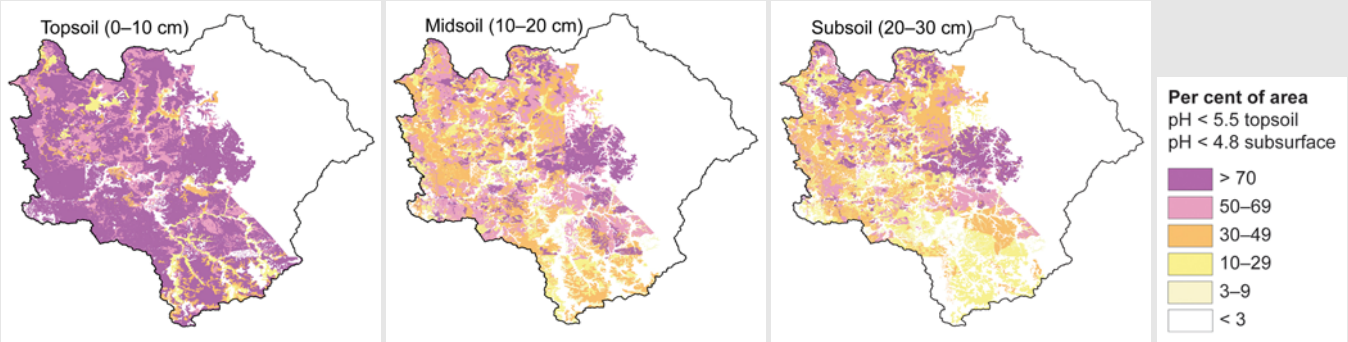
NRM Outcome area / strategy	Project	Funding source		Total $	Delivery organisation
		NAP $	NHT $		
Improve land-use planning processes to achieve NRM outcomes	Natural resource management land use planning project	231 000	1 123 120	1 354 120	WALGA strategic reserve $231 000 NAP interest
	TOTAL NHT Improve land-use planning processes to achieve NRM outcomes				
	TOTAL NAP Improve land-use planning processes to achieve NRM outcomes	**231 000**	**1 123 120**		
	TOTAL Improve land-use planning processes to achieve NRM outcomes			**1 354 120**	
Administration	State administration	3 483 333		3 483 333	DAFWA State funds only
	Commonwealth administration	7 900 000		7 900 000	Commonwealth funds only
	Regional group core funding	9 900 000		9 900 000	$6 000 000 State funds
	Foundation funding–regional NRM strategy development				
	TOTAL NHT Administration		**0**		
	TOTAL NAP Administration	**21 283 333**			
	TOTAL Administration			**21 283 333**	
	TOTAL NHT – Whole program		**18 688 441**		
	TOTAL NAP– Whole program	**152 645 621**			
	TOTAL PROGRAM			**171 334 062**	

Appendix 4. Details of case studies

Case study 1: Soil acidity in the Avon River basin

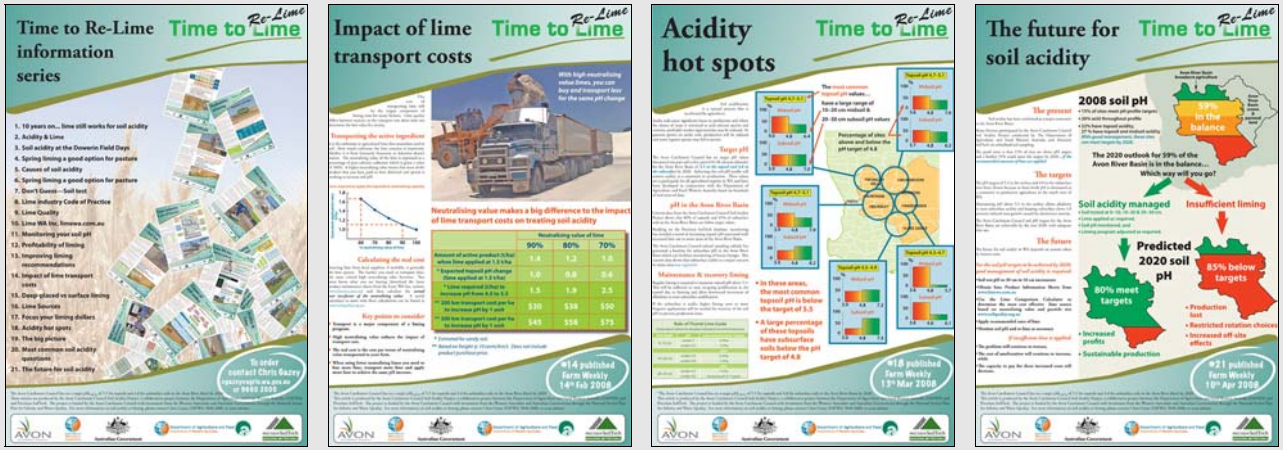
Case study 1 Title	Soil acidity in the Avon River basin
Theme	Ensuring sustainable management of Western Australia's agricultural land resource
Priority asset and threats to it	Agricultural land resource in the Avon River basin. Soil acidity of the top (0–10 cm) and subsurface (10–20 and 20–30 cm) soil poses a threat to the land resource and industry. The result is a loss of productivity and subsequent nutrient leaching. The Avon River basin produces 40–50 per cent of Australia's export grain while the Avon River carries nutrients into the Swan River.
Resources	$2.2m NAP funds ($1.1m WA funds); $1m cash contribution from farmers for topsoil collection and analysis; $0.25m in-kind contribution from farmers for grower trials and demonstration sites (Nov 05 to Sept 08), plus $0.23m Caring for Our Country transition year (Oct 08 to Sept 09). The Department of Agriculture and Food WA in partnership with Precision SoilTech delivered the project on behalf of the Avon Catchment Council. In addition to farmer participation other partners included private agronomists and grower groups.
Project description (including location, intended outcomes and outputs)	The resource condition target identified in the Avon NRM Strategy Avon Working Group (2005) is: Soil acidity levels (top and subsurface) at or above pH 5.5 ($CaCl_2$), in all soils with low capacity to buffer pH change by 2020. This was later revised to specify a separate target for subsurface soils of pH 4.8. The target was intended to be progressed through a number of formative management action targets during the first five years of investment including: • regional database established to record the status of top and subsurface pH documented for all Land Resource Sub-Regions by 2008. • 80% of land managers have knowledge of best management practice for soil acidity (including economic benefits) by 2008. Study completed documenting the spatial extent of amelioration actions, linking to a subregional scale acidity status map product and contributing to ongoing State level status mapping, monitoring and evaluation by 2008. Soil acidity was identified in the Avon NRM Strategy as the second highest degradation risk to land and soil, with over half of the Avon River basin (ARB) having a moderate to high risk of subsurface acidification. Acidic soils cause significant losses in production and restricted crop choice and there is a wider concern of unsustainable production and degradation of the soil resource. Reduced plant growth can lead to an increase in erosion and salinity and reduced organic matter accumulation. Increased water run-off and nutrient leaching can negatively impact on off-site water resources. Project proponent, the Department of Agriculture and Food WA and partner Precision SoilTech, sampled the soil pH (acidity) status across the region to assist in resource condition assessment and provide management recommendations to land managers via one-on-one advice and a strategic statewide extension program. The intended outcome of the project was to induce practice change and increase the amount of subsurface soil testing for pH and to improve the level of knowledge of the causes, impacts and management of soil acidity. This information (coupled with evidence to show that by applying the right amount of lime, productivity can be maintained and increased) should lead to changed management practices, an increase in the amount of lime applied and long-term economic and environmental benefits.

Case study 1 **Title**	**Soil acidity in the Avon River basin**
Rationale and justification **(What assumptions are being made and why will the proposed actions deliver the outcomes)**	The region covers 11.8m ha of which 63% has been released for agriculture and associated land uses. It continues to maintain profitable farm enterprises with the agricultural sector producing 34% of the State's gross value of agricultural production, predominantly through wheat exports. With the region supporting a community of 42 000, profitable industries are essential for their individual wellbeing as well as that of the State. Individual sub-catchment studies have demonstrated that as farmers have adopted improved management practices of soil acidity, there has been a gradual increase in soil pH. On a broad scale this will lead to increases in groundcover on agricultural land and therefore reduced soil erosion into aquatic environments and decreased turbidity in aquatic environments. There is strong evidence that productivity declines with increasing soils acidity. Productivity can be maintained and increased through the addition of lime. The project will produce significant amounts of data and information on soil acidity management and the lime industry. In addition long-term trials that improve the understanding of the long-term economic and environmental benefits of liming will be undertaken to support change in management practices. Soil testing of not only the topsoil but also the subsurface soil provides crucial information that will indicate the scale of the problem to be dealt with. With this data, the changes to current management practices that are required for remedial actions will be identified and promoted across the Avon River basin. The current use of lime in the Western Australian wheatbelt is estimated to be less than half of that required to treat existing and ongoing soil acidification.
Describe the major activities and outputs of the project	The project commenced in November 2005 and concluded in 2008. There was a one-year extension to the project provided by Caring for Our Country transition year funding. During the final year incentives for soil testing were not offered. The activities and outputs include the following: Current status of soil acidity was determined: 12% of the agricultural lands in the Avon River basin surveyed for soil pH to a depth of 30 cm. Subsurface sampling covering 840 000 ha (248 farms) was subsidised through the project. Farmers contributed 18 000 topsoil samples from the 0–10 cm depth and the project contributed 20 000 samples (combined) from the 10–20 and 20–30 cm layers. Participating farmers received 'farm specific' lime recommendations. A soil pH map of the 0–10, 10–20 and 20–30 cm layers for the Avon River basin was produced using the gathered data and the DAFWA soil profile mapping database to inform farmers and others of the current status of soil acidity in the region.

Case study 1 **Title**	**Soil Acidity: in the Avon River basin**
Describe the major activities and outputs of the project	 **Percentage area of agricultural soils of the Avon River basin with soils below DAFWA pH targets** A regional database was established to record the status of topsoil and subsurface soil pH. Fifteen percent of sites sampled in the Avon River basin are above pH targets set by DAFWA and the Avon Catchment Council (2005) and 59% of sites with pH currently below the targets could reach targets by 2025 if sufficient lime is applied. 'Time to re-Lime' program built on the successes of DAFWA's 'Time to Lime' program of the mid-1990s. Twenty-one weekly information articles published in the rural news were compiled into a manual distributed to over 700 farmers. The timing of the items coincided with the requirement for specific information leading up to and including the liming season.

Case study 1 Title	**Soil Acidity: in the Avon River basin**

Describe the major activities and outputs of the project



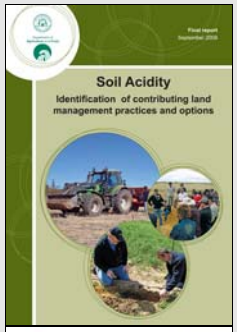
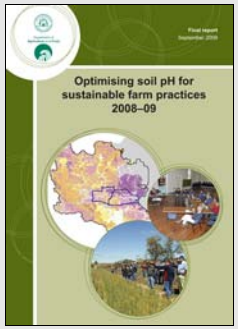
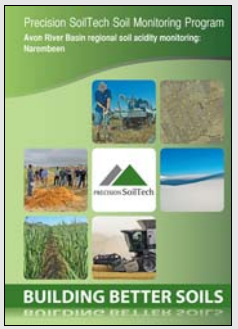
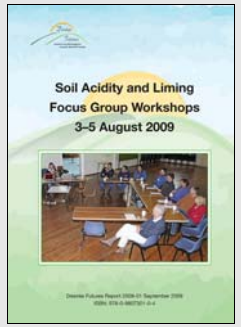
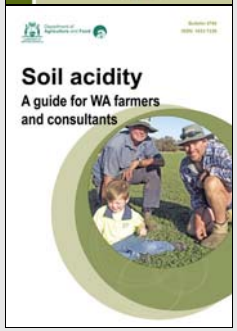
A selection of 'Time to re-Lime' information pages

Demonstrations of sustainable practices through large-scale sites and monitoring of established sites.

Sixteen existing long-term lime demonstration and trial sites were monitored and assessed to provide information for the liming information series and supporting lime rate recommendations for long-term soil pH change. Six new large scale lime demonstration sites were established to provide the basis of information provision for the next 5–10 years.

Project staff gave 62 presentations to a total audience of 1600 farmers, consultants, advisors and tertiary students. Events included Crop Updates (Perth and regional), field walks, seminars, lectures, radio interviews and workshops. Over 60 publications were produced by the project, including media releases, papers for conferences), Ag-Memos, DAFWA Bulletins and reports.

The project supported the Lime WA Inc group of independent lime suppliers who operate under a voluntary code of practice and undertake to supply a standard product information sheet with current lime quality information.

Case study 1 **Title**	**Soil Acidity: in the Avon River basin**
Describe the major activities and outputs of the project	      **Front pages of selected reports produced during the project**

Case study 1 **Title**	**Soil acidity in the Avon River basin**
Describe what outcomes have been achieved	Improved information and knowledge has led to: • increased subsurface soil testing for pH • more lime being applied • better estimates of the impact of soil acidity ($300–400 million loss pa) • better estimates of the amount of lime required to reach soil pH targets (12 million tonnes of lime over the next 10 years in the Avon River basin) • confirmation that project methods can measure resource condition change and that it is improving slowly where lime has been applied. Recognition by all regional NRM groups that soil acidity in the agricultural land resource is a serious land degradation and natural resources management issue. Forty-one per cent of agronomists surveyed independently recognised the subsurface soil sampling incentives offered and also the 'Time to Re-lime' extension program. Increased farmer knowledge of soil acidity issues and management in the Avon can be expected to be higher. Three focus group workshops were held in August 2009 to identify barriers to adoption of liming to manage soil acidity. Key barriers: • overall cost and surety of return on investment were rated as key barriers to adoption to liming: • being clear on the correct decision • knowing which paddock to treat first or which lime to use • clarifying mixed messages from lime suppliers • confidence in the transferability of trial results. Not withstanding these barriers, all participants thought soil acidity was manageable on their farm.
Lessons learned **(risk management)**	Farmers involved in the project understand the impacts of soil acidification particularly subsurface acidification and some of the reasons behind the loss of production. With higher costs of production, more efficient fertiliser use may result, as farmers understand that reducing productivity may not be entirely due to poor fertility. Reductions in nutrient run-offs into waterways may result in biodiversity and water quality benefits. The project identified barriers to adoption and areas where more surety of information on liming and returns on investment are required to change practice. The project reinforced the long-term nature of amelioration. Assessment indicates that insufficient lime is being applied and productivity and soil condition will continue to decline until sufficient lime is applied.

Case study 1 Title	Soil acidity in the Avon River basin
Project strategy **(how the project operated)**	DAFWA and Precision SoilTech (a commercial soil sampling company) established a partnership to deliver the project for the Wheatbelt Natural Resource Management Group (formerly Avon Catchment Council). The strategy to increase lime use and better manage soil acidity in the Avon River basin was to: • Improve farmers' understanding of the current soil pH status through increased subsurface soil testing for pH, leading to changes in practice. • Provide information and education that enables farmers and their consultants or advisors to make confident correct decisions to ameliorate their acidic soils. A benchmark for soil acidity in the Avon River basin was created based on extensive soil testing and analysis of data. Farmers paid for topsoil sampling and analysis while the project paid for subsurface testing and analysis. This information was collated with the DAFWA soil landscape database to establish a soil acidity map for the Avon River basin. Additionally each farmer participant received a comprehensive liming program for their properties and recommendations for changing management practices. They aimed to achieve the recommended soil Ph targets in order to maintain profitable and sustainable production on their properties. A comprehensive data sharing arrangement using project data collection and analysis was established. Participants can access individual property information and compare it to the area averages. Non-participants are able to access regional data to inform management decisions on their properties. Articles published in rural journals were developed into a manual on liming which is available for farmers and agronomists to enable the impacts and ongoing benefits of the project to continue. The project supported the Lime WA Inc group of independent lime suppliers who operate under a voluntary industry code of practice. This group undertakes to provide a standard product information sheet so that purchasers can be confident in the quality of the lime being purchased.
Describe the impacts on behavioural change	Lime use increased in each of the four years of the soil acidity projects (Nov 2005 to Sept 2009) to a State record of 1.14 million tonnes in 2008–09. An extra 983 000 tonnes of lime was applied during the project. This suggests that almost an additional one million hectares of land has been limed during the project. The project's subsurface soil sampling incentive increased the number of subsurface samples during the project compared with the number collected before the project.

Year	% topsoil sites sampled at 10–20 cm	% topsoil sites sampled at 20–30 cm
2004–05 (prior to incentive)	32	2
2004–05 (1st year of incentive)	60	8
2005–06 (2nd year of incentive)	88	62
2006–07 (3rd year of incentive)	75	57
2008–09 (post incentive)	44	25
	Increase of 12% from 2004–05	Increase of 23% from 2004–05

This project has lead to a better understanding of the causes, impacts and management of topsoil and subsurface soil acidity on the growth of vegetation and crop productivity. These benefits are assumed to flow through to reduced nutrient runoff into aquatic systems.

Case study 1 **Title**	**Soil acidity in the Avon River basin**
Describe the impacts on behavioural change (continued)	Modified management techniques will result in an increase in individual productivity and profitability for farmers, providing for healthier, more vibrant rural communities. With more efficient fertiliser use, not only will farmer profit benefit. The waterways will have less sediment due to reduced run-off from erosion and reduced nutrient flow, thus reducing algal blooms. Community will benefit through healthier recreational facilities as well as enjoying the increases in animal and plant life supported by the waterways.
Making a Difference: **(anything else?)**	Future projects are well placed to target barriers to adoption of liming, monitor resource condition change within the Avon River basin and transfer methodology to other areas of the wheatbelt.

Chris Gazey, Senior Research Officer, who lead the project on behalf of the delivery organisation Department of Agriculture and Food WA, spreads different lime sources at a trial site near Burakin. Long-term, large-scale demonstration sites have provided evidence that amelioration of soil acidity depends on an appropriate rate and frequency of lime application.

Dave Gartner, Senior Technical Officer, DAFWA, demonstrates how soil acidity occurs through use of a soil pit and pH-indicator solution to farmers and industry representatives at Bodallin. Investment into land degradation issues that provide a private benefit to the land manager are best addressed through the broadscale dissemination of information to targeted stakeholders.

Case study 2: Wilson Inlet nutrient reduction action plan

Case study 2 Title	Wilson Inlet nutrient reduction action plan
Theme:	Maintain and enhance the condition and beneficial uses of Western Australia's priority waterways
Priority asset and threats to it	Wilson Inlet on the south coast of Western Australia. Threats to the inlet include nutrient runoff and point source pollution, waterlogging and degradation of the riparian vegetation.
Resources	$910 319 NAP ($455 160 WA)
Project description (including location, intended outcomes and outputs)	Wilson Inlet is a major estuary on the south coast of Western Australia. Located near the town of Denmark, it is not only a natural and cultural icon for the region, but of economic importance for industries such as fishing, shellfish and tourism. Unfortunately the inlet is receiving too many nutrients. This is a common problem of estuaries with urban or agricultural catchments and can have extremely serious consequences. Already Wilson Inlet has seen a build-up of algae and seagrass, as well as once sandy beaches covered in black ooze. Unless this nutrient input is reduced it will have increasingly serious impacts on the inlet's ecosystem and the ways it can be used by people. The Wilson Inlet Nutrient Reduction Action Plan (WINRAP) is the guiding plan to overcome the problems faced by the inlet. It is the culmination of research and community involvement into how the inlet and catchment function and where we can make positive improvements. The WINRAP is a 5-year plan, released in April 2003 and signed off by a variety of organisations from community to government. The plan relies on the cooperation of all those who live or work in the catchment, from farmer to builder to government employers. The project partners can provide a range of services and funding to help primary producers, industry and individuals to stop the transport of nutrients and sediment to the inlet. The implementation of the Wilson Inlet Nutrient Reduction Action Plan addresses issues that contribute to the protection and enhancement of this culturally and environmentally important estuary. These include water quality, nutrient runoff and point source pollution, waterlogging, protection of the riparian zone, protection of riparian vegetation and biodiversity and community education and capacity. The project was implemented by the Wilson Inlet Catchment Committee (WICC) Inc which is the lead NRM community based group in the catchment focused on sustaining environmental heritage for future generations. The group has been active since the early 1990s.
Rationale and justification **(What assumptions are being made and why will the proposed actions deliver the outcomes)**	Community involvement in the planning and delivery leads to their ownership and willing involvement. Fencing of drains and waterways protects the riparian vegetation from stock and allows it to regenerate, be planted for revegetating and preventing erosion. Restrictions on stock crossings and water points aid in reducing stock impacts on the vegetation and reduce erosion. Perennial pastures on the floodplains around the waterways reduce erosion and enable farmers to manage stock impacts on riparian vegetation. Revegetation and remnant vegetation protection aids the restoration of remnant sites along vulnerable waterways and protects the remnants that remain. Improved fertiliser use, particularly in the floodplains of the Wilson Inlet, will reduce the nutrient flows into the waterway system.

Case study 2 **Title**	**Wilson Inlet nutrient reduction action plan**
Describe the major activities and outputs of the project	Over 100 land managers were engaged in the project. On-ground works include: Fencing waterways 59.65 km allocated and 45.55 km completed for drains/waterway fencing in the priority area 80.5 km allocated and 49.6 km completed for waterway fencing (other than the priority area) 39 stock crossings have been completed associated with fencing 30 alternate water points have been completed associated with fencing Perennial Pasture Establishment: 423.5 ha allocated and 401.5 ha established Revegetation and Remnant Vegetation Protection 52.85 ha allocated and 39.70 ha completed for estuarine floodplain revegetation in the priority area 52.55 ha allocated and 52.4 ha completed for waterway revegetation (other than the priority area) 26.4 km allocated and 19.4 km completed for remnant vegetation protection throughout the catchment Regular newsletter received by over 3000 people Several workshops a year presented by project coordinator Strong partnerships with Department of Water and Water Corporation led to effective management and best management practice opportunities on private and UCL properties Involvement of local school groups has value-added to the engagement program of the project. Reports Department of Water 2007, 'Water Quality in the Wilson Inlet from 2002 to 2006' Wilson Inlet Report to the Community No. 9
Describe what outcomes have been achieved	By preventing stock access along the Sunny Glen, Cuppup and Sleeman rivers reductions of nutrients (nitrogen and phosphorus) moving into waterways, riparian zones and Water Corporation drains occurred. The installation of buffers including the use of agri-forestry options, biodiversity revegetation and the establishment of perennial pastures used excess water and nutrients before it enters the waterways or the groundwater as recharge. Reduction of nutrients into the inlet occurred due to direct on-ground intervention, community consultation and capacity building. Reduced nutrients from the catchment entering the Inlet from urban and rural land users. The reduction of nutrients will decrease the effects, distribution and impact of algal blooms. Actions also have a flow-on effect on the issues that come with the algae. Management of development in the catchment by encouraging revegetation and asset protection while maximising water levels within the floodplain will assist the inlet's ability to process nutrients. Bar openings will also assist with the export of nutrients out of the inlet.

Case study 2 Title	Wilson Inlet nutrient reduction action plan
Describe what outcomes have been achieved	Monitoring and reporting to guide the effectiveness of management—Monitoring is being conducted to see what impact the activity has had on the inlet's condition. (too early yet to see the benefits or otherwise) Community support is exceptional; over 100 active participants; over 3000 people on the regular newsletter list. Evidence suggests that there has been no deterioration in the quality of water discharging into the inlet from 2002 to 2006 unlike 1995 to 2002 (Department of Water 2007; Wilson Inlet Nutrient Reduction Action Plan). Spikes in water condition, algal levels and nutrient levels are intrinsically linked to high rainfall events, stratification and the occurrence of bar openings. The above report suggests that WINRAP should continue in order to limit the input of nutrients from the catchment.
Lessons learned **(risk management)**	Previous understanding of community involvement reinforced
Project strategy **(how the project operated)**	WINRAP was developed in consultation between community and technical expertise. In-kind contribution from landholders has ensured the project has good community uptake and ownership. This project implements some of the actions identified in WINRAP, particularly the revegetation and remnant protection in priority sections of the Wilson Inlet catchment area to reduce nutrient flows. It is a cooperative arrangement between South Coast NRM Inc., Wilson Inlet Catchment Committee Inc, Department of Water, Shire of Denmark, Centre of Excellence in Natural Resource Management, Water Corporation, Department of Agriculture and Food WA; Fisheries WA, City of Albany and Wilson Inlet Management Advisory Group.
Describe the impacts on behavioural change	Skill development and capacity building opportunities for youth (in the Green Corps Program) and options for the landholder to implement on-ground works. Landowners are addressing nutrient loss at source, preventing nutrients from entering the system early in the process. Nutrients are disposed of in a more considerate/effective way. Learning opportunities for landholders; technical advice and support promote sound management decisions.

John Dennis with Green Corps erecting a fence to protect the Hay River

Andrew Johnson checking effluent flows

Mark Ugle showing invention to roll out fencing materials

Viewing perennial establishment (tall fescue)

Case study 3: Resource condition monitoring—soil

Case study 3 Title	Resource condition monitoring—soil
Theme	Implementation of monitoring programs for land resources to provide baseline and trend information to give context for planning and prioritisation.
Priority asset and threats to it	Soil health in the wheatbelt of Western Australia Water erosion; soil acidification; carbon change and wind erosion
Resources	$688 000 NAP ($344 000 WA) In addition, the Department of Agriculture and Food WA provided infrastructure, systems and skills for soil condition monitoring, and capacity and experience in interpreting the data. It is also provided a project manager (full time) and two research officers (80% and 40%).
Project description (including location, intended outcomes and outputs)	Three key global challenges surround soil and its degradation: the food crisis, trends in land degradation, and soil health which is inextricably linked to the global greenhouse situation. In Western Australian context this requires that we know: benchmark values for the key natural resources, the existence of and rate of any degradation processes, and the State or condition of those natural resources at any point in time. With respect to soil condition at the present time we do not know these things. We are not in a strong position to design intervention strategies to manage soil condition or to judge the effectiveness of the strategies after implementation. The four degradation processes being addressed are wind and water erosion, soil acidification and soil carbon change.
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	The effective management of our soil resource requires quality information at the appropriate scale. Broadscale soil condition monitoring will provide regional, State and national NRM decision-makers with the necessary information on which to base those decisions. It will help to assess the current condition of the resource and determine if changes to the resource are being affected by on-ground investments.
Describe the major activities and outputs of the project	An appraisal of the nationally preferred water erosion model, which was judged unsuitable for Western Australia Adaptation of an internationally recognised method for designing a soil monitoring network, which can be applied to soil acidification and to soil organic carbon in Western Australia Field methods developed and continue to evolve for monitoring wind erosion, soil acidification and soil carbon change Laboratory methods tested for soil acidification and soil carbon analysis Permanent wind erosion transects identified and inspected twice a year An atmospheric dust sampler installed in the north-eastern wheatbelt (Mullewa) and monthly reports provided to DAFWA district offices Databases developed for wind erosion, soil acidification and soil carbon change. These are continually improved and are the prototype for the national equivalents. Ten permanent roadside wind erosion transects have been established along over 2000 km of roads; monitored twice a year, in late autumn (April–July) when ground cover is at a minimum and again in spring (August–December) when the ground cover rating is at its highest.

Case study 3) **Title**	**Resource condition monitoring—soil**
Describe the major activities and outputs of the project	Collaboration with two national projects sponsored by DAFF to develop national standards for roadside survey methods and to develop a national approach to monitoring soil organic carbon (SOC) and pH. An adaptation of n internationally recognised method for designing a soil monitoring network was applied for soil acidification and SOC in Western Australia. The soil monitoring fieldwork has commenced and will continue indefinitely. Field standard operating procedures and monitoring protocols developed with ongoing testing and improvement. Laboratory analytical methodologies tested for soil acidification and SOC analysis; samples analysed by Chemistry Centre Western Australia.
Describe what outcomes have been achieved	Quality information at the appropriate scale is available for effective management of the soil resource Broadscale soil condition monitoring to provide regional, State and national NRM decision-makers with information to: • assess the current condition of land-based natural resources • determine whether on-ground investments are producing natural resource condition changes at sufficient scale to make a difference • set and report on achievement of regional resource condition targets • contribute data to the State and national State of environment reports and other similar initiatives. A PM 10 DustTrak atmospheric dust sampler installed in the north-eastern wheatbelt at Mullewa Research Station. Monthly reports are generated from this data to produce an erosion hazard rating as a percentage of the sites within a landscape mapping zone. Links to rainfall zones; land-use practices and crop selection. Databases developed for wind erosion and changes in soil pH and SOC. These are under constant review and improvement and will be the prototype for the national equivalents.
Lessons learned **(risk management)**	Underestimated the issues and difficulties in staff recruitment. Needed to rely on DAFWA infrastructure and contract staff to enable progress to be made. The nationally preferred water erosion model was judged unsuitable for use in Western Australia.
Project strategy **(how the project operated)**	The purpose of this project is to: • establish baseline soil condition in the agricultural south-west of Western Australia with respect to SOC, pH and erosion by wind and water • establish seven representative catchments for pH and SOC using GIS analysis of soil, climate and land use • establish permanent transects for monitoring soil erosion by wind and water by the same methodology • analyses a representative set of soil samples for their SOC components to use for calibration purposes • enhance the existing State soils database with additional time series information; offer improved data to national soils ASRIS database • conduct baseline sampling at a point in time that uses the monitoring protocols developed by the National Land and Water Resources Audit. Project monitoring commenced in the north and moved progressively south. On average one monitoring site (100 m X 100 m) was selected per two kilometres along the road transect. All sites have GPS locations for revisiting.

Case study 3 Title	Resource condition monitoring—soil
Project strategy **(how the project operated)**	The DustTrak samples the air particulates every fifteen minutes and every minute if the values remain above a set minimum. A passing willy willy, traffic or stock movements can cause a sharp spike in readings, but erosion events occur over longer periods of time. Dust monitor reports are circulated to relevant DAFWA district offices. It is hoped that current CfoC funding proposals will allow this dust monitoring network to be expanded to the southern agricultural regions and eventually selected parts of the pastoral region.
Describe the impacts on behavioural change	This project is a resource condition monitoring project. It is establishing benchmarks for soil erosion and is a foundational activity from which future activities can be developed. Monitoring soil condition has become a core activity of DAFWA.

Case study 4: A commercial oil mallee industry

Case study 4 Title	**A commercial oil mallee industry**
Theme	Salinity–Strategic tree planting in priority areas
Priority asset and threats to it	Agricultural land. Salinity through rising watertables; wind and water erosion
Resources	$450 000 NAP funding coupled $400 000 cash from local farmers to purchase subsidised seedlings and develop a biomass transfer system. In-kind support for mulching trees; labour for planting. Kalannie Distillers have modified machinery and brought experience and knowledge to the project as has the Oil Mallee Association. $3 100 000 NAP funding coupled with in-kind support from DEC, FPC, DAFWA, CRC for Salinity, CSIRO, Verve Energy, local government, Oil Mallee Association, private companies, Wheatbelt Development Commission and farmers.
Project description (including location, intended outcomes and outputs)	This project aims to ensure the viability of farming land by encouraging revegetation through incentives to farmers that encourage the growth and processing of oil mallees and the creation of a viable industry. Planting oil mallees increases the viability of the land by controlling erosion, providing stock shelter, reducing groundwater tables and controlling surface water runoff. Creating a viable oil mallee industry also builds local capacity and assists small communities to retain residents through employment opportunities. This project aims to make a viable industry from growing and processing oil mallees by: providing an incentive to landowners to practice sound land management activities by revegetating with a local native species – the oil mallee, for harvesting and production of eucalyptus oil. • assisting in addressing serious threats to natural resources caused by salinity and erosion • contributing to sustainable farming practices by adopting farming methods that lead to decreased soil and wind erosion, reducing rising groundwater tables and controlling surface water run-off • generating new employment opportunities in rural areas • increasing biodiversity by creating a natural haven for native birds and fauna • trialling harvesting techniques and distillation methods • developing a biomass transfer system for biochar. The Integrated Wood Processing (IWP) trial sought to provide a sustainable market for farm grown mallee tree crops and encourage tree planting for salinity control. The project designed and built a demonstration plant as a forerunner of future plants five times the size that could be replicated across the wheatbelt. There were four components: 1. an extended operational period for the IWP demonstration plant to work through any problems that were inevitable in a world first innovative engineering plant; test the robustness of the technology, provide feedback from farmers and product markets, and streamline harvesting technologies 2. an operating budget to pay for breakdowns and bottlenecks so that quality and quantity products could be optimised 3. specific input of an activated carbon expert to tailor the activated carbon production to market demands 4. marketing plans for eucalyptus oil and activated carbon so that both products were accommodated into existing markets. At the conclusion of the project, the bankability of future projects in attracting finance will be established.

Case study 4 Title	A commercial oil mallee industry
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	This project builds on past knowledge and investment in the Kalannie area from DEC, the Oil Mallee Association and Kalannie Distillers. The Oil Mallee Association started planting trees in 1994. Widespread bore monitoring had shown that trees helped to reduce the impact of salinity and rising groundwater tables. Kalannie Distillers (established in 2001) called on the experience of generations of tree growers who had incorporated trees into traditional farming practices. However, harvesting had come to a standstill and the distiller needed more trees. The industry was facing failure. The benefits for managing salinity, sustaining the viability of the agricultural land and the community itself would be lost. This project has reignited community enthusiasm for the oil mallee industry and all its associated environmental, economic and social benefits. It has given farmers the confidence to proceed into landcare as the opportunities and returns become increasingly apparent. Trialling of the biomass transfer system and potential biochar gives the oil mallee industry an opportunity to become more financially viable for farmers with alternative uses for its products. Without commercial returns being established for products from oil mallees, relying solely on the salinity benefits from these plantings was never going to be enough to firstly establish and then sustain a commercial industry. The challenge was to use the integrated wood processing concept to build a fully operational demonstration plant to confirm the potential for it to support an industry. A full feasibility study conducted by the Oil Mallee Company, Western Power and Joint Venture Agriforestry Program concluded that the process was technically feasible, had favourable outcomes for farmers, and was expected to provide a viable return to Western Carbon. It concluded that a 10 000 tonne per annum feedstock was required to achieve economies of scale that would fit with a sustainable level of tree planting and electrical grid support opportunities. As it was not feasible to build a full-scale plant, a one-fifth scale plant was developed and built to demonstrate the concept's feasibility and to test several hypotheses.
Describe the major activities and outputs of the project	Modifications and trials of harvester-mow chipper and distillation unit; resulting efficiency reviews Tree subsidies to landholders through expressions of interest, with seedlings purchased and planted throughout the Kalannie area Expressions of interest sought from farmers willing to mulch existing stands (no longer economically viable due to their size) to encourage greater oil production in the next harvest Flail type harvester developed Trial findings made public through a Fact Sheet on Oil Mallee Harvesting for commercial oil production A database established to record details on planting areas 350 000 trees have been mulched 1 800 000 seedlings planted (1000 ha) Primary findings published in fact sheet now available for others across the wheatbelt. It identifies better practices and efficiencies and crop specific information such as when to plant, harvest and distil. Contract farmers to supply mallee feedstock for the plant trial. Trial potential wheatbelt tree crops for wood-chipping. Investigate the best harvesting techniques to provide woodchips at the required quality and quantity for the trial plant.

Case study 4 **Title**	**A commercial oil mallee industry**
Describe the major activities and outputs of the project	Design, build and trial for an extended period of time, a one-fifth scale integrated wood processing plant that has three products: renewable energy; activated carbon and eucalyptus oil. Deal with any wastes from the plant so that it does not adversely affect the surrounding environment. Produce a report that has all available information on eucalyptus oil for a market study. Determine the best operating conditions to produce the highest quality carbon. Produce a business developmental model for future private investment. Develop an Information Memorandum.
Describe what outcomes have been achieved	This project is showing that an oil mallee industry is viable for landowners and the distillers. Commercial viability provides the best prospect for delivering the long-term environmental and agricultural benefits promised by the research. The findings of this project are being made available to communities across the wheatbelt. The project has suggested future efficiencies that may increase returns to landowners. This has increased the incentive to plant oil mallees, giving even better results for the sustainability of the land and these small communities. A database is being created showing where and when oil mallees have been planted and harvested that will create a valuable reference tool for the future development of the industry. The project's mulching systems model enables a biomass transfer system and biochar product for further financial viability. Harvest and transport costs: Various methods of harvesting from 'by hand' to mechanical prototypes were tested and found to be uneconomical. The lowest conceivable cost of delivery using conventional techniques is about $60/tonne (wet) with a possible reduction to $35. Functionality of the plant The fluidized bed developed by CSIRO to recover the heat from the partial combustion of the woodchips eliminated troublesome liquid and gaseous emissions common to normal charcoal plants and decreased the conversion times dramatically. One result of the trial was the recommendation that in future water wall boiler tubes be used. The CSIRO fluidized bed technology was proven and a range of quality carbons produced from various wheatbelt timbers. An Australian made gasifier that burnt the spent leaves and fines raised steam for power generation and activation was successfully trialled. This was modified from a sloping grate to a moving floor grate to give better control of biomass into the plant. The operating trial compared various conditions specific to waste steam produced as a result of the distillation process;. Detailed understanding of the process of oil extraction from leaves was gained. The steam turbines produced up to 400 kW of electricity into the grid on numerous trials. Integration of the plant: An automated Safety Management System (SMS) was successfully trialled and is now recognised as an essential component of process control. The trial revealed problems including the quality of instruments, their installation and the lateness of implementation of the SMS. Recommendations for future plants resulted from these problems. The trial demonstrated that the plant could be successfully operated in an integrated manner.

Case study 4 Title	A commercial oil mallee industry
Describe what outcomes have been achieved	Value of the products: An IWP has three energy related products to sell. Verve Energy has undertaken to buy any output from the first two commercial IWP plants. Improvement in the quality of activated carbon was noted during the trial, with the expectation that a fully operational IWP plant would produce commercial quality activated carbon. Currently the market for eucalyptus oil is small, with Australia already producing more than is required. There are likely to be opportunities for industrial uses for the oil. Cash Flow: Given the assumptions from the trial, a five MM commercial plant would be economically viable with an internal rate of return of about 15% for a capital cost of $40m. Further development of a mallee harvesting system is required as without a continuous harvesting system; the economics do not appear favourable (Verve Energy 2007).
Lessons learned **(risk management)**	Farmers will invest for the overall good of their land and the wider environment when convinced of the industry's future and offered an initial incentive. Farmers have faith in the NRM project process when they can see on-ground benefits. This project has seen minimal expenditure on wages and maximum expenditure on tree planting. It has also involved a lot of people so there is a feeling of ownership in Kalannie for the success of the project. The project has allowed for technical lessons that have led to greater efficiencies. As a result, duplicate projects will benefit from this experience. The project showed positive effects for the sustainability of the land and the viability of the industry as well as its ability to sustain a small regional area by creating local jobs. Alley farming within oil mallee plantings shows promising signs of reducing the costs increasing profits. It provides a number of efficiencies such as reduced spraying costs, insect impacts and fuel costs due to alley tracks, auto steer systems and cell management techniques. Overall this type of landscape change project has the ability to improve the prosperity of marginal farming properties via reducing costs, improving salinity issues and providing a diversified income for properties. Between Kalannie and Dalwallinu the impact of the project is clearly visible with numbers of trees planted and mulching occurring. This visibility has helped to generate the community interest and enthusiasm for the project and a sense of ownership. A component of the project should have been allocated to feedstock processing as the expected availability of the prototype harvester was not available. Issues arose with the contingency component of the project and in hindsight more operational time should have been allowed. The 'contingency' funds would have been better termed as operational capital to reduce the confusion between the fund administrators and Verve Energy. Issues with the Intellectual Property clauses in NAP contract. Better definitions in future of commercial IP (for example, patents, trade marks) and project materials. In future this issue would need to be considered if industrial development applicants attract funding under similar circumstances.

Case study 4 **Title**	**A commercial oil mallee industry**
Describe the impacts on behavioural change	The success of the project has enormous ramifications for other small wheatbelt towns to duplicate and create their own commercially viable oil mallee industry. It is proposed that cells operate throughout the wheatbelt–approximately 200 km apart, servicing a radius of 100 km each. A central distiller would process the oil mallees planted and harvested by farmers in their local area. As they develop increased efficiencies, they will deliver increased returns to the landowner and an increased incentive for the landowner to plant more trees without the need for government to continually fund tree planting. This project has identified potential new efficiencies such as using solid fuel burners to power the distillers that would see returns increase for landowners. It is this type of development that the project will move into as its next scope. Ultimately the oil mallee industry will provide a sustainable means for farming communities across the wheatbelt to protect and enhance their land, engage in best practice farming methods and ensure the long-term survival of their small communities. This project has reignited community enthusiasm for the oil mallee industry and all its associated environmental, economic and social benefits. It has given farmers the confidence to proceed into landcare as the opportunities and returns become increasingly apparent. The project designed, built and operated a prototype integrated wood processing plant to gauge its potential for future needs should opportunities arise. Farmers would be very interested in being involved in the future if multiple products can be achieved from oil mallee tree plantings. Verve Energy has committed to the future if other full-scale plants are built.
Making a difference (anything else?)	Much has been learnt from this project from the designers and developers of the IWP plant and the funding bodies. All will be valuable information should a similar proposal arise in the future where public funds are requested. This project led to immediate employment for people from a range of industries in the local community including steel fabrication, a nursery supplier, mulching contractors and harvester workers. As the industry develops and more oil mallees are available for harvesting and production, work opportunities can only increase. As it assists farmers with the sustainable management of their land as well as providing another cash crop, it further strengthens the economic and social fabric of small communities. The stronger these communities and the stronger the industry, the more the environment will benefit with salinity and erosion control on the farmed land. The concept was proven to be successful with a three-month fully operational component. It should guide future investment in this area.

Case study 5: Collie River/Wellington Dam salinity recovery

Case study 5 Title	Collie River/Wellington Dam salinity recovery
Theme	Maintain and enhance the condition and beneficial uses of priority water assets
Priority asset and threats to it	Wellington Dam Salinity
Resources	$30 000 000 NAP ($15 000 000 WA) as at 30 June 2009, only $4 000 000 has been spent. Major infrastructure costs will be incurred in the September quarter. $15 000 000 WA contribution from Water Corporation funds.
Project description (including location, intended outcomes and outputs)	The Collie River Salinity Recovery Plan is an integrated program of four major projects that will result in salinity in the Wellington Dam being reduced to 650 mg/L by 2015. The project will contribute to a review of future water and salinity management in the Collie River Catchment and the Collie Coal Basin, taking into account the need for potable water, sustainable water allocations and management, sustainable rehabilitation of mine voids and development of a healthy river and catchment.
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	Not only farmland is so adversely affected by rising salt levels One of the State's south-west dams has become so saline the water is no longer drinkable and irrigators have stopped using it. The Wellington Dam, fed from the Collie catchment, is at the centre of intense research on how to turn the problem around. Over the past 30 years, the salt levels in the Wellington Dam have risen from 250 mg/L to 1100 mg/L. The acceptable level for potable, or drinking water, is 500 mg/L. The assumption is that, following the opening winter rains, diverting the first hyper-saline flush from the Collie River East branch away from the Collie River South branch and the Wellington Dam, salinity levels will reduce in the short term. This would allow for longer term recovery due to best management practice of farm lands within the catchment. This may be an Australian first to divert this quantity of water for improved salinity outcomes in a river system. Water will be diverted into a mining void.
Describe the major activities and outputs of the project	Completed Collie River Salinity Recovery Plan to final draft stage Completed Preliminary Design of Diversion Facility Completed Stage 1 Diversion trials over a three-year period Implementation Incentives developed and implemented for improved farming systems. 900 ha total of perennial based farming systems (including 206 ha trees) committed, with most already established. Establishment will be complete by November 2009. Completed Draft marron recovery and waterways rehabilitation strategy
Describe what outcomes have been achieved	During the trial diversion period of three years a total of 6 GL of water was diverted, removing 31 000 tonnes of salt from the river and resulting in an estimated decrease in salinity of inflows to the Wellington Reservoir of approximately 150 mg/L to 950 mg/L. With a 10 to 14 GL diversion it is expected that reductions in salinity levels will be 430 mg/L. In the first year (2005) only 1 GL was diverted and the main saline first flush was largely missed, so the resultant decrease in salinity was mainly due to the diversions of 2006 and 2007. Improvements in farming systems as a result of the incentives program offered and the provision of expert advice on an individual basis has seen perennial grasses and shrubs planted. However, the tree component received a poor response, mainly due to the activity of private tree companies working in the catchment for several years prior to the commencement of the project. Plantings are only one year old, so at this stage it is difficult to identify any resource condition change due to improved farming techniques.

Case study 5 **Title**	**Collie River/Wellington Dam salinity recovery**
Lessons learned **(risk management)**	Delays in the planning and approvals processes were experienced throughout the project including negotiations for land tenure, access routes and the development of commercial agreements. Until agreement was reached, ordering of materials was delayed. The original engineering plans were revised to include a desalination plant to treat 2.4 GL of water, part of the 3.9 GL of hyper-saline water diverted to the mining void. All of the planning, designing and approvals processes took much longer than envisaged, and the original completion date of June 2008 was extended to December 2009. The project proposed that it link to the Forest Products Commission Strategic tree farming program to plant between 1100–1750 ha of trees in the Collie South and East catchment. This was dependent on incentives, with Department of Water supplying up to $1500 ha in the up-front payment to participating landholders resulting in up to $3000/ha being available. However, the generous incentive and significant effort to promote the offer to landholders resulted in only 207 ha being planted in 2008. This poor uptake was due to a saturation of trees in the catchment and the desire of landholders to participate in more traditional land-use activities. It was wrongly assumed that cash incentives would deliver the desired outcomes. DoW also committed $250 000 for incentives to encourage landholders to invest in perennial plantings. At $500/ha and one-on-one advice, this was a very successful component. By understanding the requirements of the landholders prior to developing incentives programs, a greater chance of uptake occurs.
Project strategy **(how the project operated)**	The project has been managed by the Department of Water with the WA cash component from the Water Corporation. It has been operated through a steering committee consisting of all stakeholder groups including DoW, Water Corporation, Harvey Water, Griffin Coal, Verve Energy, local landholders, Wesfarmers Premier Coal, DAFWA, SWCC and the Shire of Collie.
Describe the impacts on behavioural change	With personalised advice and incentives to plant perennials, landholder interest was high, partly due to rotational grazing which forms an essential component of managing perennial pastures. Incentives did not work for tree plantings.
Anecdotal	Good planning is required prior to commencing complex projects. If successful, this project will show the potentials for managing salinity in similar rivers and catchment areas.
Making a difference **(anything else?)**	By 2015 it is anticipated that the project will provide up to 57 GL of potable water per year at the approximate cost of $0.3 m/GL. An extra 40 GL per year will be available from the Wellington Dam for irrigation and industrial uses. In the future the project will provide the State with a new cost-effective source of potable water and a future option for the Integrated Water Supply Scheme.

Waterways planting June 2007.

Perennial pasture site February 2009 after planting in Spring 2008.

Trial diversion site July 2006, pipe to mine void centre left.

Case study 6: Implementing the Lake Warden catchment plan

Case study 6 Title	**Implementing the Lake Warden catchment plan**
Theme	Recovery and conservation of Western Australia's biodiversity and maintaining and enhancing the condition and beneficial uses of Western Australia's priority waterways
Priority asset and threats to it	Lake Warden in the Esperance region. Water inundation in the lakes; waterlogging; eutrophication; sedimentation
Resources	$1 626 768 NAP ($813 384 WA); $110 280 NHT
Project description (including location, intended outcomes and outputs)	Lake Warden is a Ramsar-listed wetland. The project supports the implementation of the Department of Environment and Conservation's Lake Warden Recovery Plan to protect the Ramsar-listed wetlands of the Esperance Lake Warden suite. It aims at maintaining and recovering the surrounding suite of lakes and their biodiversity assets (fauna and flora) by reversing waterlogging created by clearing of natural vegetation in the catchment.
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	The wetlands are of international significance and have a high conservation value. Encompassing 3400 ha of land, the suite is home to a significant number of bird species, several of which are rare and endangered, along with a diverse array of vegetation also considered rare and endangered. The area is valued highly for its recreation and tourism and its agricultural use and cultural history.
Describe the major activities and outputs of the project	4240 ha of perennial pastures sown; 147 km of fencing erected to protect perennial pastures, creeklines and 307 ha of remnant vegetation; 700 ha of revegetation of native species (1 000 000 trees) Groundwater bore transect constructed and monitored Environment impact assessment completed on a proposed de-watering of the lakes Annual spring invertebrate surveys completed; annual spring bird surveys for water bird diversity completed Neridup surface water management plan completed Bandy Creek surface water management plan completed 15 km of surface water management earthworks; 1000 ha of soil amelioration by liming and clay spreading
Describe what outcomes have been achieved	Reduction in salinity, inundation, water logging, eutrophication and sedimentation—observations of reduced salt scalds in the paddocks surrounding the lakes Benchmarks established for macro-invertebrates and water birds for monitoring impacts of the catchment plan Natural vegetation returning inside fenced areas due to exclusion of stock; reduced wind erosion and increased numbers of fauna and flora. Bushwalking and water sports have increased due to the increases in vegetation and reduced sedimentation.
Project strategy (how the project operated)	Landholders, landowners, community groups and the general public have supported the activities and actions of the catchment plan. The Lake Warden Project Management Team oversaw the project. Membership crossed agency and community organisations including Aboriginal groups, local government and the Esperance Regional Forum. This resulted in good cooperation in the project delivery.

Case study 6 **Title**	**Implementing the Lake Warden catchment plan**
Making a difference (anything else?)	Excess water in the lakes has resulted in a loss of habitat and an associated dramatic decrease in the number of water birds and varieties of birds, especially the wading birds that depend on shallow water depths for food in their breeding season. It is too early to evaluate the changes in lake water levels or to suggest they are due to the recent investment. It will take at least five to 10 years to see any change and probably more than 10 years to be confident that the changes are not seasonal.

Lake Warden before

Lake Warden after

Case study 7: Strategic tree farming

Case study 7 Title	Strategic tree farming
Theme	Sustainable management of land resources; maintain and enhance the condition and beneficial uses of priority water catchments
Priority asset and threats to it	Rising groundwater, salinity and erosion on cleared agricultural land in the medium rainfall zone of south-western Western Australia Water Resource Recovery Catchments in the medium rainfall zone of south-west WA. Priority areas as identified by participating/partnering NRM organisations: Targeted Investment Program area in Northern Agricultural Region; Capercup/Haddleton and Qualeup in South West Region; Frankland/Gordon and Middle Kalgan/Oyster Harbour in South Coast Region and Lake Warden in the South Coast Esperance Region.
Resources	$64 400 000 NAP ($32 200 000 WA)
Project description (including location, intended outcomes and outputs)	The $64 million Strategic Tree Farming (STF) program was the largest single NAP investment in Australia. The primary aim of the project was the integration of almost 18 000 ha of tree crops into existing farming enterprises in the medium rainfall zone of south-western Western Australia, delivering environmental and socio-economic benefits. The environmental benefits include groundwater table control through reduced recharge; salinity mitigation; enhanced landscape biodiversity and aesthetic outcomes; land and water resource protection; and carbon sequestration. The economic benefits include the production of wood and biomass; strengthening existing industries; and progress toward building new industries. The social benefits include diversification of rural incomes; farm sustainability; and regional employment and development.
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	**Rising groundwater and salinity:** Broadscale and strategic distribution of woody perennials across the cleared agricultural landscape was recommended for the control of salinity in *The Salinity Strategy* (State Salinity Council 2000). The replacement of deep-rooted native vegetation with shallow-rooted crops and pasture as the cause of rising watertables and salinity is well documented. Many studies prior to, and since, the production of the State Salinity Strategy have shown that trees can prevent recharge to watertables and that, in time, the watertables respond to the reduced recharge conditions, depending on residual infiltration and lateral flows from adjacent unplanted areas (Greenwood et al. 1992; George et al. 1999; Johnsen et al. 2007). Watertables under alley farming systems with *Eucalyptus globulus* at Boyup Brook were shown to decrease by about 30 cm each year over a 12-year period compared to adjacent annual pasture (Rob & Bennett 2004). Blue gum plantations established since the late 1980s have lowered groundwater and led to improved water quality in the Denmark Catchment (Bari et al. 2004). **Industry and regional development:** The State Salinity Strategy acknowledged that commercial returns would be necessary to get adoption of woody perennials on a scale required to address rising watertables and salinity in Western Australia (State Salinity Council 2000). Consequently, STF had important industry development objectives which were underpinned by the Action Plan for Tree Farming in Western Australia (Government of WA 2002) and subsequent Industry Development Plans (IDP) developed for Maritime Pine, Eucalypt Sawlog, Radiata Pine and more recently Oil Mallees and Sandalwood. The areas targeted by STF included those areas where Regional NRM Strategies overlapped with IDP industry development cells. It is envisaged that the investment in new plantings through STF will act as a seed for the establishment of further plantings (DEWHA 2008). When IDP targets are met a range of new processing and supporting industries will be attracted and will contribute to rural and regional employment and regional development. **Ancillary farm and environmental benefits:** Wind erosion is a significant environmental threat on cleared light textured and sandy soils in the northern wheatbelt, Midwest and along the South Coast. In the Zone of Rejuvenated Drainage in the South West and in the Avon Valley, over 20 per cent of soils have high to extreme wind erosion susceptibility. Replanting trees and native vegetation is recommended to reduce surface wind speeds and thus erosion. Windbreaks need to be spaced at least 20 to 30 times tree height to reduce wind speed, and effectiveness will be increased with closer spacing (DAFWA 1998). Windbreaks reduce physical damage to soils and crops and can lead to improved crop growth and yield, improved stocking rates and lambing percentages (Sudmeyer 1999; Rundle & Rundle 2002).

Case study 7 Title	Strategic tree farming
Rationale and justification **(What assumptions are being made and why will the proposed actions deliver the outcomes)**	Tree plantings can provide an expanded habitat for wildlife and connectivity between remnants and form buffer zones between agriculture and valuable natural assets such as watercourses and wetlands (DAFWA 1998). DEC identified 30 catchments and landscapes that are high priority for conservation of biodiversity in the agricultural areas. Recharge management with trees was identified as the major approach to management of salinity in 11 of them (DEWHA 2008). Wherever possible, FPC targeted its STF planting activities in priority areas identified by DEC, DoW and/or the regional NRM organisations. FPC and landholders worked together to design STF plantings to maximise agricultural productivity and hydrological and ancillary environmental benefits. Direct biodiversity benefits will flow from the establishment of more than 5700 ha of sandalwood (*Santalum spicatum*) as part of the STF Project. Being a root hemi-parasitic tree, sandalwood is planted with a nitrogen-fixing host species such as jam (*Acacia acuminata*). Both being native species, they make an important contribution to biodiversity values, with a variety of native fauna making use of these plantings for food and habitat (Majer et al. 2001).
Describe the major activities and outputs of the project	**Tree crop establishment**: The major output of the project is the successful establishment of the target 18 000 ha of tree crops on previously cleared agricultural land in the medium rainfall zone of Western Australia, across four NRM regions (see table below).

NRM Region	Taxa	2005	2006	2007	2008	2009	Total
South Coast NRM Inc.	Eucalypts	240	823	590	475	779	2,907
	Sandalwood	88	207	256	195	158	904
	Pine	114	534	1,397	694	467	3,206
	Total	**442**	**1,564**	**2,244**	**1,364**	**1,404**	**7,017**
South West Catchments Council	Eucalypts	41	241	600	341	1,022	2,246
	Sandalwood	47	210	467	666	279	1,669
	Pine	16	104	22	445	63	649
	Total	**104**	**555**	**1,089**	**1,451**	**1,364**	**4,563**
Wheatbelt NRM Inc.	Eucalypts	9	10	0	23	5	46
	Taxa Trials	0	0	0	16	0	16
	Sandalwood	35	134	657	1,079	44	1,949
	Pine	94	111	0	138	0	342
	Total	**138**	**255**	**657**	**1,256**	**49**	**2,354**
Northern Agricultural Catchments Council	Eucalypts	0	0	0	0	35	36
	Taxa Trials	0	0	0	35	0	35
	Sandalwood	47	62	165	774	209	1,257
	Pine	322	823	1,108	467	0	2,720
	Total	**370**	**885**	**1,273**	**1,276**	**244**	**4,047**
Total All Regions	Eucalypts	290	1,074	1,191	839	1,841	5,235
	Taxa Trials	0	0	0	51	0	51
	Sandalwood	216	613	1,546	2,714	690	5,778
	Pine	546	1,571	2,527	1,743	530	6,917
	Total	**1,053**	**3,258**	**5,264**	**5,347**	**3,061**	**17,982**

Case study 7 Title	Strategic tree farming
Describe the major activities and outputs of the project	**Farm Forestry Education Project**: Education is a key strategy to increase the awareness and adoption of farm forestry as part of more productive and sustainable farming systems. The WA Farm Forestry Education Project, a sub-project of STF, was a partnership between the participating NRM Groups, FPC, the WA Private Forestry Development Committees (PFDC) and the Australian Master TreeGrower Program. There were 48 Farm Forestry Promotion/Education activities delivered across the four participating NRM regions between 2005 and 2008. Farm Forestry Development Officers, employed with external funding, worked with PFDCs and the regional NRM partners to provide invaluable extension to STF and other landholders in farm forestry. **Hydrological Monitoring Program**: A program was developed to monitor, evaluate and report on the hydrological impacts of STF plantings. The program involves a structured sampling design which will provide robust estimates of the effect of tree plantings on watertables and recharge in landscapes representative of those targeted by STF. The 25 sites currently being monitored will document the hydrological regime at the time of tree farm establishment and reductions in saline discharge due to the tree farm in coming years. The large number of sites and the concurrent monitoring of watertable levels and tree development will address the question of the long-term performance of trees planted near saline discharge zones. This will lead to future planting efforts being focused to provide the greatest hydrological and productivity benefits. A draft report was produced with information for all sites including maps of location of property; plantings and monitoring equipment; EM survey results; drill logs; soil data; Flowtube modelling analysis; and baseline data for groundwater levels, surface flow, tree growth and water quality. When finalised, the report will be published in the DAFWA *Resource Management Technical Reports* series (http://www.agric.wa.gov.au/PC_91722.html). **Performance Story Report**: Another significant output of the STF Project has been the production of a Performance Story Report (DEWHA 2008). STF was one of 13 projects chosen nationally by the Australian Government to trial the 'Performance Story' method as a way of reporting more holistically on the performance of the NHT2, NAP, other relevant current investments and future NRM investments. The focus of the Performance Story Report (PSR) was on evaluating the STF Project from a regional NRM perspective in terms of social, economic and environmental outcomes. The report draws on a wide range of published sources and on consultation with many agencies and individuals including FPC; participating NRM groups; Private Forestry Development Committees; Department of Agriculture and Food WA; DEC; DoW; CSIRO; UWA; participating landowners; contractors and other service providers; and agri-forestry consultants. **Taxa Trials**: Trials of a range of taxa were established on 51 ha across seven sites in the northern Agricultural and Avon Regions in 2008. This research will provide alternative tree-crop options to landholders in the future through testing the drought tolerance and productivity of a range of taxa including a number of local provenances. Taxa include *Casuarina*, three species of *Corymbia*, five species of *Eucalyptus*, two *Eucalyptus* crosses and three *Pinus* species. **Carbon Sequestration**: The sequestration of CO2-e by the almost 18 000 ha of STF plantings is estimated at 3.9 Mt, which would offset the annual emissions of more than one million cars, or about 5 %of the estimated total 2007 emissions for Western Australia (71 Mt). There are benefits from the displacement of fossil fuels (bioenergy) and carbon in harvested wood products (Dr Peter Ritson *pers. comm. FPC*.)

Case study 7 Title	Strategic tree farming

Describe what outcomes have been achieved

Rising Groundwater and Salinity: The hydrological monitoring program (see Outputs section above) is designed to monitor, evaluate and report on the hydrological impacts of STF. However, given that the oldest of the plantings are only coming up to five years of age it will not be possible to provide empirical evidence of the outcomes for this objective for another five to seven years, until the trees are big enough to reduce recharge to watertables.

Ancillary Farm and Environmental Benefits: Although the STF planting is less than five years old, anecdotal evidence (see Anecdotal below) about the positive impacts of the trees in the landscape emerged in interviews with project participants during the production of the Performance Story Report (DEWHA 2008).

Taxa Trials: Fifteen months after establishment and having experienced their first summer, seedling survival is high– on average more than 85 %. Some seedlings are already over 3 m tall. While it is too early to make predictions on the best performing species, there appear to be some very promising prospects among the species tested.

Increased Awareness, Understanding, Acceptance and Confidence in Farm Forestry: Tree farming is a relatively novel land use in the medium to low rainfall zone of Western Australia, where traditional agricultural pursuits of grazing and cropping systems are the norm. The outcomes of the Farm Forestry Education Project (see Outputs above) have been increased awareness, understanding, acceptance and confidence in farm forestry.

The following quote is from a landholder who attended one of the Education Project course.

The Introductory Farm Forestry workshop in itself was a very significant change in my attitude to dry land forestry and the opportunities that are available. Prior … I had very much relegated forestry into the higher rainfall areas and was very sceptical about dry land farm forestry and even integrated into farming systems. It just wasn't on my horizon … ever since then I've been shouting about integrated tree cropping.

Further evidence of the increased awareness and confidence of landholders can be seen in an increasing trend in the number of hectares planted per landholder from 2005 to 2009 (see table below).

NRM Region	2005	2006	2007	2008	2009
Northern Agric.	92	126	127	128	121
Wheatbelt	34	36	66	105	48
South West	35	43	42	73	136
South Coast	44	58	72	62	82
TOTAL	**205**	**263**	**307**	**368**	**387**

The total number of landholders to have planted trees as part of the STF Project is 186 with 14% of farmers planting in more than one year.

Industry Development: An outcome of the STF Project has been its contribution to industry development which is outlined in the following table. STF plantings have contributed to building the critical mass of resource needed for the development of new regional processing and value adding opportunities. The planting targets have been obtained from the Industry Development Plans.

Case study 7 Title	**Strategic tree farming**

Describe what outcomes have been achieved

Industry Development Plan Cell	Plantings prior (or additional*) to STF (ha)	Planted under STF (ha)	Min. resource required or planting targets (ha)	Progress toward planting targets
MidWest Pinaster (Northern Agric. & Avon NRMs)	10,000	3,062	~70,000	~19%
Esperance Pinaster (South Coast NRM)	2,650	2,549	~70,000	~7.5%
Euc. Sawlog (SWCC & South Coast NRM mainly)	690	4,372	~40,000	~13%
Sandalwood (4 NRM regions)	9,700*	5,778	~50,000	~31%

Project strategy (how the project operated)

The FPC delivered the project in partnership with four regional NRM groups–Wheatbelt NRM Inc. (previously Avon Catchment Council); Northern Agriculture Catchments Council; South West Catchments Council; and South Coast NRM Inc. The CEOs of the NRM organisations were members of the STF Project Steering Committee with an Australian Government, WA State NRM Office and FPC representative. The Steering Committee oversaw all aspects of project delivery.

Land for STF plantings was acquired via promotion of the project and direct engagement with landholders by FPC staff (for example, visits to the farms). Sites were selected after assessment and evaluation to ensure the offered land met productivity and legal criteria. The final layout of plantings was decided after discussions with the landholder and detailed in a property management plan (PMP). Land was secured in accordance with the *Forest Products Act 2000* in the form of a Timber Sharefarming Agreement (TSA), which sets out the payment to landholders and rights and obligations of the landowner and the FPC.

The PMP is a critical document which contains a map of the property and plantings and information on the methods by which the plantings will be established, managed and protected in compliance with the *Code of Practice for Timber Plantations in WA 2006.* The PMP also forms the basis of the application for planning approval for the planting from the relevant local government authority under town planning legislation.

Site preparation involves clean-up of debris and woody weeds; soil preparation by ripping, rip-mounding or scalping (the method depending on site conditions) and weed control. Weed control is essential for the successful establishment of seedlings and the soil preparation and weed control strategies need to be complementary. Planting occurred in the winter months of each year 2005 to 2009. Maintenance activities which occur at intervals throughout the rotation include pest and weed control; firebreak maintenance; and pruning and thinning operations if/as required. Site preparation and maintenance activities are generally carried out by contractors. However, landholders were given the option to undertake the work at prevailing contract rates, providing additional on-farm income.

The initial design of a hydrological monitoring and evaluation program was undertaken by a Scientific Reference Group which consisted of hydrologists from a number of agencies including DAFWA. The 25 strategic monitoring sites will be monitored throughout the rotation of the tree crop and will enable the hydrological impact of the STF plantings to be properly evaluated.

Case study 7 Title	Strategic tree farming
Making a difference (anything else?)	There is more awareness, understanding and confidence among landholders about the capacity and benefits of integrating tree crops with traditional agricultural enterprise. Sandalwood was a popular choice due to the perceived high future value of products and because as a native species it resonated with landholders on a psychological level. Maritime pine was the tree crop of choice in areas of deep infertile sands where traditional agricultural returns are typically very poor. While STF has broken new ground and made a significant contribution to the development of farm forestry in the medium rainfall zone, further investment and commitment from government will be needed to achieve the critical mass of plantings necessary for a sustainable farm forestry industry. The environmental, economic and social benefits of developing a sustainable farm forestry industry in the medium rainfall zone will be amplified in a carbon constrained economy. For long-term sustainability of farm forestry in the medium rainfall zone, multiple product streams and markets for those products are needed. These products could include wood fibre (bioenergy, wood panels, paper), timber, oils, seeds, activated carbon and services such as sequestered carbon, salinity and water quality benefits, protection against wind erosion and biodiversity benefits. Markets for these products need further investigation and analysis. As tree farming is a relatively novel pursuit in the medium rainfall zone, early adopters are more likely to become / remain involved if they have the security and confidence of doing so in partnership with government. Continued education and extension is a critical part of building the confidence of landholders. Some landholders are strongly committed to maintaining what are seen as traditional farming practices and even generous incentives to plant trees will not persuade them otherwise (see the Collie River/Wellington Dam salinity project).

Integration of commercial plantings of sawlog Eucalypts with traditional cropping and grazing enterprise, providing hydrological benefits; protection to soils, crops and stock; biodiversity benefits by buffering and connecting remnants and; and aesthetic benefits.

D-notch weir and piezometer at one of the 25 sites on which monitoring is occurring to evaluate the hydrological impacts of the STF plantings.

Tending seedlings in the nursery (left) and site preparation (right) for planting tree crops. STF and farm forestry generally provide a range of on- and off-farm employment opportunities in regional and rural areas.

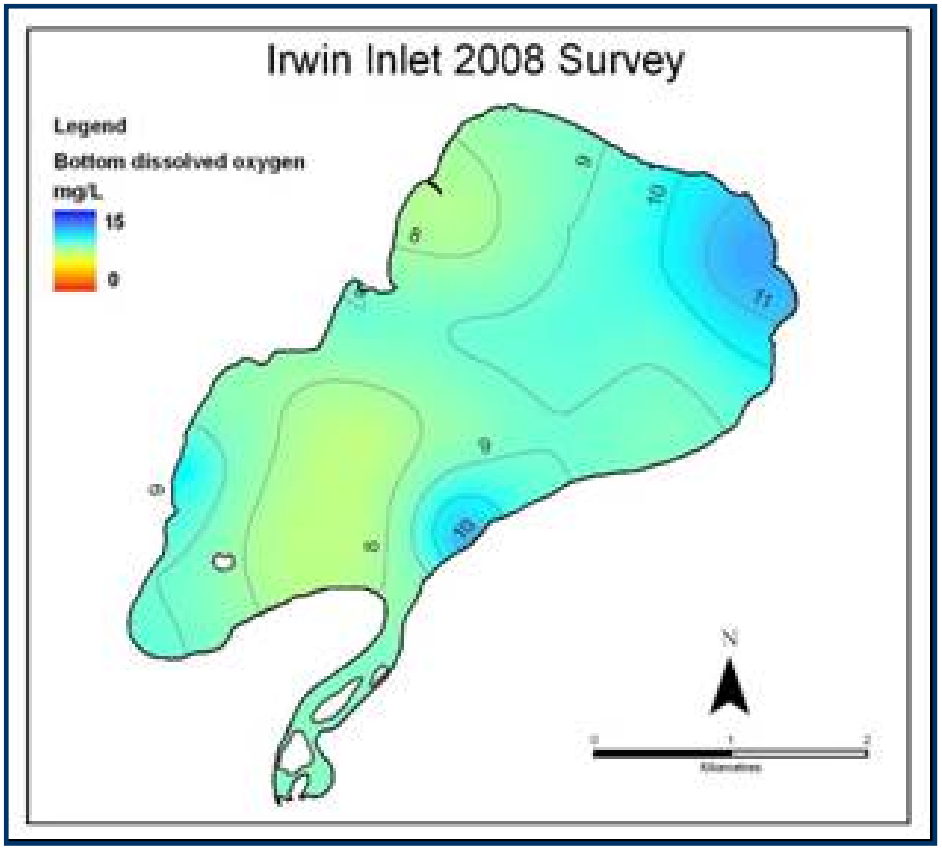
Education and extension was a critical component of engaging landholders and building awareness and confidence in the relatively novel pursuit of farm forestry in the medium rainfall zone.

Case study 8: Resource condition monitoring—estuarine

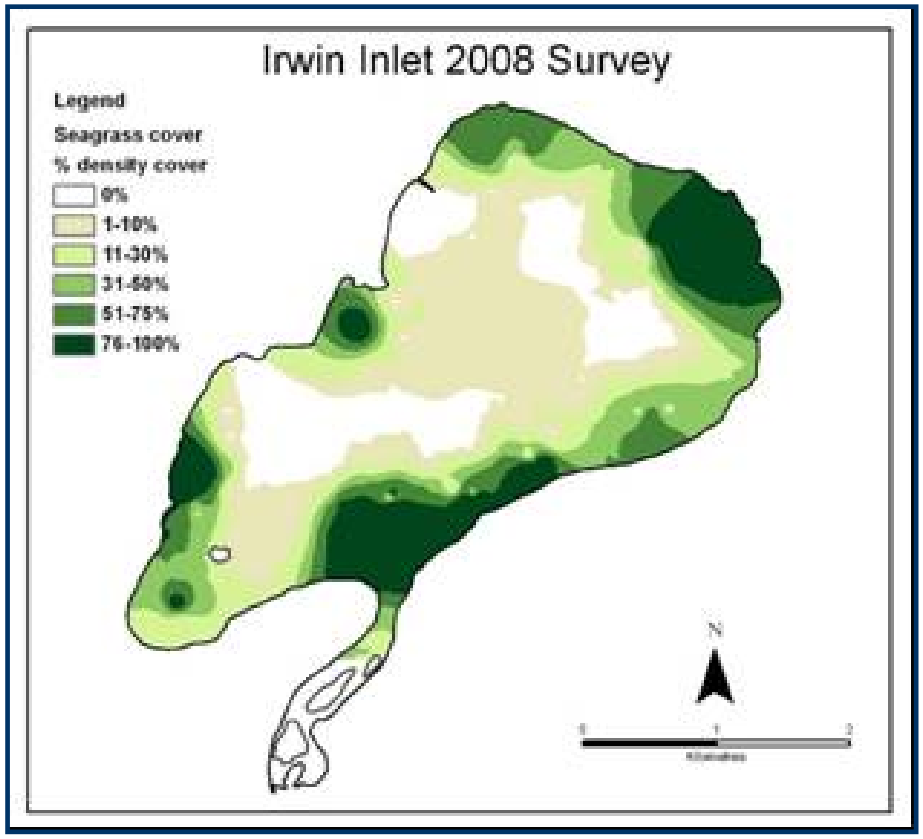
Case study 8 Title	Resource condition monitoring—estuarine
Theme	Maintain and enhance the condition and beneficial uses of priority water assets; and enhancing skills, knowledge and engagement and evaluating outcomes
Priority asset and threats to it	Iconic south-west waterways: Avon; Torbay; Wilson Inlet; Lower Blackwood and Hardy Inlet; Leschenault; estuaries east of Albany and Hill River Eutrophication; pollution; sedimentation of water and the impacts on biota and abiota
Resources	$814 000 consisting of $543 500 NAP ($271 750 WA funds) and $270 500 NHT
Project description (including location, intended outcomes and outputs)	Estuaries are heavily impacted by agricultural and urban activities in catchments. Establishing estuarine condition and appropriate responses to these activities is complex. The Estuarine Resource Condition Monitoring Project aims to develop indicators of estuarine condition with a focus on biotic and non-biotic indicators and not water quality. Experience so far in Western Australian estuaries shows that sediments and submerged aquatic vegetation are important measures of estuarine condition and reflect changes in catchment loading and estuarine dynamics. Under similar nutrient loading conditions estuaries may respond quite differently. Some grow phytoplankton and some grow macroalgae and macrophytes. Traditional water quality data are important indicators of eutrophication, for example, but on their own do not describe the overall estuarine condition, especially when nutrients are stored in sediments or plant biomass. A combination of indicators is required to establish condition and these should be incorporated into any long-term monitoring program. Aims: • Develop indicators of estuarine condition from which resource condition targets can be derived and which are measurable in routine and systematic monitoring programs. • Provide condition assessments of priority estuaries using the recommended indicators. • Report back to communities on the condition of their estuaries.
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	Traditional water quality variables are important indicators of eutrophication but are not always the best indicator of estuary condition, especially when nutrients are stored in sediments or plant biomass. This project aimed to increase knowledge and develop biotic and abiotic indicators other than water quality. Potential indicators include changes in the extent and distribution of estuarine submerged aquatic vegetation, and differences in the physical properties, and nutrient flux and metabolism in estuarine sediments; each of these is reflective of changes in catchment loading and estuarine dynamics.

Case study 8 **Title**	**Resource condition monitoring—estuarine**
Describe the major activities and outputs of the project	Undertake submerged aquatic vegetation surveys in selected estuaries. Assess additional estuarine condition indicators that may have applicability over a wide range of estuaries. Compare estuarine indicator approach to other states to ensure compatibility when compared at a national scale. Develop a set of indicators that can be used over the long term which are meaningful at the community and the manager level. Several sampling and analysis plans have been developed to provide a clear, concise plan for each of the surveys. The sampling and analysis plans assist in achieving uniformity of sampling and analytical chemistry protocols across the regions. Results from the surveys are stored in the Water Information (WIN) database maintained by the DoW This includes chemical analysis data of water samples collected, sediment data and media files from the underwater video footage. The project has produced GIS shape files and contour maps of data collected in each estuary. These maps exist as GIS layers and include bathymetry, physical water quality for surface and bottom waters (temperature, salinity and dissolved oxygen), sediment characteristics (grain size, porosity, total organic carbon and TCO2), as well as seagrass species distribution. These maps will provide a visual tool to identify important habitats and changes over time in those habitats. Macrophyte survey will be conducted in the Hardy Inlet. Sediment quality and submerged aquatic vegetation surveys completed in Stokes, Wellstead, Beaufort, Gordon, Oyster Harbour, Wilson Inlet, Torbay, Parry, Irwin, Walpole–Nornalup, Hardy, Vasse–Wonnerup, Leschenault and Swan–Canning Bathymetry collected in Stokes, Beaufort, Parry, Irwin Estuarine indicator approach compared at national workshops. Summary reports for seven estuaries from which 'report cards' have been developed that can be used to support estuary management by community based estuary management groups.
Describe what outcomes have been achieved	Submerged vegetation surveys have been completed in six estuaries (Stokes Inlet, Wellstead Estuary and Beaufort Inlet east of Albany, and Wilson Inlet, Walpole–Nornalup Inlet and Irwin Inlet west of Albany). Video footage of more than 615 transects were collected across these estuaries. Sediment surveys were also completed in six estuaries (Stokes Inlet, Wellstead Estuary, Beaufort Inlet, Wilson Inlet, Walpole–Nornalup Inlet and Irwin Inlet). Sediment samples were collected from 130 sites across the six estuaries. Samples were analysed for a range of potential condition indicators including grain size, porosity, total organic carbon content and sediment reactivity (TCO2) as a measure of carbon dioxide production. Bathymetry data has been collected in three estuaries for which there are no existing marine charts with the Department of Planning and Infrastructure. These are Parry Inlet, Irwin Inlet and Stokes Inlet. The eutrophication status of Hardy Inlet and Walpole–Nornalup Inlet has been assessed using the USA-based eutrophication index tool, ASSETS (Assessment of Estuarine Trophic Status). Estuary condition reports were compiled for: Parry Inlet; Walpole–Nornalup and Beaufort Inlet. Established core list of measures and indicators for estuaries and an understanding of the frequency of measurement required to obtain good indicators of estuary health. Knowledge gaps filled in 15 estuaries to allow comprehensive estuary condition assessment and reporting. Completed condition assessment and presentation on Hardy Inlet to community and agency audience in Augusta and on the Leschenault estuary in Bunbury. Others to follow.

Case study 8 Title	Resource condition monitoring—estuarine
Lessons learned **(risk management)**	In the first pass use of the ASSETS tool, it is proving to be a useful and objective approach for assessing the susceptibility and status of an estuary to nutrient enrichment that can be compared to other systems. This tool has been applied to systems in the USA and Europe. We now understand what the key measures of the condition of a Western Australian estuary are and can synthesise water quality, biotic and sediment measures in a way that is understandable to concerned communities and management agencies. Routine assessment of estuaries using these measures shows the community how an estuary changes as a result of their efforts and with time. The same assessments provide feedback to government on the effectiveness of their policies and provide early warning of problems so a management response can be implemented before serious loss of amenity occurs. Estuaries are still where the majority of West Australians live and the condition of the estuary is of vital interest to all.
Project strategy **(how the project operated)**	The Department of Water's Water Science Branch lead the project through a collaborative scientific process between the Department of Water and Edith Cowan University, Curtin University and Geoscience Australia.



A draft contour map of bottom water dissolved oxygen from data collected at 20 reference points across the Inlet.



A draft distribution map of the seagrass *Ruppia megacarpa* in the Leschenault obtained from video transect data collected in the Inlet Estuary (created by Luke Riley, Water Science).

Case study 9: Ecoscapes—Avon

Case study 9 Title	Ecoscapes–Avon
Theme	Recover and conserve biodiversity
Priority asset and threats to it	Biodiversity within the Avon River basin, part of an internationally recognised biodiversity hotspot Land clearing; salinity and rising water-tables; invasive plants and animals; erosion–wind and water
Resources	$5 054 371 consisting of $4 402 773 NAP ($2 201 388 WA funds) and $651 598 NHT
Project description (including location, intended outcomes and outputs)	This project aimed to conserve the extent and integrity of the natural diversity (species, TECs and ecosystems) within 12 landscapes that best represent the natural diversity of the Avon River basin (undertaking 12 projects within the first three years). Two landscapes within each IBRA region that provide the best representation of the natural diversity were selected for intensive conservation action. In total, when complete the project proposed that it would maintain and enhance nature conservation assets over some 720 000 ha.
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	Threats to biodiversity across the Avon include salinity and water quality as well as invasive weeds. The project intended operating in landscape areas of generally between 30 000 ha and 100 000 ha. Natural resource specialists worked with land managers and the community to undertake fencing, regeneration, revegetation, weed and animal pest management, surface water management, drainage, groundwater pumping and improved fire management.
Describe the major activities and outputs of the project	402 km fencing to protect 4489 ha of remnant vegetation and revegetation sites 8 km fencing to protect 77 ha riparian vegetation 365 565 trees planted for biodiversity 37 000 oil mallees planted 4000 sandalwood planted. Report compiled that details selection process to identify regional Ecoscapes (Walshe Report 2005) Interim Conservation Plan for Tampu, Westonia, Wongan Hills and Dale Ecoscapes identifying priority areas and ‘neighbourhoods’ (see supplied plan and mapping) 6000 ha of valley floor area protected by waterway engineering
Describe what outcomes have been achieved	Review and adapt/adopt existing criteria to identify and select ecoscapes best representing natural diversity in the Avon River basin. Established and applied a process and criteria for determining and evaluating options for retaining the natural diversity of representative ecoscapes. Prepare four priority conservation plans. Each interim Conservation Plan comprised: • an asset list of vegetation and sensitive bird species • a value analysis of the assets based on extent against pre-European extent • a threat assessment from a desk top hydrological modelling threat assessment and the CSIRO’s Land Monitor and Veg Machine remote sensing software • a prediction for spatial occurrence of sensitive bird species and habitat threat to assist in community engagement.

Case study 9 Title	Ecoscapes–Avon
Describe what outcomes have been achieved (continued)	Prioritisation of the Ecoscape assets is based on: • retaining 30 per cent of the specific Ecoscape pre-European extent for vegetation • consideration of the vegetation representativeness across the wider Avon extent analysis model (Comprehensive, Adequate and Representative (CAR) • distribution and fragmentation of remnants vegetation parcels. Consideration to any significant future threats indicative of the Brooker and LeFroy predictive modelling Consideration to the adoption of existing natural diversity priorities based on previous projects A proposal for interim management options, including cost-benefit analysis and target management locations Designed skills development programs in mentoring and project management for bioregional teams Initiated on-ground works according to priorities identified in conservation plans
Lessons learned (risk management)	The concept of Ecoscapes was a great theory, but was difficult to turn into on-ground actions. It was ambitious to attempt to get DEC, Greening Australia WA (GAWA), and the community to work together with the ACC to achieve the conservation planning and implementation desired from the program. This project was a unique trial that endeavoured to get biodiversity experts with differing ethos to work together to develop conservation plans and achieve change on the ground. The initial target was to identify 12 ecoscapes and to develop conservation plans and implement intensive conservation action in all of them. Basically this program was trying to achieve twenty years work in three. The process identified 13 new plus two existing ecoscapes (Tarin Rock and Lake Bryde). A steering committee contracted Terry Walshe from the University of Melbourne to undertake this process of identification. The Muchea ecoscape was not pursued as it was outside the regional boundary. The final selection was Dale, Westonia, Tampu, Lake Bryde, Tarin Rock, Kondinin, Tutanning, Welsh, Chinocup, Burracoppin and Dunn Rock. It became evident that the program was unable to deliver all twelve and consequently the number was reduced to six. Dale, Westonia, Wongan Hills, Tarin Rock, Lake Bryde and Tampu were selected through a process that matched a set of feasibility criteria to prioritise them. The program was delivered initially by multiple organisations with differing ethos and work structures. While every effort was made by all concerned to work together, it created many problems including the uncertainty of who was in charge. The program also suffered from being unable to complete the planning and on-ground components for twelve ecoscapes and had constant variation requests to reduce the output of the program. As a result of a review all project teams began using the ACC Project Management Methodology (developed in consultation with the PeopleRich consultants) and completed separate components of the program rather than working in partnership with the other service providers. The review also provided for the following: • utilise and learn about the new ACC Project Management Methodology • build a more productive relationship between the service providers and the ACC • manage the communication to the community through a single channel.

Case study 9 Title	Ecoscapes–Avon
Lessons learned **(risk management)**	These will result in: • guidance for future on-ground works that reflect guidance by the interim Conservation Plans • a baseline for on-ground validation of the desk analysis • a cost-benefit analysis for future planning.
Project strategy **(how the project operated)**	The project operates in landscape areas of generally between 30 000 ha and 100 000 ha. Natural resource specialists working with land managers/holders and the community undertake fencing, regeneration, revegetation, weed and animal pest management, surface water management, drainage, groundwater pumping and improved fire management. Twelve ecoscapes were identified using as a basis a framework developed by Beecham, Bone and Wallace (Managing Natural Biodiversity in Western Australian Wheatbelt 2003). For selection as an ecoscape these were required to contain areas of high remnant vegetation cover; include at least two ecoscapes within each IBRA region; and include a range of impacts for current and predicted salinity risk. The Avon Catchment Council technical panel (DEC, GAWA , WWF, DAFWA and Murdoch University) decided that Beard's vegetation associations were to be used; a notional target equivalent to capture of 1 per cent of the pre-European extent of each vegetation association would apply; and candidate sites were to be mutually exclusive 10 000 ha hexagons. The process identified 13 new plus two existing ecoscapes (Tarin Rock; Lake Bryde. A steering committee contracted Terry Walshe from the University of Melbourne to undertake this process of identification. The Muchea ecoscape was not pursued as it was outside the regional boundary. The remaining sites are Dale, Westonia, Tampu, Lake Bryde, Tarin Rock, Kondinin, Tutanning, Welsh, Chinocup, Burracoppin and Dunn Rock. Tarin Rock and Lake Bryde had conservation plans completed for them in September 2006. In February 2008 the Lake Bryde and Tarin Rock ecoscapes had their components of on-ground works completed. These works complemented works that were in progress under a DEC program. The remaining active ecoscapes beyond February 2008 are Dale, Westonia, Wongan Hills and Tampu.
Describe the impacts on behavioural change	Endeavouring to get different organisations in the biodiversity field and community (with completely different ethos, styles of operation and expectations) was a major inhibitor to the delivery of the project. Changes were required to the management of the project to enable it to be successfully implemented.

Case study 9 **Title**	**Ecoscapes–Avon**
Anecdotal	Lessons learnt from the experience of being involved in the program include: The time and resources required to complete the Conservation Plans were under-estimated. Taking a technically sound framework and making it practical creates issues. The critical importance of social capacity in turning the theory into practice cannot be over-estimated. Project management skills are critical to the success of any program / project for the ACC and also for its delivery organisations / service providers. Clear roles and responsibilities of personnel need to be identified and established during program / project development particularly in complex proposals such as Ecoscapes. It was felt that the actual project plan details should be developed with the delivery organisation in future to ensure better results. Changing behavioural practices are not only difficult to achieve, but also to identify. In project management, overall management is difficult if the delivery organisation sub-contracts components of the project. Often the timeframes for delivering programs conflict with the practicalities of on-ground works, for example, tree planting from planning to planting takes at least twelve months, It often stretches over a calendar rather than a fiscal year with the timing of the beginning of the process critical.
Making a difference (anything else?)	The major inhibiting factor in delivering this program was the difficulty of taking a technically sound theory and turning it into on-ground activity. This is not a problem exclusive to this project. There are many examples of service providers / delivery organisations, from both government and non-government who have had similar issues when trying to deliver on-ground activities that lead to change. For example, in the Ecoscapes Program, it has been shown that the Beecham and Bone Biodiversity Framework (Managing Natural Biodiversity in Western Australian Wheatbelt 2003) is best practice, but it is very theoretical. It raised the issue of being extremely resource intense yet lacking any recognition of the importance of social capacity.

Typical Avon natural vegetation

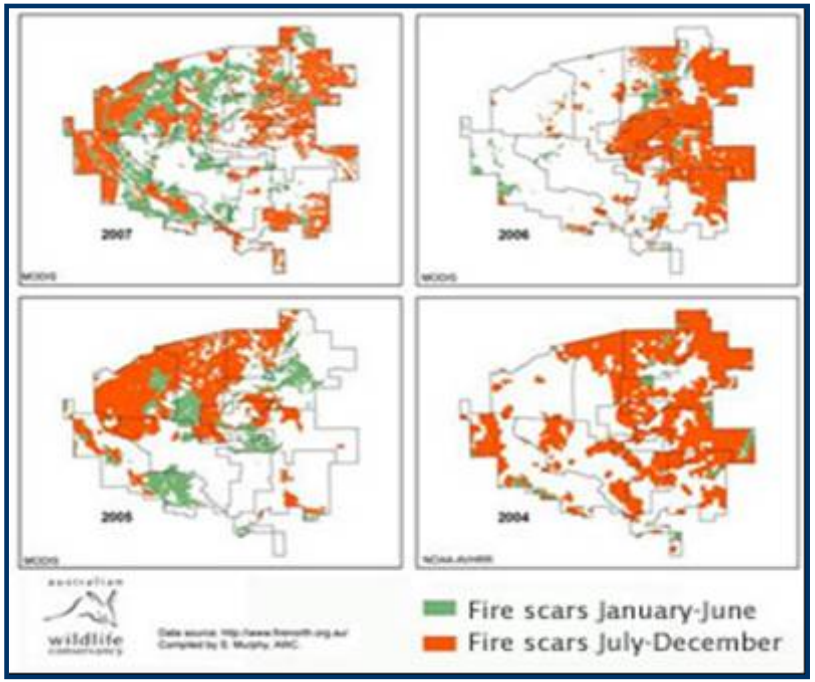
Revegetation site in the Avon

Case study 10: EcoFire—Kimberley Rangelands

Case study 10 Title	**EcoFire—Kimberley Rangelands**
Theme	Sustainable management of land resources; recover and conserve biodiversity; improved land-use planning
Priority asset and threats to it	Pastoral grasses for pastoral sustainability Biodiversity including flora and fauna across the Kimberley Inappropriate fire regimes
Resources	$822 625 NHT
Project description (including location, intended outcomes and outputs)	The project addresses the problem of large destructive fires in the Kimberley through regionally coordinated fire management. The project area covers 14 central and northern Kimberley pastoral, Indigenous and conservation properties (almost 5 million ha).
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	Fire is a natural part of the Kimberley environment. Fire patterns are changing to more frequent, larger size and increased intensity. These changes have seen declines in threatened bird species, small mammal populations and sensitive vegetation communities. Fires now occur on a much larger scale and more frequently in the mid-to-late dry season (July–November) and typically recur every two years. With the changes in timing, frequency and intensity of fires, large areas of grass are lost, resulting in reduced production for pastoralists. In addition, culturally sensitive sites can be damaged. EcoFire can coordinate fire management in the Kimberley.
Describe the major activities and outputs of the project	Monitoring sites across the EcoFire project area to observe the interaction of grazing and the various types of fire. Participatory fire management planning trialled with the Yulumbu community, Tablelands Station (conducted by Kimberley Land Council) Training in prescribed fire management for EcoFire participants (provided by Fire and Emergency Services Authority). A communication strategy prepared by AWC to improve awareness of fire-related issues in the community
Describe what outcomes have been achieved	AWC's analysis of satellite imagery demonstrated that fire patterns in the project region had improved within one year. Results include: • Mid-to-late dry season fires made up a much smaller proportion of all fires than previous years. • Unplanned fires were much smaller in size. • The dispersion of burnt and unburnt vegetation was much 'grainier'. There were many more small patches, and they were spread more evenly throughout the project area. • This reduction in the extent of intense fires is expected to benefit biodiversity, improve pastoral production and limit damage to cultural sites.
Lessons learned (risk management)	EcoFire is successful because it: • operates on a regional rather than property scale • effectively engages the community in fire management • has strong support and active participation from organisations and stakeholder groups with an interest in the region's fire management including Rangelands WA.

Case study 10 Title	EcoFire—Kimberley Rangelands
Project strategy **(how the project operated)**	The Australian Wildlife Conservancy (AWC) managed the project on behalf of the Rangelands NRM group. It is based at the AWC Wildlife Sanctuary at Mornington Station in the central Kimberley. The project is guided by a Steering Committee of representatives from organisations and stakeholder groups with an interest in fire management in the Kimberley. Members include Rangelands NRM Group, AWC, DEC, FESA, DAFWA, Shires of Wyndham–East Kimberley, Broome and Derby and PGA. EcoFire aims at improving Kimberley fire patterns through a strategic prescribed burn program. This occurs when AWC meets with participating lease holders during the dry season to produce a regional burn plan. By accessing satellite imagery fire histories of the area can be produced. Strategically placed fire breaks are put in place by aerial incendiaries dropped from a helicopter early in the dry season when vegetation is still damp and fires generally go out overnight. Property managers also carry out on-ground follow-up work.

Firebreaks from aerial incendiaries



Australian Wildlife Conservancy website:
www.australianwildlife.org EcoFire Project

Case study 11: Engineering Evaluation Initiative

Case study 11 Title	**Engineering Evaluation Initiative**
Theme	Water resources and Land Salinity
Priority asset and threats to it	Inland waterways Salinity
Resources	$4 000 000 from the State Government Approximately a further $1 500 000 from Department of Water from in-kind contributions (staff and other resources).
Project description (including location, intended outcomes and outputs)	The Engineering Evaluation Initiative (EEI) is a $4m State Government electoral commitment initiated in 2002 that focused on developing and demonstrating better ways to implement engineering works to tackle salinity while minimising damage to the environment. The EEI has completed eight on-ground evaluations of salinity engineering options at sites across the wheatbelt, including deep drains, evaporation basins, pumping and surface water drainage management. Final outputs will be a series of reports and brochures to inform readers of project outcomes in an appropriate fashion, targeted at the audience.
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	There is considerable interest in regional Western Australia in employing engineering methods to mitigate dryland 'secondary' salinity. The primary techniques involve drainage, utilising varying depths of excavation to transport saline and/or acidic water, with use of bores and other similar techniques also possible. The State Government needed to ensure that these activities are properly planned and evaluated to ensure that broader community interest is upheld. It is assumed that landowners will employ engineering for on-farm water management in an irregular fashion. There is a real risk of poor implementation, and while much of the water is salty and/or acidic the offsite impacts of disposal and management design will not be appropriately planned.
Describe the major activities and outputs of the project	The EEI reviewed current knowledge on using engineering to mitigate dryland salinity and to clarify 'best practice' by establishing demonstration sites for a range of options. The performance of specific engineering options (deep drains, groundwater pumping, relief wells, and surface water management/raised beds for waterlogging) was examined at eight sites, demonstrating techniques to improve previously saline soil, identifying ways to dispose of water safely, and evaluating potential downstream impacts. Assessments of downstream impacts, recovery in soil productivity after drainage and regional acidic water assessment and management for the Avon have been completed. Regional drainage in the Avon River basin has been assessed against the baseline of no water management interventions. Five EEI reports have been completed. One finding is that when planned with clear objectives, particular designs of deep drains can be effective, but this is less obvious with single channel designs.
Describe what outcomes have been achieved	A clearer scientifically-based understanding of the impacts of deep drainage on water and soil condition in the wheatbelt has been gained. Also a greater understanding of the potential impacts of discharge from deep drains on downstream wetland habitats.
Lessons learned (risk management)	Staff attrition caused significant delays to the delivery of project components, particularly reports.
Project strategy (how the project operated)	The project was managed by the Department of Water and overseen by a Steering Committee consisting of government, industry and private individuals having a varied range of skills and expertise. Contractors and consultants were engaged to bolster internal resources as required.

Case study 11 Title	Engineering Evaluation Initiative
Describe the impacts on behavioural change	An improved appreciation is expected by the community of the complexity of deep drainage and related activities. This should lead to the improved planning of such activities and a reduction in negative impacts. The release of reports will permit this message and resultant behaviours to be spread.
Anecdotal	Drainage and other engineering activities occurs very sporadically. The incidence of these activities often rise following a good harvest, so attention needs to be given to the issue even in lean years as interest can spike with little notice.
Making a difference (anything else?)	This project has highlighted other issues, such as the extent of wheatbelt acid groundwater, that has lead to further projects, for example, the Wheatbelt Drainage Evaluation and the Inland Drainage Initiative.

Case study 12: NRM land use planning—EnviroPlanning

Case study 12 Title	**NRM land use planning—EnviroPlanning**
Theme	Improve land-use planning processes to achieve NRM outcomes
Priority asset and threats to it	Water supply areas, bushland, wetlands, waterways, agricultural land and basic raw materials across the State. Population pressures and development.
Resources	$1 354 120 consisting of $1 123 120 NHT, $231 000 NAP, $722 305 cash and $298 970 in-kind support from local and State Government and NRM regional groups
Project Description: (Including location, intended outcomes and outputs)	Land-use planning is a powerful tool through which local and State Governments can consider and promote NRM matters in decision-making. EnviroPlanning was initiated in 2006 by the Western Australian Local Government Association (WALGA), in conjunction with the Western Australian Planning Commission (WAPC) and the former Department for Planning and Infrastructure (DPI) to improve the integration of NRM into land-use planning. Key components of the project included: • a local government partnership program to address the recognised lack of resources within local government to implement NRM related policies and requirements through their local planning framework • awareness raising component to improve the understanding of the opportunities and challenges of achieving NRM outcomes through land-use planning • a land-use planning and NRM framework component which reviewed of land-use planning and NRM policies and processes to determine recommendations for improving the integration of NRM into land-use planning. Key outputs of the project included delivery of nine local and State Government partnership projects, facilitation of 10 regional forums for over 240 people and a Directions Paper that highlighted opportunities and challenges of effective integration of NRM into land-use planning and recommendations for improving the integration of NRM into the land-use planning system.
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	Land-use planning is recognised as an important tool in the ongoing management and protection of our natural resources. It is a process for considering natural resources in the context of land-use decision-making and has established links with the environmental impact assessment process. Land-use planning can protect natural resources from incompatible land uses, locate development away from sensitive environments, and require sustainable management of natural resources. Natural resources that benefit most from land-use planning include water supply areas, bushland, wetlands, waterways, agricultural land and basic raw materials. The drivers which led to the EnviroPlanning project included: • recognition by WALGA, NRM regional groups and the Australian Government that the integration of NRM into land-use planning was a significant gap not previously acknowledged through NRM initiatives delivered through the Natural Heritage Trust program • limited resources within DoP to support implementation of the State Planning Framework to assist achievement of NRM outcomes • requirement for partnerships to foster cooperation and commitment of local and State Governments to integrate NRM considerations into their land-use planning decision-making, as the NRM regional groups have no statutory land-use planning powers.

Case study 12 Title	NRM land use planning—EnviroPlanning
Describe the major activities and outputs of the project	Review of the six Regional NRM Strategies from a land-use planning perspective. Directions Paper on the Integration of NRM and Land-Use Planning and implementation plan developed Assistance for local government to identify data, resources and analysis gaps to improve integration of NRM into land-use planning. Local government partnership program, including: • Environmental study for the Mundijong—Whitby District Structure Plan • Land Use Management Strategy for Moresby Ranges • Geraldton Regional Flora and Vegetation Survey • Dawesville to Binningup Strategic Environmental Planning • Albany Regional Flora and Vegetation Survey • Shire of Busselton Local Environmental Planning Strategy • South East Avon Voluntary Regional Organisations of Councils: Local Planning Policy for Tree Farming in Low Rainfall Areas • City of Wanneroo Water Management Strategy • Local Biodiversity Strategy insert for the Shire of Mundaring's Local Planning Strategy • Land Use Planning Awareness Program—regional forums • Guidance and advice to 21 local governments to facilitate NRM into their local planning strategies • Guidance and advice to 16 local governments to assist in integration of biodiversity conservation into land use planning • Integration of NRM into DoP and WAPC planning documents
Describe what outcomes have been achieved	The key findings and recommendations of the Directions Paper were endorsed by WAPC in December 2008; paper released for wider stakeholder consultation in March 2009 Recognition by the State that land-use planning is an important tool for achieving NRM outcomes Draft guidelines for the integration of biodiversity conservation into land-use planning Local planning strategies recognised as having potential to provide significant direction on the achievement of NRM outcomes Improved understanding of NRM professionals of the land-use planning system and how it can be used to achieve NRM outcomes Improved awareness of land-use planners of NRM and of the opportunities to improve the integration of NRM into land use planning.

Case study 12 **Title**	**NRM Land Use Planning—Enviro Planning**
Lessons learned **(risk management)**	Improved integration of NRM into land-use planning requires: • clarification of the respective roles and responsibilities of the EPA and the WAPC • NRM considerations incorporated into the planning process as early as possible and reflected in later stages of planning • strategic planning at the regional scale to consider the natural extent of environmental assets and the possible cumulative impacts of individual planning proposals on natural resources • integration of NRM at the local level through local planning strategies and schemes • improvement to the State Planning Framework to address current NRM issues, and guidance for policy implementation to improve integration of NRM into land-use planning • whole of government involvement in strategic planning and improved efficiency of statutory referral processes.
Project strategy **(how the project operated)**	The Western Australian Local Government Association was the proponent for the project with components delivered through the DoP; and the WAPC; . Project partners worked extensively with State NRM agencies, local governments and NRM regional groups.
Describe the impacts on behavioural change	NRM professionals are more aware of land-use planning and its potential to deliver NRM outcomes. Local planners and local governments are becoming more aware of the need to consider NRM when developing planning schemes.
Making a difference **(anything else?)**	The Directions Paper is being implemented with additional funds from the State Government. Outputs of the nine local and State Government partnerships projects will inform future strategic and statutory land-use planning.

Case study 13: Marine Futures

Case study 13 Title	Marine Futures
Theme	Coastal and Marine
Priority asset and threats to it	Marine habitat of south-western Western Australia Human use, and pressures associated with these increasing pressures
Resources	$4 394 000 NHT
Project description (including location, intended outcomes and outputs)	This project will provide managers, resource users and community with critical information about the nature and condition of the Western Australian marine environment in order to enable more effective management of these natural resources in south-western Western Australia. The project will produce the first comprehensive cross-regional assessment and mapping of south-western Western Australia marine habitat and resource extent, distribution and condition across priority areas. This will result in a comprehensive suite of marine benchmarking methods and indicators to measure resource condition in the south-western marine environment. The biophysical assessment and mapping will be complemented by a community outreach and education program to build community awareness and capacity for marine resource management.
Rationale and justification (What assumptions are being made and why will the proposed actions deliver the outcomes)	Increasing pressures from human use may be impacting on the resource of the marine environment. The current actual status of the resource is not well understood nor the impacts of human use.
Describe the major activities and outputs of the project	Habitat mapping: 1400 square kilometres at eight sites between the Abrolhos Islands and the Recherche Archipelago resulting in bathymetric maps and the compiling of predictive maps Towed video surveys of 1000 km or 320 hours of footage of data on habitats across various gradients and locations. A predictive habitat model developed by spatial modelling team using the bathymetry, backscatter and towed video information Full coverage habitat models for biotic and abiotic developed and tested. Habitat maps of 1400 square kilometres now available to government and community using the Google Earth platform. Biodiversity review collected current information on specific organisms associated within habitat and determined the best method to collect further information. Processed 3000 hours of fish footage, 8000 benthic images and thousands of trawl specimens from 86 trawls Collected 70 sponges new to science Linked biodiversity data with habitat maps Determined human use patterns and identified potential drivers to change that behaviour Outreach and education program conducted; over 400 participants in the Port of Call program undertaken at eight ports.

Case study 13 **Title**	**Marine Futures**
Describe what outcomes have been achieved	Benchmarks were established for future planning; a better understanding of the relationship between habitats and organisms which live there. Developed resource condition targets and indicators for future monitoring efforts Established better technical basis for regional marine planning, protection and prioritisation, environmental impact assessment for coastal development, fisheries management and management of contaminants.
Lessons learned **(risk management)**	It is important that information generated by the project is easily accessible; this has been achieved.
Project strategy **(how the project operated)**	The University of Western Australia delivered the project on behalf of the South Coast NRM Regional Group, working with 14 partners among universities, industry and State and Commonwealth Government agencies.
Describe the impacts on behavioural change	State and Commonwealth agencies now access detailed marine environment information for planning and monitoring. DoF used the information to underpin research for the Rock Lobster industry. Documented benchmark characteristics for benthos and fish; easy-to-generate and easy-to-use marine indicators for regional NRM groups. Visual products generated by the project now assist required changes in behaviour. Researchers at UWA and government agencies continue to 'mine' the project's data to improve their understanding of the State's marine environment.

Appendix 5. Regional NRM strategies

Current strategies for all Western Australia's NRM regions were accredited by the State and Commonwealth according to nationally agreed criteria. The strategies are comprehensive and were required to address key national and State policies and strategies, identify the values of natural assets in each region, the threats to these values and establish regional targets for assessing progress and impact. Targets include 20 to 50 year asset condition targets and three to five year management action targets, as short to medium-term measures of progress.

Implementation was effected through rolling investment plans that were required to demonstrate their impact on targets.

It is important that the State NRM Plan guides the alignment and direction of future regional NRM strategies and investment plans to address priority gaps in investment.

Summary of regional strategies and priorities

Regional NRM group	Scope	Key directions
Rangelands NRM Coordinating Group www.rangelandswa.info/	The strategy broadly describes the current State of the Rangeland landscapes, waterscapes and sea-scapes, the living and non-living assets contained within them, and the ways in which people use, manage and value these assets. It also deals with salinity and water quality issues in the Kimberley Ord River catchment. The traditional associations of Indigenous people with components of biological diversity and land management are recognised.	**Vision: A robust, vibrant economy based on the sustainable management of economic, social and environmental resources and a strong partnership approach within and between regional communities, industry and government.**
Northern Agricultural Catchments Council www.nacc.com.au	Issues include salinity, the integrity of marine, terrestrial and aquatic communities, water, land and marine scapes, groundwater, farming systems and biosecurity. Some community and infrastructure assets are addressed in relation to community capacity.	**NACC's vision is to be part of a vibrant community in a diversified economy with a healthy environment. Its objectives are to:** **• conserve and enhance natural resources by sound NRM planning;** **• identify key NRM assets and their values, analyse threats and pressures and their impacts, and develop appropriate responses;** **• develop sound, logical and practical management actions that will improve the condition of key resources and lead to enhanced on-ground outcomes;**

Regional NRM group	Scope	Key directions
	NACC has identified the current State of natural resources and linked this with community targets. Its strategy identifies assets in the following categories: • Land • Biodiversity • Water • Coastal and marine • Atmosphere • Community.	**• link community aspirations, opinions and values to Commonwealth and State legislative imperatives and priorities and to develop meaningful trade-off preferences;** **• promote broader understanding of the importance of investing in NRM in this region and to develop a framework for such investment;** **• integrate and coordinate activity both across the region and with State and Commonwealth partners.**
Perth Region NRM www.perthregionnrm.com	Perth Region NRM adopted a process based on the principles of conservation and the sustainable use of natural resources. This involved comprehensive consultation and engagement in identifying issues and the use of available scientific and technical information. Priority issues and actions were then identified. The strategy has been based on core objectives for: biodiversity conservation; sustainable use of natural resources; and community capacity building and institutional change.	**Perth Region NRM's vision and mission are that the natural resources will be protected and managed sustainably in their own right and for the enhancement of the quality of life for present and future generations.**
Wheatbelt NRM (formerly Avon Catchment Council) www.avonicm.org.au/	The strategy provides an integrated planning framework for managing natural resources within the Avon River Basin. The focus is on land, water and biodiversity resources, and recognises that NRM has strong linkage with regional economies, social wellbeing and regional infrastructure management. It provides a framework for coordinated action over the next five years set within a 50-year timeframe. The strategy considers the changes to the landscape that can be made as well as those that cannot. The four key NRM areas are: water resources; land resources; biodiversity conservation; and infrastructure.	**ACC's vision is to enjoy a socially, environmentally and economically sustainable rural lifestyle within a healthy and beautiful landscape, including land, water, biodiversity and built infrastructure, which is characterised by innovation,** **cooperation, the use of local wisdom and skills, strong social engagement and democratic processes, and a willingness to share our rural culture with others both inside and outside the region in a manner that contributes to global sustainability** **and celebrates 'sense of place' within our unique landscape.**

Regional NRM group	Scope	Key directions
	Assets, threats, goals, targets and actions for management have been identified for each key area.	
South West Catchments Council www.swcatchments council.com/	SWCC's strategy acknowledges the threatening processes affecting natural resource assets and presents a vision for delivering NRM. It aims to achieve a coordinated approach by: • directing investment to the highest priorities as determined by the community; • increasing the quality of and quantity of on-ground outcomes; • establishing partnerships with the community for local, catchment and regional partners. SWCC coordinated the strategy using scientific and technical data, and extensive community consultation. It takes an asset-based approach and assets are listed as: water; biodiversity; land; marine and coasts; air and climate; people and culture.	**SWCC's vision is to promote and coordinate the effective conservation and sustainable use of land, water, biodiversity and coastal natural resources through effective planning and management, research and monitoring, and community development.**
South Coast NRM Inc. www.southcoastnrm. com.au	The strategy builds on previous planning processes. Extensive involvement with partner organisations and comprehensive consultation engaged the wider community and a range of stakeholders to collate information, discuss issues, identify regional priorities and set realistic targets. This strategy is intended to strengthen the region's ability to achieve that integration of purpose and effort, and work effectively to protect natural resources by providing: • vision for NRM and directly related	**The South Coast community's vision is to be recognised locally, nationally and internationally for its outstanding biodiversity; sustainable primary production systems; respect for diverse cultural values; and strong community stewardship of valued natural resources.** **Objectives are:** **• Community: a strong community able to plan and manage natural resources for a wide range of employment, educational, recreational and lifestyle opportunities.** **• Conservation: regional biodiversity is conserved and the natural landscapes and marine values are maintained.** **• Sustainable use: economy is diverse and robust, based on managing all natural resource-dependent industries and activities in an ecologically, socially and economically sustainable**

Regional NRM group	Scope	Key directions
	social and economic matters; • values and condition of, and threats to the natural resources; • specific goals and targets that will provide the steps towards achieving the vision; • actions required to achieve the targets and an indication of their relative priorities; • a framework for implementing the actions, with emphasis on partnerships between stakeholders; • the basis for an investment plan that will assign costs to the priority actions.	

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