

2012-13



2012-13 Yearbook

Department of Environment and Conservation



Department of
Environment and Conservation





Foreword

DEC's final Yearbook is a companion volume to its final Annual Report that provides more detail about the diverse projects and programs undertaken by the former department. In addition, it has provided an ongoing record of data that is of public interest, from the number of specimens added to the WA Herbarium collection to the number of bushfires attended in each region.

DEC was created in 2006 through the amalgamation of the former Department of Conservation and Land Management (CALM) and the former Department of Environment (DoE). On 1 July 2013, DEC was separated into the Department of Parks and Wildlife (DPaW) and the Department of Environment Regulation (DER).

My thanks go to DEC's staff for their commitment and professionalism, which will continue to underpin our management of the environment. I would also like to acknowledge the volunteers and various organisation that worked with DEC, their support was invaluable and I look forward to that continuing involvement.

I am pleased to present the 2012–13 DEC Yearbook for the public record.

A handwritten signature in black ink that reads "JR Sharp". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Jim Sharp

Acting Director General – Department of Parks and Wildlife
(Acting Director General – Department of Environment and Conservation until 30 June 2013)



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Burrup Peninsula landscape. Photo – Cliff Winfield/DEC

PART ONE: OVERVIEW



Two Peoples Bay Nature Reserve

In memoriam

DEC bids farewell to a tireless leader

On 12 March 2013, DEC Director General Keiran McNamara informed his staff he had been diagnosed with a terminal illness and did not have long to live. In a letter he shared highlights and insights from his 12 years at the head of CALM and DEC and paid tribute to staff.

“It has been an honour and a privilege to lead the Department of Conservation and Land Management and DEC since 2001, and I will miss not being able to continue doing so. I want to thank each and every one of you for the support you have given me, and for your dedication, commitment, professionalism and passion in what we achieve for this state and its people in conservation and environmental protection, and for the bravery and skills so often displayed in tough times such as bushfire emergencies and park visitor rescues. The state of Western Australia is very well served by DEC, its staff, our large volunteer contingent and our many partners.”

From the tributes that followed the announcement of his retirement and after his death on 28 March 2013, it is clear that WA was well served by Keiran.

Premier Colin Barnett said Keiran made an outstanding contribution to Western Australia. “He has worked tirelessly to conserve and protect the state’s environment, to improve our parks and to protect and promote the state’s rich biodiversity.

“His role has been a difficult and demanding one, involving as it does the striking of an appropriate balance between environmental conservation and economic development. He has fulfilled this role with vision, commitment and integrity.”

Environment Minister Bill Marmion described Keiran as an outstanding leader who had left an enduring legacy in environmental protection.

“The environmental and conservation achievements of Western Australian Governments over the last 10 years could not have been possible without Keiran’s contribution,” Mr Marmion said.


“Keiran led his agencies and advised Ministers with a level of expertise and professionalism that honoured the best traditions of the public service. His energy, drive and passion will be greatly missed.”

Astute and highly-skilled with a focus on net gain through compromise, Keiran combined his passion for the natural environment with a clear understanding of what was required of him as a public servant to great effect.

Topping his list of significant things achieved during his time with CALM and DEC was the growth in WA’s national parks, marine parks and other conservation reserves towards a world-class system, including the creation in January 2013 of WA’s 100th national park at Murujuga on the Burrup Peninsula.



Keiran McNamara



The protection of old-growth forests also featured high on his list, as did the adoption of a landscape-scale approach to conservation through the recent Kimberley and Great Western Woodlands strategies; recognition of the 'outstanding universal values' of Shark Bay, Purnululu and the Ningaloo Coast through World Heritage listing and the acquisition of substantial lands for conservation, through the Gascoyne-Murchison Strategy, in a large area of the state's rangelands where there were very few reserves.

Keiran started his public service career in Canberra after graduating in natural resources from the University of New England in NSW and a short stint in saltwater crocodile research at Sydney University. He spent seven years with the Australian National Parks and Wildlife Service and during that time contributed to the Inquiry that led to Australia ceasing to be a commercial whaling nation.

He joined CALM in July 1985 and went on to become Director of Nature Conservation in 1991 and CEO in 2001. In 2006, he oversaw the amalgamation of CALM and the Department of Environment to form DEC and became Director General of the new department that encompassed both conservation and environmental regulation.

In his tribute, DEC's Acting Director General, Jim Sharp, highlighted Keiran qualities and achievements.

"Keiran worked tirelessly with courage, passion and commitment to conserve and protect the state's environment, leading to major additions to parks, an increased appreciation of these by the public, innovative projects to protect the state's rich biodiversity, streamlined environmental approvals and regulation, and significant advances in science," Mr Sharp said.

He had a remarkable ability to work at the strategic level while still keeping a diligent eye on the details of these and many other positive outcomes.

His commitment enabled him to withstand many significant challenges and was reflected in his support for staff in difficult circumstances.

This support for staff was something Keiran believed was critical, and this saw him stand up as head of DEC and take responsibility when fire operations went seriously wrong, with devastating consequences, and apologise while maintaining confidence in his staff.

In his letter to staff Keiran said: "There have also been difficult and traumatic times, when the spirit and camaraderie across the department have come to the fore. Over recent years we have seen the deaths of three truck drivers in the Boorabbin fire, the death of one of our staff and a pilot during aerial feral animal control, the death of one of our staff fighting a bushfire, some serious injuries including one case of paraplegia, the Margaret River bushfire, and various Coronial and other inquiries.

"While it is critical that we learn from things that go wrong, staff in operational agencies who put their hand up to do difficult and dangerous jobs as best they can in extraordinary and rapidly evolving circumstances deserve support, otherwise one day we will find we don't have enough of our people willing to do those jobs. I have always tried my best to provide that support."

Keiran was 58 when he died. He is survived by his wife Anne and their three children Peter, Sarah and Ian.

Tribute to a brave firefighter

On 14 November 2012, family, friends and work mates gathered in Albany to say farewell to Wendy Bearfoot and to celebrate the life of the courageous and much-loved wife, mother, sister, daughter, friend and colleague who lost her life after being severely injured in a burn-over while fighting a bushfire near Two Peoples Bay Nature Reserve.

About 200 DEC staff, wearing green firefighting jackets, formed a guard of honour at Allambie Park Cemetery, Albany, while DEC fire trucks formed a motorcade and a DEC fixed-wing water bomber flew overhead as a tribute to Wendy's bravery and courage as a firefighter.

The funeral service was attended by hundreds of people from the local community and across the state, including Environment Minister Bill Marmion.

DEC Regional Services assistant director Kelly Gillen spoke on behalf of the department and government and extended condolences to Wendy's husband, Garry, their sons Steven, Josh and Geoffrey and the rest of her family for the loss of one so loved.

"DEC, and the previous CALM, is in many ways a family and the loss of Wendy has struck at the heart of that family," he said.

"In particular, for those of us who work in fire, there is a special bond that comes from working together under often difficult conditions, the dependence we have on one another and the camaraderie that develops from doing a tough job and sharing the highs and lows of that experience.

"Our friend and colleague brought to the workplace a love of life and a love of her job that was infectious, and she was good at her job.

"Thanks for the time you shared with us Wendy. Your memory will be cherished by your workmates and your colleagues will forever honour your life, the joy it brought to those around you and your undeniable courage."

Wendy joined the then Department of Conservation and Land Management in Albany in 2003 as an Indigenous Land Management Trainee and successfully progressed through the roles of conservation employee, national park ranger and most recently overseer in the Albany District.

She graduated from DEC's first Mentored Aboriginal Training and Employment Scheme (MATES) training program in 2006.

Having left school at age 15, it required real determination and self-motivation to complete these studies while still finding time for her family. Her Albany colleagues saw these qualities in everything Wendy did, as they explained in a collective recollection:

"Following a successful time as a ranger at Two Peoples Bay, Wendy took on the role of overseer for the work crew at Albany and filled that role over the last four years of her life.

"Not many women have filled this role in DEC but Wendy displayed her characteristic reliability, dedication and professionalism in her new role. In addition, Wendy exhibited outstanding leadership qualities and soon clicked with her team.



Wendy Bearfoot

“With a reputation as a fair boss, she also proved very capable of drawing a line in the sand when required, as no doubt those close to her will be aware. If she felt someone required putting back on the tracks, she certainly wasn’t shy about letting them know!

“Wendy was a problem solver, not a problem finder. From the outset, her supervisors were able to depend on her considerable skills and abilities, no matter how trying the circumstances.

“As a key member of Albany’s fire management team, Wendy spent many long days and nights on the front line involved in the difficult work of bushfire suppression and prescribed burning.

“She had a reputation for maintaining her positive outlook no matter how long she had worked or how tired she was – a skill many of us are yet to learn.

“The Albany office just isn’t the same without Wendy.

“We all miss her quiet competence. We miss her companionship and good humour, especially when times get tough.

“Most of all, we miss our friend.”



Environment Minister Bill Marmion, Murujuga Aboriginal Corporation chair Joan Hicks, and DEC Director General Keiran McNamara signing commemorative certificates marking the creation of Murujuga National Park on 17 January 2013.

DEC 2012–13


The challenges and achievements of DEC's final year of operation will be covered in Part Two of this Yearbook. However, the ongoing engagement with Aboriginal people, built on many years of liaison and cooperation, was a particular highlight.

Aboriginal people are the traditional custodians of the lands and waters managed by the department and the ability to carry out cultural activities on country and be involved in managing country is an important part of Aboriginal culture and connection to the land.

The department has an important role to play in providing opportunities for Aboriginal people to contribute their cultural knowledge and skills to land management, and gain employment and economic independence. The department is involved in Native Title negotiations across the state and, with the new legislative provisions under the CALM Act and *Wildlife Conservation Act 1950* (WC Act) that allow for the establishment of joint management arrangements and enable Aboriginal customary activities to occur on DEC-managed lands, it is actively engaging with Aboriginal people to promote employment and training, establish joint management arrangements and facilitate customary activities on DEC-managed land.

New Minister

With the re-election of the Liberal–National Government, the department welcomed a new Minister on 21 March 2013, with the appointment of Hon Albert Jacob MLA as Minister for Environment; Heritage. At the same time, the former Minister for Environment; Water (2010–13) Hon Bill Marmion MLA was appointed Minister for Mines and Petroleum; Housing.



Employment and training

To support the implementation of the new provisions in the CALM Act relating to Aboriginal heritage and culture, training modules for staff were revised.

Training and employment opportunities are a central feature of Native Title and joint management agreements. One of the first joint management arrangements was with the Miriuwung Gajerrong (MG) people in the East Kimberley, enabled through the 2005 Ord Final Agreement Indigenous Land Use Agreement. There are currently nine MG rangers and one ranger's assistant, appointed by their dawangs (family groups), employed to work on the reserves. Three rangers have received formal qualifications in the course of their employment with DEC and six are undertaking traineeships.

Other ranger partnerships include cooperative programs with the Yawuru people in Broome, the Murujuga Aboriginal Corporation on the Burrup Peninsula, the Bunuba people around Fitzroy Crossing and Martu people in the Goldfields. Currently there are seven Yawuru rangers, 14 Murujuga rangers, four Bunuba rangers and between six and eight Martu rangers. Each program operates under a different arrangement through either direct employment or through contracts for service, as per the relevant agreement.

During the year, DEC developed a partnership agreement with Fairbridge Western Australia Inc. to develop cross-cultural, healing and personal identity programs, and to explore opportunities for training and employment initiatives. DEC's Aboriginal cultural and community coordinator, Terry (Koodah) Cornwall, began a two-year tour of duty at Fairbridge to assist in implementing the initiative.

Native Title negotiations

Negotiations progressed with the Nyangumarta and Dambimangari groups as part of the implementation of the *Kimberley Science and Conservation Strategy*, and included the creation of the Eighty Mile Beach Marine Park and the Lalang-garram Camden Sound Marine Park.

Since December 2009, when the state government signed a Heads of Agreement with the South West Aboriginal Land and Sea Council to start negotiations to resolve Native Title claims in the south-west of the state, the department has had ongoing involvement in the South West Native Title negotiations in a number of key areas including joint management of conservation estate, access to state lands for customary purposes, use of natural resources for customary purposes, establishment of a land base and creation of a revised heritage scheme. The successful conclusion of negotiations will provide opportunities for Noongar participation in managing conservation estate.

Joint management and customary activity

Significant progress was made by DEC in increasing the involvement of Aboriginal people in the management of parks and reserves through a variety of joint management strategies.

In January 2013, WA's 100th national park was created. Murujuga National Park was the first joint management agreement reached under the terms of the revised CALM Act. The park is freehold land held by the Murujuga Aboriginal Corporation and leased to the state to be jointly managed as a national park. The Murujuga Park Council has representatives from the Murujuga Aboriginal Corporation, DEC and the Minister for Indigenous Affairs and is responsible for overseeing the management of the park.

In the east Kimberley, there is a joint responsibility with the Yawoorroong Miriuwung Gajerrong Yirnggeb Noong Dawang Aboriginal Corporation (Miriuwung Gajerrong Corporation) for management arrangements for six new conservation reserves. The land will be freehold held by the MG people and leased to the state for joint management. In 2012–13, the MG rangers were involved in major projects including: the assessment and development of visitor sites for future development, flora and fauna research and implementation of nature

conservation programs such as weed management, fencing and feral animal control, cultural connection to country visits by elders, fire planning and management, and community education patrols (including crocodile safety).

In 2010, an Indigenous land use agreement was signed with Yawuru Native Title holders enabling the creation of terrestrial and marine conservation reserves to be jointly managed with Yawuru people. The agreement included an allocation of \$12 million over five years for land management, management planning and the employment of Aboriginal rangers. The Yawuru cultural management plan released in 2011 provided a framework for managing country that is underpinned by Yawuru knowledge, values, principles and protocols. The plan was awarded the 2012 Australian Medal for Landscape Architecture.

The creation of a network of new marine parks and terrestrial reserves in the Kimberley in partnership with traditional owners is a centrepiece of the *Kimberley Science and Conservation Strategy*. As is providing opportunities for Aboriginal people to jointly manage these areas and be employed in conservation. Substantial progress has been made on this initiative and there is a network of Aboriginal rangers working on conservation estate as well as across other tenures. The strategy also promotes assistance for Aboriginal communities in identifying and developing nature- and culture-based tourism services. Native title negotiations are central to the implementation of the strategy and are ongoing.

A range of other informal cooperative and joint management arrangements are being implemented in other parts of the state. These include longstanding memoranda of understanding in the Goldfields Region that establish cooperative management arrangements with the Goldfields Land and Sea Council in the Great Western Woodlands for reserves and land around Kalgoorlie and over the Gibson Desert Nature Reserve, and with the Martu people for the former Earahedy (Kurrara Kurrara) and Lorna Glen (Matuwa) pastoral stations.

A Martu ranger team is contracted to undertake activities including prescribed burning, biological surveys, monitoring of re-introduced animals, feral animal and weed control, road maintenance, erosion control, and general maintenance. DEC staff also assisted Martu people and rangers to undertake management work on their own lands.

DEC has also worked with the Martu people in the Pilbara at Karlamilyi National Park and the Western Desert on fire planning and prescribed burning, feral animal control and other conservation projects. Cooperative management and joint work are also being undertaken in the Great Victoria Desert with the Pila Nguru (Spinifex) people at Tjuntjuntjura.

Organisational highlights

Future leaders recognised

DEC's Annual Graduation and Awards Ceremony was held in June 2013 at the WA Conservation Science Centre, with Environment Minister Albert Jacob and Acting Director General Jim Sharp on hand to congratulate the deserving and committed recipients.

The ceremony marked the achievements of participants in the department's *Graduate Development Program*, *Mentored Aboriginal Training and Employment Scheme (MATES)*, *Pathways Program*, *Regulatory Training Program*, *Frontline Management Program*, *School-based Trainee Program* and *Scholarship Program*.

Graduate Development Program – the program returned this year, with significant changes, after being reviewed at the end of the 2009 program. Changes included recruiting graduates to permanent positions in the department and introducing accredited training, with the graduates completing eight units from the Certificate IV in Government over 12 months.

A total of 221 people applied for the program in 2012 and eight graduates were appointed to DEC professional entry-level positions throughout the state. Three internal graduates were also selected to join the program.

Graduates were: Tammy-Ann Cole, Alison Crowther, Blake Edwick, Melissa Faassen, David Lindner, Lynette Marshall, Nicola Mincham, Blair Pellegrino, Deanna Rasmussen, Kelly Rayner and Megan Rowland.

Two awards are presented to *Graduate Development Program* graduates – the *Keynes Memorial Award* which went to Environmental Officer Melissa Faassen, and the *Director General's Merit Award* which was awarded to Parks and Visitor Services Project Officer David Lindner.

MATES – The *MATES* program is an important part of DEC's commitment to increasing the number of Aboriginal employees in the department through a range of strategies including a traineeship program.

Five employees graduated from Certificates II and III in Conservation and Land Management in 2013 and were recognised at the ceremony. They were Wayne Winton, Timothy Champion, Vincent Kennedy, Peter Lavern and Curtis Robinson.

Curtis Robinson received the *Aboriginal Trainee of the Year Award* in recognition of his outstanding work as a trainee in the Kimberley Region.

The *Aboriginal Trainee Supervisor of the Year*, awarded to the supervisor who has demonstrated the highest level of support and commitment to the development of trainees under their supervision, was awarded to Kimberley Region operations officer Alexander (AJ) Scott.

Kwabalitch is a Nyoongar word that means 'excellent' or 'good'. The *Kwabalitch Award* was established to recognise a *MATES* trainee with dedication, perseverance and a commitment to personal and professional development. Eugene Park received the award for his dedication to DEC, his co-workers and his fellow *MATES* trainees.

Pathways Program – DEC has a proud and strong culture of encouraging its staff on a path of continuous learning. The program aims to recognise the skills and knowledge of conservation employees and expand their professional experience and expertise.

Pathways Program graduates in 2013 were Jessica Correia Henriques, Dean Johnson and Gregory Hamlyn.

Regulatory Training Program – the *Regulatory Training Program* provides a competency-based training framework for environmental enforcement and investigation officers. These qualifications are the best-practice standard for environmental regulators and other staff involved in regulatory activities.

Graduates in 2013 were Mark Adams, Mark Brand, Jeffery Fussell, Peter Knol, Gillian Stryk, Damian Thomas, Malcolm Wright, Paul Anderson, Maxine Birkin, Gary Brown, Cameron Craigie, Melissa Faassen, Caron Goodbourn, Garth Grimsley, Daniel Hartnup, Clint Joseph, Craig McLernon, Jonathan Pridham, Nanette Schapel, Carmen Standring, Josephine Tuohy and Joanna Waugh.

Frontline Management Program – DEC’s management and leadership framework identifies and develops current and future leaders, as well as addressing succession management in key DEC positions and retention of corporate knowledge. The *Certificate IV in Frontline Management* graduate for 2013 was Alison Raper.

Business School-based Trainee Program – Business School-based traineeships are an initiative to promote the department to a younger demographic and provide employment experience to school students. In partnership with Sevenoaks Senior College students undertake the Certificate IV in Business.

The trainees who successfully completed the program in 2012 were Julie Ogden, Rochelle Robertson and Naomi Williams.

Scholarships – each year, the department awards a number of scholarships to encourage DEC staff to expand their skills and qualifications through higher education.

This year the Science Scholarship in memory of Dr George Malajczuk was awarded to Erin Biggs, Wendy Chow, Saorla Finucane, Cassidy Newland and Ricky Van Dongen.

The Leadership Scholarship in memory of Seamus Mulholland was received by Winston Kay, and the Women’s Scholarship in honour of June Craig was awarded to Rebecca Griffiths and Lucinda Peters.

The Director General’s Career Development and Study Assistance Scholarship provides support for undergraduate and postgraduate study and was awarded to Frances Hoskins, Kerri-Ann Hudson, Cherie Kemp and Jelena May.



Aboriginal Trainee of the Year Curtis Robinson celebrates with his family.



1. *Aboriginal Trainee of the Year* Curtis Robinson with Environment Minister Albert Jacob.
2. *Kwabalitch Award* winner Eugene Park with Environment Minister Albert Jacob.
3. *Graduate Development Program* graduates (left to right): Back: Tammy-Ann Cole, Melissa Faassen, Deanna Rasmussen, David Lindner, Blair Pellegrino and Nicola Mincham. Front: Megan Rowland, Chloe Sellars (program coordinator), Lynette Marshall (absent: Blake Edwick, Alison Crowther and Kelly Rayner).
4. MATES trainees Peter Lavern, Barry Fontana, Eugene Park, and Curtis Robinson with Conservation and Land Management program coordinator Pat Foley (second from the right).
5. DEC Acting Director General Jim Sharp (left) and Environment Minister Albert Jacob (right) with the *Regulatory Training Program* graduates in Certificate IV in Government (Investigations or Statutory Compliance): Back: Jeffery Fussell, Daniel Hartnup, Cameron Craigie and Peter Knol. Front: Josephine Tuohy, Joanna Waugh, Clint Joseph, Garth Grimsley, Nanette Schapel and Gillian Stryk.

Carbon-neutral school environmental champions

Australia's first carbon-neutral school picked up the top award in the *2012 Western Australian Environment Awards*.

During the presentation of the award for overall winner, Environment Minister Bill Marmion said South Fremantle Senior High School's achievements epitomised the high calibre of entrants.

"It takes a great deal of commitment, passion, drive and innovation to develop and implement the kind of projects nominated for this award, and I congratulate the community groups, businesses and organisations for their tireless work," Mr Marmion said.

The Minister said South Fremantle SHS was a standout in its commitment to environmental education and communication.

"South Fremantle Senior High School is a standout not only in this quality field of Environment Award entrants, but also on a national scale, because it has become Australia's first carbon-neutral school," he said.

RePipe Pty Ltd was awarded a high commendation for its use of innovative technology in replacing underground pipes with minimal disturbance to vegetation.

Mr Marmion said the WA Environment Awards were an excellent way to acknowledge, celebrate and promote community involvement in environmental care and biodiversity conservation.


"Much of the environmental work being done by the state government relies on community involvement and support. The awards are an excellent way to acknowledge work well done," he said.

"It takes a great deal of commitment, passion, drive and innovation to develop and implement the kind of projects nominated for this award, and I congratulate the community groups, businesses and organisations for their tireless work," Mr Marmion said.

The WA Environment Awards were coordinated by DEC with generous support from sponsors Publishers National Environment Bureau, Western Power, Swan River Trust, Royalties for Regions, Whiteman Park and the Waste Authority.



South Fremantle Senior High School representatives receive their award from Environment Minister Bill Marmion.



There were more than 90 entries in the awards that acknowledge, reward and recognise the businesses, government agencies, community groups and individuals who make a valuable contribution to protecting and conserving the state's natural environment.

The winners were selected from 41 finalists in 11 categories.

2012 winners

Overall Environment Award Winner

South Fremantle Senior High School – *The Carbon Neutral Project*

Overall Highly Commended Award

RePipe Pty Ltd – *RePipe*

Corporate Business Leading By Example Award

Joondalup Health Campus and John Holland Group – *Joondalup Health Campus Redevelopment Project: pushing the boundaries of sustainable business practice*

Small Business Leading by Example Award

RePipe Pty Ltd – *RePipe*

Government Leading by Example Award

SEAVROC, WEROC and NEWROC (South East Avon Voluntary, Wheatbelt East Regional and North Eastern Wheatbelt Regional Organisation of Councils) – *Perennial farming systems targeting wind erosion within the north, eastern and southern Wheatbelt*

Resource and Waste Management Award

Custom Composts with Main Roads WA – *New Perth Bunbury Highway Soil Manufacture for Landscaping and Construction*

Bush, Land and Waterways Award

South East Regional Centre for Urban Landcare (SERCUL) – *Restoring and protecting the wetlands and estuaries of the south region of Perth*

Rivers, Estuaries and Wetlands category

Peel Harvey Catchment Council – *Management and protection of the Peel-Yalgorup Ramsar Site*

Biodiversity Conservation

South West Catchments Council and Leschenault Catchments Council – *Blackbury Buffer Zone*

Environmental Education and Communication

South Fremantle Senior High School – *The Carbon Neutral Project*

Environmental Sustainability

Beyond Gardens Team – *Beyond Gardens*

Community Achievement – Metropolitan

Foodbank WA – *Third Life Waste Program*

Community Achievement – Regional

Peel-Harvey Catchment Council Inc – *People working together for a healthy environment*

Long-standing DEC staffers retire

During 2012–13, three dedicated staff members retired, who, together, had contributed almost 120 years to the conservation and protection of WA's natural environment.

Robert Atkins

DEC Deputy Director General Environment Robert Atkins retired after a 32-year career in a variety of senior executive roles in the protection of WA's environment.

Robert joined the public service in 1980 and spent 15 years working for the Waterways Commission, first as a research officer and then as the Director of Environmental Investigation and Assessments. As a research officer, Robert was involved in a significant change of strategy that saw the management of waterways expanded from a boundary that hugged waterway foreshores to including catchment areas. A move he described as a huge leap forward as it required a significant change in the concept of what comprised waterway management.

Then, in 1996, he was appointed manager of the Swan River Trust when the Waterways Commission was restructured and became part of the Water and Rivers Commission. It was the first in a series of agency restructures that saw Robert, between 2001 and 2006, work for the Department of Environment, Water and Catchment Protection, the Department of Environment and then DEC without making a move.

During those six years he went from Acting Director Regional Operations to Director Environment Management to Director Environmental Regulation. That progression saw a major shift in focus for Robert, from waterway management to pollution control — a move that threw up many challenges. Highlights for Robert included boosting resources in the regions, targeting a number of problem industries to improve environmental outcomes and kick-starting a licensing reform process.

In 2008, Robert was appointed Deputy Director General Environment of DEC and played a key role, along with other senior government advisors, in developing and implementing solutions for the removal of a stockpile of lead carbonate ore and improving infrastructure and procedures for nickel export through the Esperance Port.



Alan Walker

Director Regional Policy and Projects Alan Walker retired after a 42-year career dedicated to the protection, management and sustainable use of WA forests, lands and waters.

Alan's career saw him start with the Forests Department, then move through CALM and into DEC in a variety of roles including district manager, regional manager and Regional Services Director, a demanding role where he used his personal and professional qualities to great effect and inspired and motivated his staff.

A talented footballer who was a clear leader, Alan had both discipline and courage, and rose to management, where his expertise gained from on-



ground experience as a forester and someone intimately familiar with fire operations commanded respect and helped him tackle some very difficult challenges.

During Alan's 10 years as Regional Services Director there were several extraordinary calamities, in particular the tragic Gracetown cliff collapse and the terrible loss of three lives in the Boorabbin fire. He played a key role in guiding and supporting staff in the aftermath of the Gracetown tragedy and in working closely with the families of the bereaved after the Boorabbin fire.

Alan's interest in his staff saw him visiting the regions and districts as often as possible where he took particular interest in young staff and ensuring they got every opportunity to develop their careers. He was also concerned about staff welfare and was involved in the development of staff mentoring programs, the department's Critical Incident Stress Management System and Guidelines and the department's chaplaincy program.

His calm and considered approach and skill in communicating with a wide range of people made Alan the ideal senior officer to develop, promote and implement DEC's Good Neighbour Policy. With a grasp of operational issues and political expectations, Alan often represented the department in high level negotiations where tact and delicacy were critical.

Alan's outstanding contributions to the department's programs in fire management and community and infrastructure protection was formally acknowledged by the Australian Government when he was awarded a National Medal.

Dave Mell

Nature Protection Branch Manager Dave Mell retired after a 45-year career starting in 1967, when he joined the then Department of Fisheries and Fauna as a cadet fisheries inspector in Perth and Pemberton.

A few years were spent as a wildlife officer in Perth, Pingelly and Albany district, doing things as varied as aerial surveys for illegal duck traps and fighting bushfires. He also became all too familiar with the distinctive smell of dead whales during his stint at the Albany Whaling Station recording sperm whale data, not a smell that could be left at work as it impregnated the skin of all who worked on the whales.

His wildlife career was then interrupted for a couple of years when Dave fulfilled his national service duty.

His focus soon returned to wildlife and Dave's successful investigations into parrot nest robbing, illegal kangaroo shooting and unlawful possession of reptiles put him on the path to senior, and then chief, wildlife officer. He became Nature Protection Branch Manager in 2002.

Among many career highlights, the work Dave did to protect black cockatoos stands out as particularly important. He initiated a joint research project into DNA profiling of cockatoos and pioneered the use of this technology, which significantly reduced false breeding claims by aviculturists. He also led the first successful whale rescue in WA.

Dave was highly respected by people both more senior and junior than himself and his considered, well informed and sensible advice was sought and keenly listened to. His judgement and discretion could be counted on.

He excelled in developing and updating the department's prosecutions policies, in ensuring adequate training of staff in these areas and in identifying and maintaining the right balance in determining the matters to prosecute and those to pursue through education and raising awareness.





A boat makes its way through one of the gorges at Horizontal Falls.

PART TWO: SERVICE AREAS



Mark Blythman with a female red-capped robin caught during a bird survey at Lorna Glen. Photo – Judy Dunlop/DEC.

Nature Conservation



Nature Conservation

The conservation of WA's rich biodiversity is strategically coordinated through the Nature Conservation Service, which oversees a range of programs and activities. This service is built on scientific and technical knowledge accumulated over many decades, which continues to develop and grow. Ongoing processes of biological survey, specimen collection and classification are complemented by developing and implementing recovery plans for species and ecological communities under threat, identifying and acquiring land that supports representative ecosystems, managing areas for their conservation values, and promoting public awareness of the value and vulnerability of WA's natural areas.

The Nature Conservation Service is divided into the following strategic areas:

- building biodiversity knowledge
- establishment of the terrestrial and marine conservation reserve system
- effective management of the conservation reserve system
- recovery of threatened species and ecological communities and management of other significant species and ecosystems
- conserving landscapes and seascapes, integrating off-reserve and on-reserve conservation and managing threatening processes
- encouraging public understanding and support for biodiversity conservation and other DEC programs and activities.

Building biodiversity knowledge

Biological inventory


Terrestrial inventory

Surveys of threatened and priority flora, fauna and ecological communities were undertaken or coordinated by the department. Details are provided in the threatened species and ecological communities' recovery section of this report (see page 25).

A biodiversity audit was initiated to update *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*, and document WA's biodiversity through a detailed bioregional analysis. The audit intends to give a snapshot in time of condition and pressures facing biodiversity assets, management effectiveness and future management requirements for ecosystems across the 53 Interim Biogeographic Regionalisation for Australia (IBRA) subregions of WA.

Work continued on developing a consistent approach to reporting vegetation statistics across the state. Statewide statistics are available from a number of different vegetation mapping products, including the Regional Forest Agreement mapping, the statewide Beard-Hopkins mapping, and detailed mapping on the Swan Coastal Plain. Additional detailed mapping of the Swan Coastal Plain was undertaken to provide better integration of these mapping products, and enable the production of a compiled set of vegetation statistics using the most accurate and up-to-date data available.

The amount of content on *NatureMap* was substantially increased. *NatureMap* is one of the department's web portals providing access to high-quality biodiversity data. Additions included new themes such as the Great Western Woodlands and Pilbara Threatened Fauna. New and updated datasets included banded iron formation,



greenstone, Darling Scarp, south coast and calcrete surveys. Registrations for access to *NatureMap* increased by 50 per cent from 1042 to 1513, with the biggest number from industry.

In conjunction with Science Division, the Goldfields Region provided technical and scientific input for the biological survey and inventory of the Native Title-determined area of the Carnarvon Range. The area had been identified as one of high biological value before Native Title was determined in 2008. Since then the Goldfields Region has worked with the traditional owners to implement environmental management to complement the preservation of Aboriginal cultural values. During two biological surveys, conducted in spring 2012 and autumn 2013, threatened fauna, declared rare and priority flora as well as several species range extensions were identified.

In the Exmouth District, a local herbarium has been established at the Exmouth office. Over two years, plant samples were collected and pressed as part of a vegetation exclusion plot project. Areas representing localised habitats were fenced to keep out goats, kangaroos and wallabies to investigate the impact of these animals on vegetation structure, diversity and condition. The sites are being photographed annually from a fixed point to provide a visual record of the state of the vegetation. An in-depth initial flora survey of the sites was conducted and will serve as a baseline.

The department continued to take the lead in the coordination of biotic and abiotic data for wetlands, including the mapping of wetland type, extent and distribution in the landscape using the geomorphic wetland classification system. During the year, DEC added new wetland mapping data to the statewide wetlands database, WetlandBase, for an area of 460,000 hectares encompassing Cervantes, Jurien Bay, Greenhead and Eneabba in DEC's Midwest Region.

Resource condition monitoring

DEC continued the biological monitoring of 25 Wheatbelt wetlands for the State Salinity Strategy.

The 1977–2011 report on depth, salinity and pH trends of 101 wetlands included in the *South West Wetlands Monitoring Program*, conducted by DEC under the State Salinity Strategy, was completed. Continuous water level and rainfall recorders were installed in several additional high conservation value wetlands under threat to collect data to assist in developing an improved understanding of likely consequences of predicted climate change, particularly rainfall decline, on wetlands of south-western Australia.

Reports on some of these wetlands have been published, some of which are available on DEC's website: www.dec.wa.gov.au/management-and-protection/wetlands/publications/technical-reports.

Research continued into the ecological condition of wetlands of the agricultural zone, including monitoring groundwater, wetland water levels and water quality, and flora and fauna for 27 wetlands in relation to threats, such as secondary salinisation, climate change and catchment land-use practices.

The Landscape Conservation Initiative of the *Kimberley Science and Conservation Strategy* reported on conservation resource condition, principally in the North Kimberley Bioregion. Rainforests, mammal assemblages and savanna vegetation structural condition were looked at in relation to annual fire and feral cattle management programs.

Marine inventory

DEC continued to focus on the development and progressive implementation of the *Western Australian Marine Monitoring Program* (WAMMP). WAMMP is determining the status and trends in the condition of key biodiversity assets, human pressures on these assets, and the management response, with particular respect to WA's marine parks and threatened marine fauna, such as turtles, sea lions (*Neophoca cinerea*) and dugong (*Dugong dugon*). The main objective of WAMMP is to obtain information necessary to assess the efficiency and effectiveness of the department's marine management programs so as to promote ongoing improvement through an active adaptive management cycle. Systematic monitoring of coral, seagrass, invertebrate, mangrove and fish communities is an example of some of the work that is being undertaken in WA's marine parks.



In late 2012, WAMMP reported new and historical time-series information across nine marine parks in WA. Individual status reports for multiple bio-physical assets and passive social values were completed. This enables adaptive management planning and delivery, and provides the information necessary to fulfil the Marine Parks and Reserves Authority's (MPRA) audit reporting requirements.

The Western Australian Marine Science Institution (WAMSI) is a collaboration of state, federal, industry and academic organisations working together to provide independent marine research. WAMSI's inaugural five-year program across Ningaloo Marine Park concluded in 2011–12. The important findings of each of the research studies and their implications for management, along with a listing of all data resources and publications produced from the work, have been published and the report is available at: www.wamsi.org.au.

The state government has committed a further \$12 million to WAMSI to inform and support the creation and management-planning of four marine parks in the Kimberley. The *Kimberley Marine Research Program*, led by the department, has a science plan that outlines 25 integrated science projects across two main research areas. The research will document new information on habitats and biodiversity across the Kimberley, including information on ecological processes, human use and values.

Research under approved marine park management plans was ongoing. A study of the interaction of fishing and climate change on reef fish populations in Ningaloo Marine Park resulted in ongoing investigations into the spatial and temporal variations in recruitment of fish that have highlighted the importance of inshore algal fields in tropical lagoon systems as habitat for species targeted by recreational fishers.

In the Pilbara, the department's *Marine Science Program* initiated projects to provide benchmark information on the state of the region's marine ecosystems. Collaborative research continued with the Pilbara Marine Conservation Partnership, a CSIRO and The University of Western Australia (UWA) project, with offset funding from the Pluto and Wheatstone projects. The research aims to improve understanding of west Pilbara marine systems and the potential for recovery following natural and human-induced disturbance. Field surveys, contemporary molecular techniques and oceanographic modelling will be used to examine the condition of bio-physical assets. The insight gained through this research will aid the design and management of existing and proposed marine protected areas, enhance environmental management of current and future industrial developments, and assist fisheries and marine fauna management.

Assessments of the effects of dredging operations on coral reef and fish community health in the Montebello Islands and Barrow Island Marine Protected Areas, undertaken as part of the Gorgon Monitoring Evaluation and Reporting Project, are now largely completed and the final report is in preparation.

In the south-west, the assessment of sediment in-fauna of Walpole and Nornalup Inlets Marine Park is reaching its conclusion. The project has revealed a diverse and unique assemblage of animals that, so far, has been found to include more than 120 invertebrate species and 49 algal species, including one undescribed species of algae. The baseline conditions for invertebrates and algae can now be used to measure change.

Other research included continuing investigations into the distribution patterns of marine biodiversity in the mangrove communities in Shark Bay Marine Park and of the intertidal reefs along the Perth metropolitan marine parks. So far the intertidal project has identified more than 120 invertebrate species, predominantly molluscs and echinoderms, as well as more than 110 species of algae. These results have established a baseline and suggested suitable 'indicator' species for ongoing monitoring, evaluation and reporting.

Taxonomy and biotic collection management

A total of 9,351 specimens were added to the WA Herbarium collection, which now stands at 742,929, an increase of 1.3 per cent during the year. At June 2013, the collection at the WA Herbarium comprised the following specimens from all major groups of plants, algae, moss, lichens and fungi (Table 1).

Table 1: Specimens held at the WA Herbarium

Taxonomic group	Number of specimens (June 2013)	Increase since June 2012 number
Myxomycetes	905	90
Fungi	23,519	246
Lichens	16,374	83
Algae	23,360	226
Liverwort and hornworts	1,967	2
Mosses	6,714	37
Ferns and fern allies	3,685	51
Gymnosperms	2,039	15
Flowering plants	664,366	8,601
Total number	742,929	9,351

During the year, 1,197 specimens were loaned to other institutions and 1,105 specimens were received on loan from other herbaria. The WA Herbarium forwarded 1,574 and received 304 exchange specimens from other Australian and international herbaria.

The reference herbarium of vascular plants, which has 14,554 specimens representing 11,599 taxa, was used by about 2,000 visitors during the year.

WA Herbarium specimen database

Records of all specimens incorporated in the WA Herbarium are entered into the WA Herbarium specimen database (*WAHerb*). During the year 9,351 specimen records were added to *WAHerb*, including 917 priority flora and 96 threatened flora. The total collection of priority and threatened flora comprises 46,203 specimens.

Flora data for WA

At 30 June 2013 WA's vascular flora (flowering plants, ferns, cycads and conifers) comprised 13,539 recognised species, subspecies and varieties (12,307 native and 1,232 introduced to the state). This was a net increase of 58 taxa recognised as occurring in the state. During 2012–13, 105 new names were formally published.

The census of WA plants maintained by the WA Herbarium as the authoritative reference for all plants of the state contained 23,097 names, representing 15,756 currently recognised species, subspecies and varieties of vascular and non-vascular (algae, moss, liverworts, lichens and fungi) plants (14,517 native and 1,239 alien).

Note: In the 2011–12 Yearbook, it stated that the 22,754 names contained in the census represented 16,850 currently recognised species, subspecies and varieties of vascular and non-vascular (algae, moss, liverworts, lichens and fungi) plants (14,419 native and 1,231 alien). It should have stated that the census contained 22,754 names representing 15,650 currently recognised species, subspecies and varieties of vascular and non-vascular (algae, moss, liverworts, lichens and fungi) plants (14,419 native and 1,231 alien).



Herbarium volunteers

An extensive volunteer program at the WA Herbarium sees volunteers provide important skills and help in many curation activities. During the year, volunteers contributed 8,740 hours to the herbarium, equivalent to five full-time staff. This contribution is gratefully acknowledged.

Establishment of the terrestrial and marine conservation reserve system

The formal conservation reserve system comprises national parks, nature reserves, conservation parks, marine parks, marine nature reserves, marine management areas and miscellaneous conservation reserves referred to in the CALM Act.

One marine park was formally created during 2012–13. The Eighty Mile Beach Marine Park in the Kimberley covers more than 200,000 hectares along 220 kilometres of remote coastline that supports a rich diversity of wildlife.

On 28 January 2013, Premier Colin Barnett and Environment Minister Bill Marmion announced a proposal to create the Horizontal Falls Marine Park covering about 300,000 hectares. In addition, the state has committed to establish the proposed North Kimberley Marine Park and an extension of the marine park network to the WA-Northern Territory border. Collectively, these parks and the existing Lalang-garram / Camden Sound Marine Park will be known as the Great Kimberley Marine Park. It will encompass almost three million hectares, and constitute the second biggest marine park in Australian state and territory coastal waters.

New conservation reserve proposals were also announced for the proposed Wandjina and Horizontal Falls national parks. The proposed Wandjina National Park will, when proclaimed, be Australia's biggest national park.

The 202 hectare Cave Hill Conservation Park was formally established after a change of purpose from water reserve to reserve vested in the Conservation Commission.

More information about lands and waters managed by the department is available in DEC's 2012–13 Annual Report: www.dpaw.wa.gov.au/about-us/annual-report-and-yearbook

Effective management of the conservation reserve system

Management planning for conservation reserves

Work continued with three traditional owner groups to develop Aboriginal land use and joint management arrangements for the Eighty Mile Beach Marine Park. The aim of joint management of the marine park is to facilitate the conservation of the marine environment and ensure its cultural significance to Aboriginal people is recognised and protected, and that opportunities for managed recreational and commercial uses are provided where appropriate. Progress was made on joint management arrangements for Lalang-garram / Camden Sound Marine Park, which was created on 19 June 2012.

Following the establishment of the Ngari Capes Marine Park on 12 June 2012, the *Ngari Capes Marine Park Management Plan 2013–2023* was gazetted on 5 February 2013. The zoning scheme will be gazetted after minor administrative amendments have been made to the CALM Act.

A five-year periodic audit of the implementation of the *Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005–2015* was completed by the MPRA with assistance from DEC.

Work continued on management plans being prepared under the Yawuru Indigenous Land Use Agreements for the joint management of Yawuru conservation land and waters in and around Roebuck Bay and Broome, including the proposed Yawuru Nagula Roebuck Bay Marine Park and Roebuck Bay Intertidal Reserve.

In 2011, a draft management plan was released for the Yoorrooyang Dawang jointly managed conservation parks in the east Kimberley. The management plan for the Ord River and Parry Lagoons nature reserves was gazetted on 5 October 2012.

A list of approved management plans is available on the DPaW website:
www.dpaw.wa.gov.au/parks/management-plans/approved-management-plans

Good Neighbour policy

The implementation of the department's *Good Neighbour* policy continued during 2012–13, including weed control, introduced animal control programs and fire management.

In the Kimberley Region, work continued with traditional owners, pastoral lease holders and non-government organisations to manage pest animals, implement prescribed burning programs and deliver biological survey programs. About 17 kilometres of fence was constructed on the eastern boundary of the Ord River Nature Reserve adjoining Carlton Hill Station to prevent cattle damaging high value crocodile breeding habitat.

Funding was provided to the Australian Wildlife Conservancy (AWC) under the *Kimberley Science and Conservation Strategy* for the management of the Artesian Range within the Charnley River pastoral lease, Tablelands and Beverley Springs pastoral leases, and the implementation of the *Ecofire* fire management program.

Through the *Kimberley Science and Conservation Strategy*, DEC also funded the fencing of Three Mound Springs on Drysdale River Station.

Work continued on the development of a memorandum of understanding with the Aboriginal lease-holders of Carson River Station, a pastoral lease to the north of Drysdale River National Park.

Fire and biodiversity research projects

Research continued into links between fire regimes and biodiversity in tropical savanna ecosystems of northern Australia. Collaboration continued with Charles Darwin University and the Australian National University in a project supported by the federal government's *Biodiversity Fund* to investigate the importance of fire on grass seed production as food for Gouldian finches (*Erythrura gouldiae*). In April 2013, a prescribed burn was undertaken at the base of the Bastion Range near Wyndham to reduce the likelihood of destructive dry season bushfires destroying finch nesting trees and grass feed.

In the Kimberley, the department has been supporting research by the AWC on feral cats. GPS collars have been fitted to 30 cats on Mornington, Marion Downs and Glenroy stations. The work indicates that careful management of fire can alter the hunting behaviour and success of cats reducing their density and the impact on wildlife. Further work with dingoes has demonstrated a negative correlation between cat and dingo activity, suggesting that dingoes affect the behaviour, and probably the population density, of feral cats, which is likely to reduce the impact of cats on native prey. Other AWC



Gouldian finch. Photo – David Bettini.



research partially funded by DEC demonstrated a direct cat predation impact on native long-haired rat (*Rattus villosissimus*) populations.

More information on fire and the environment is available on DPaW's website:
www.dpaw.wa.gov.au/management/fire/fire-and-the-environment

Recovery of threatened species and ecological communities, and management of other significant species and ecosystems

Recovery of threatened species and ecological communities

The Threatened Species Scientific Committee's recommendations from 2012 for changes to the lists of threatened flora and fauna under the WC Act were gazetted on 6 November 2012.

DEC continued to implement the memorandum of understanding with the federal Department of Sustainability, Environment, Water, Population and Communities to better align the threatened species lists under the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) with the state lists under the WC Act.

This understanding, and the prior joint project to prepare information sheets as the first stage in nominating changes to the list of threatened species under the EPBC Act, has so far resulted in 102 changes to the list of nationally threatened species under the EPBC Act.

As part of the process of seeking to better align the federal and state lists of threatened ecological communities (TECs), the 'Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula' and the 'Scott River Ironstone Association' were listed under the EPBC Act. DEC participated in a national workshop on TEC listing which investigated the national acceptance of the new International Union for Conservation of Nature (IUCN) categories and criteria for listing TECs.

Flora

Seven flora species were added to the state list of extant threatened flora: *Allocasuarina globosa*, *Aluta quadrata*, *Gastrobium humile*, *Grevillea* sp. Gillingarra (R.J. Cranfield 4087), *Hypocalymma sylvestre*, *Leucopogon* sp. Flynn (F. Hort, J. Hort & A. Lowrie 859) and *Stylidium wilroyense*. One species, pyramid mulla-mulla (*Ptilotus pyramidatus*), was moved from the list of presumed extinct flora to extant threatened flora following its rediscovery after 160 years in a wetland in the Perth suburb of Kenwick. One species, *Picris compacta*, was added to the list of species presumed to be extinct. Despite targeted surveys, it had not been found since it was originally collected in the Perth suburb of Crawley in 1941.

The Yornaning wattle (*Acacia insolita* subsp. *recurva*) was upgraded from endangered to critically endangered and *Ricinocarpos brevis* was downgraded from critically endangered to endangered. Six nomenclature changes were also endorsed.

A further 42 taxa were added to DEC's priority flora list, and 22 taxa were deleted from the list after more survey and taxonomic review demonstrated their adequate conservation status.

At 30 June 2013, there were 413 extant threatened flora species listed, with 14 listed as presumed to be extinct and 2,946 taxa listed as priority flora.

Recovery actions were implemented for a suite of threatened flora. Highlights included:

- A total of 181 species of threatened and priority flora comprising 386 populations were surveyed or monitored and 48 new populations of threatened flora and 68 new populations of priority flora were located. Of note was the discovery of new populations of the critically endangered Stirling Range davesia (*Daviesia pseudaphylla*), late hammer orchid (*Drakaea confluens*), milky emu bush (*Eremophila lactea*), net-veined gyrostemon (*Gyrostemon reticulatus*), prickly honeysuckle (*Lambertia echinata* subsp. *echinata*) and round-leaf honeysuckle (*Lambertia orbifolia* subsp. *orbifolia*). In addition, new populations of the three-flowered stachystemon (*Stachystemon nematophorus*) and long-flowered nancy (*Wurmbea tubulosa*) were located. Eighteen priority flora were recommended for downgrading in status following the discovery of further populations.
- Volunteer members of the DEC-WA Native Orchid Study and Conservation Group collaborative Adopt an Orchid Project surveyed and monitored 29 priority orchid species, with 102 populations monitored and seven new populations discovered.
- Recruitment trials were conducted for several species including *Acacia chapmanii* subsp. *australis*, Wongan cactus (*Daviesia euphorbioides*), Norseman pea (*D. microcarpa*), white-flowered philotheca (*Philotheca basistyla*), *Stylidium amabile* and *Verticordia pityrhopis*. Of particular note is a 179 per cent increase in the number of plants of wavy-leaved smokebush (*Conospermum undulatum*) following fire.
- Phosphite applications were carried out to control *Phytophthora* dieback targeting 19 threatened flora species including 11 critically endangered taxa in the Stirling Range National Park and Albany coastal area.
- Aerial canker monitoring continued for Albany banksia (*Banksia verticillata*) and *Lambertia orbifolia* populations, as part of a larger South Coast aerial canker research project and a fungicide application trial was undertaken to protect Albany banksia plants severely threatened by aerial canker disease.
- Fencing to protect plants from grazing was erected for several threatened flora species including the critically endangered Stirling range wattle (*Acacia awestoniana*), tangled wattle (*A. volubilis*), cactus dryandra (*Banksia anatona*), blue tinsel lily (*Calectasia cyanea*) and paddle-leaf davesia (*Daviesia ovata*).
- Rabbit control was undertaken for many threatened flora species including Wagin banksia (*Banksia oligantha*), Stirling Range dryandra, yellow mountain bell (*Darwinia collina*), *Latrobea colophona*, Stirling Range beard heath (*Leucopogon gnaphalioides*), small-flowered snottygobble (*Persoonia micranthera*), and shy featherflower (*Verticordia fimbriolepis* subsp. *fimbriolepis*). Rabbit control included the fumigation of rabbit warrens and baiting of threatened flora habitat.
- Pig control was undertaken for several threatened flora species including Kalbarri spider orchid (*Caladenia wanosa*), elegant spider orchid (*C. elegans*), Hoffman's spider orchid (*C. hoffmanii*), Moresby Range drummondita (*Drummondita ericoides*) and *Grevillea bracteosa* subsp. *howatharra*.
- Weed control was undertaken for many threatened flora species including the elegant spider orchid, native wild rose (*Diplolaena andrewsii*), rough emu bush (*Eremophila scaberula*) and southern tetraria (*Tetraria australiensis*).
- "Have you seen this plant?" posters were developed for several threatened flora species including the Norseman pea, milky emu bush, prickly honeysuckle, *Marianthus aquilonaris* and salt myoporum (*Myoporum turbinatum*) to raise awareness and encourage the reporting of new populations. A threatened flora book was completed for the Shire of Esperance.
- A recruitment burn was carried out in spring 2012 on a population of *Androcalva perlaria* that had no above-ground plants. Soil-stored seed germinated and flowering occurred within six months of the burn.
- Planting at translocation sites was undertaken for nine plant species in 2012–13 (Table 2). Additionally, monitoring of 62 established plant translocation sites was undertaken for 38 taxa.



Table 2: Flora translocations undertaken as part of the implementation of recovery and interim recovery plans in 2012–13

Species	Activity	Number of translocation sites established
<i>Banksia brownii</i>	Infill planting at one site	3
<i>Banksia montana</i>	Infill planting at one site	2
<i>Darwinia camea</i>	Infill planting at one site	3
<i>Darwinia whicherensis</i>	Infill planting at two sites	2
<i>Gastrolobium papilio</i>	Infill planting at two sites	2
<i>Grevillea batrachioides</i>	Infill planting at one site	1
<i>Grevillea humifusa</i>	Infill planting at one site	2
<i>Grevillea calliantha</i>	Infill planting at one site	2
<i>Grevillea maccutcheonii</i>	Infill planting at two sites	2
<i>Hemigenia ramosissima</i>	Infill planting at one site	2
<i>Lambertia echinata</i> subsp. <i>occidentalis</i>	Infill planting at two sites	2
<i>Leucopogon gnaphalioides</i>	Infill planting at one site	2
<i>Petrophile latericola</i>	Infill planting at two sites	2
<i>Verticordia albida</i>	Infill planting at one site	1

Threatened Flora Seed Centre

The Threatened Flora Seed Centre is a member of the Australian Seed Bank Partnership, a national network of conservation seed banks working towards conserving Australia's plant species and building and sharing knowledge to support restoration.

A total of 261 seed collections were banked at the seed centre, 241 of which were collected during the past year. About half of the collections were from threatened flora with 92 from critically endangered taxa. A total of 114 threatened or priority flora collections were made under targeted project funding: 33 collections from 13 threatened taxa from federal government funding through the Australian Seed Bank Partnership for species susceptible to *Phytophthora* dieback; 12 collections funded through the South West Catchments Council (SWCC); 13 collections under the Millennium Seed Bank fieldwork fund; and 46 collections under funding made available through NRM or Caring for our Country projects.

Seedlings from 14 critically endangered species from 23 collections were provided for DEC translocation projects.

During 2012–13, seed bank staff provided substantial technical advice and assistance to the Perth's *Banksia Woodland Restoration Project*, processing and germinating seed from a range of species.

The seed bank has provided secure short-term storage conditions for 45 collections of local native species from the SWCC for future restoration projects, and a further 10 collections from the *Banksia Woodland Restoration Project* for research, and for use in direct seeding and nursery propagation.

Fauna

At 30 June 2013, there were 240 extant threatened fauna species, 18 presumed to be extinct fauna species and 12 listed as otherwise specially protected fauna species, with a further 196 species on the department's priority fauna list.

Changes to the schedule of threatened fauna included those emanating from a major review of the threat status of bird species in Australia. A total of 16 species of fauna were added to the WC Act list of specially protected (threatened) fauna, including 12 species of migratory birds that are suffering world-wide decline. Also listed were

the grey falcon (*Falco hypoleucos*) and purple-crowned fairy-wren (western) (*Malurus coronatus coronatus*), and two plant-louses that occur only with specific species of geographically restricted flora.

Eight species of bird were delisted, including four migratory species. Muir's corella (*Cacatua pastinator pastinator*) was transferred from Schedule 1 (threatened fauna) to Schedule 4 (otherwise specially protected fauna) as it has recovered in numbers due to management actions. It still requires special management to ensure that it is not again significantly reduced in numbers from uncontrolled population management. The graceful sun moth (*Synemon gratiosa*), was delisted following targeted survey work to demonstrate that it no longer met the IUCN criteria for threatened. The Gouldian finch and northern crested shrike-tit (*Falcunculus frontatus whitei*) were delisted as they do not appear to be declining. Seven species of migratory birds were re-graded in threat ranking from vulnerable to endangered, and one species, Tristan Albatross (*Diomedea dabbenena*), from endangered to critically endangered.

Recovery actions were implemented for many threatened fauna species during the year. Highlights included:

- The Peak Charles National Park fauna survey was completed, replicating survey sites last assessed during the biological survey of the eastern Goldfields between 1978 and 1982. Several species were recorded for the first time in the park, including the chuditch (*Dasyurus geoffroii*) and Gilbert's dunnart (*Sminthopsis gilberti*).
- Continued monitoring of translocated white-bellied frogs (*Geocrinia alba*) recorded 31 calling males indicating a persisting population of at least 60 animals. A further 20 orange-bellied frogs (*G. vitellina*) and 44 white-bellied frogs were released from the Perth Zoo's captive breeding and rearing program. Five of the white-bellied frogs were captive-bred; this was the first release of captive-bred frogs of this species.
- With the assistance of the Cape Conservation Group, monitoring of black-flanked rock wallaby (*Petrogale lateralis lateralis*) populations within Cape Range National Park was re-instated as a long-term monitoring program to provide information about distribution within the national park and how wallaby numbers change over time.
- In collaboration with the Kanyirninpa Jukurrpa rangers, work to control feral cats continued at Kaalpi (Calvert Range) and Jilukurru (Durba Hills) to protect the black-flanked rock wallaby and other threatened species in the area.
- At Perup, woylie (*Bettongia penicillata ogilbyi*) numbers continued increase. An additional \$250,000 of state NRM funding has been received for ongoing predator control work outside the fenced area as well as improvements to the fence.
- An assessment of EBPC Act threatened fauna, including Gouldian finch, northern quoll (*Dasyurus hallucatus*) and red goshawk (*Erythrotriorchis radiatus*), was conducted for the Ord Stage Two irrigation area. DEC provided significant input and approval of the Gouldian finch management plan for the Ord Stage Two area.
- During 2012–13, 84,301 new records were added to the Fauna Survey Returns system, with 19,410 of those for threatened or priority fauna species. A further 3,208 new records were added to the *Threatened and Priority Fauna* database.
- A UWA PhD project continued to investigate roost site fidelity and resource use by Carnaby's cockatoo (*Calyptorhynchus latirostris*) on the Swan Coastal Plain. Satellite tags attached to 24 birds have been used to track the study birds and their flocks to determine the food and water resources used around night roosts and distances travelled.

In addition to being fitted with satellite tags, the Carnaby's cockatoos had their tail feathers marked with non-toxic coloured ink so people could identify the tagged birds and report sightings to DEC. Photo – Christine Groom/DEC.





- A new species of the fresh water fish, the little pygmy perch (*Nannoperca pygmaea*), was described in the Mitchell and Hay rivers.
- A statewide strategic plan for the conservation of marine turtles has been developed and is being reviewed. This plan is due for general release in 2013–14.
- In the Kimberley, flatback turtle (*Natador depressus*) nest monitoring continued on Eighty Mile Beach in partnership with traditional owners, pastoralists and volunteers. Flatback turtle populations were also monitored at Cape Domett to determine population viability.
- At Dirk Hartog Island National Park, ongoing monitoring of nesting loggerhead turtles, (*Caretta caretta*) continued assisted by a remote camera system. The extended monitoring period has helped in showing that Dirk Hartog supports one of the world's biggest nesting loggerhead turtle populations.
- The Ningaloo Turtle Program, established in 2002, continued with 45 volunteers contributing a 2,819 hours in identifying and counting turtle nests along key Ningaloo Coast beaches. Relatively low numbers of nesting turtles were recorded during the 2012–13 season, with 1,023 nests compared to the 7,049 recorded nest in 2011–12. Although this difference is deemed significant, similar reductions in nesting activity were recorded at other turtle rookeries throughout the state. Of the 1,023 nests recorded, 585 were made by green turtles (*Chelonia mydas*), 304 by loggerhead and 125 to hawksbill turtles (*Eretmochyls imbricata*).
- DEC's Marine Science program assisted with a CSIRO-led project at Ningaloo Marine Park where DEC staff were trained in the capture and tagging of sea turtles. Acoustic transmitters were attached to 20 green turtles with two of these turtles also fitted with GPS satellite tags.
- The Dampier Archipelago supports the biggest hawksbill turtle rookery in the Indo-Pacific and one of the biggest in the world. Turtle monitoring on Rosemary Island, which lies within the Archipelago, primarily focused on hawksbill turtles and continues to add to knowledge of spatial trends, turtle mortality and growth rates. Rosemary Island has been a focus for hawksbill turtle tagging and monitoring research since the mid-1980s.
- The West Pilbara Turtle Program is funded by Rio Tinto and is a cooperatively managed community based program that monitors flatback turtles at Wickham beaches. Volunteers from the Karratha and Wickham monitor nesting, false crawl events, hatchling events and nest interference by predators and humans. During 2012–13, the number of volunteers involved increased from 56 in the 2011–12 season to 150.

Table 3: Fauna translocations undertaken as part of the implementation of recovery and interim recovery plans in 2012–13

Species	Translocated from	Translocated to
Numbat (<i>Myrmecobius fasciatus</i>)	Perth Zoo	AWC Scotia Sanctuary (NSW)
Gilbert's potoroo (<i>Potorous gilbertii</i>).	Bald Island and Two Peoples Bay Nature Reserve	Waychinicup National Park fenced enclosure
Noisy scrub-bird (<i>Atrichornis clamosus</i>)	Bald Island	Angove water reserve
Dibbler (<i>Parantechinus apicalis</i>)	Perth Zoo	Waychinicup National Park
Woylie (<i>Bettongia penicillata ogilbyi</i>)	Wildlife carer	Dryandra
Western swamp tortoise (<i>Pseudemysdura umbrina</i>)	Perth Zoo	Twin Swamps Nature Reserve
White-bellied (<i>Geocrinia alba</i>) and orange-bellied frog (<i>G. vitellina</i>)	Perth Zoo	Witchcliffe area

Threatened ecological communities

The Threatened Ecological Communities Scientific Committee met once during the year and considered possible amendments to the lists of priority ecological communities (PECs) and TECs. As at 30 June 2013, there were 66 extant TECs, three listed as 'totally destroyed', and 297 PECs listed by DEC.

Highlights of work done to protect TECs and PECs are listed below. Some activities, such as weed control, fencing, surveys and data analysis were completed with funding assistance from the federal government's *Caring for our Country* program.

- Environmental impact assessments advice was provided for 148 projects with the potential to affect TECs or PECs in locations across the state.
- A total of 482 occurrences of threatened or priority ecological communities were added to DEC's *Threatened and Priority Ecological Community* database. New occurrence information was added to the database for 18 TECs and 20 PECs and boundary mapping was refined for 28 TECs and PECs, assisting in resolving the status of the PECs, and providing improved information for land use planning.
- Site visits were made to 134 occurrences of TECs and PECs and data collected about habitat, composition, condition, threats and recommended recovery actions.
- DEC's Species and Communities Branch hosted a symposium about the status, knowledge, research, and conservation of WA's four TECs and seven PECs that are built by microbialites, such as the stromatolites of Hamelin Pool, and the Lake Clifton thrombolites. Seventy international and local experts attended and outcomes included strategies for future collaborative research and recommendations about future conservation management for WA's unique living microbialites.
- Data from 119 floristic quadrats in the Swan Region and 26 in the South West Region were statistically analysed to verify the presence of TECs or PECs present and identified special land management requirements.
- Seven occurrences of 'Claypans with shrubs over herbs' were surveyed and comprehensive species lists compiled. Hydrological monitoring, weed mapping and control were completed for two of these claypans in the Perth Hills. An occurrence in Perth Hills was fenced and a track realigned in the Great Southern District to prevent damage to the claypans from illegal access.
- Floristic surveys were conducted in two occurrences of the 'Yate dominated claypan' to determine recovery after fire.
- Floristic surveys were conducted in conjunction with hydrological monitoring in seven occurrences of the 'Bentonite lakes' TEC, to monitor condition of vegetation.
- Seven priority and one threatened microbialite community in lakes in the Swan Region were sampled to provide baseline data about microbes that are adapted to different conditions.
- In the South Coast Region rabbit control was undertaken to protect the 'Montane thicket of the eastern Stirling Range' TEC. A summary of data for the TEC and its threatened flora was provided for a new book to be published on long-term ecological monitoring.
- Landowners in the Albany peri-urban area were notified about occurrences on their property of recently listed PECs identified through the Albany Regional Vegetation Survey. TEC recovery actions in this area included rabbit baiting, fencing, phosphite application to control *Phytophthora* dieback, seed collection and monitoring of component species.
- In the Lake Toolibin TEC, groundwater monitoring was completed and vegetation monitoring data were analysed. Seed collection, propagation of seedlings, and revegetation with 9,000 swamp sheoak (*Casuarina obesa*) seedlings was completed on the lake floor. A Toolibin Lake project review was completed and progress made on a revised recovery plan.



- The most recently identified occurrence of the Lake Bryde type TEC in Lakelands Nature Reserve was partially fenced to protect it from overgrazing by kangaroos, and rabbit grazing.
- In the Swan Region operational works to map and control weeds, establish and repair fences, control feral pests and revegetate degraded areas were undertaken in 31 reserves to benefit 14 TECs and seven PECs.
- At Lake Coo loongup, the Regional Parks Branch completed a project to control weeds including the highly invasive pampas grass (*Cortaderia selloana*), sharp rush (*Juncus acutus*) and cotton bush (*Gomphocarpus fruticosus*) to benefit the 'Sedgelands in holocene dune swales' TEC.
- In the Warren Region, peizometers were installed in seven occurrences of the reedia swamps Warren Region PEC to monitor water changes.

More information on threatened flora, fauna and ecological communities is available on the DPaW website: www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities.

Recovery planning

Ten interim recovery plans for flora species were approved:

- Stirling Range wattle (*Acacia awestoniana*)
- *Acacia leptoneura*
- Wilson's wattle (*Acacia wilsonii*)
- *Androcalva adenothalia* (previously *Commersonia adenothalia*)
- Boddington spider orchid (*Caladenia* sp. Quindanning (K. Smith & P. Johns 231))
- Hopetoun beard orchid (*Calochilus pruinosus*)
- Phalanx grevillea (*Grevillea dryandroides* subsp. *dryandroides*)
- Stirling Range beard heath (*Leucopogon gnaphalioides*)
- Cinnamon sun orchid (*Thelymitra dedmaniarum*)
- One-sexed hydatella (*Trithuria occidentalis*).

Recovery plans were approved for two TECs: 'Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (type 20b)' and 'Stromatolite community of stratified hypersaline coastal lake – Lake Thetis'.

Four threatened fauna recovery plans were approved: Carnaby's cockatoo (update), chuditch (update), quokka (*Setonix brachyurus*) and five species of the black-flanked rock-wallaby (*Petrogale* spp.). The recovery plans for the woylie (*Bettongia penicillata ogilbyi*), the western spiny-tailed skink (*Egernia stokesii*), the chuditch and the Shark Bay marsupials were adopted by the federal government under the EPBC Act. The recovery plans for Carnaby's cockatoo, quokka and five species of the black-flanked rock-wallaby have been submitted to the federal government for adoption under the EPBC Act.

In addition, the department contributed to the preparation of a national recovery plan for the Australian sea lion (*Neophoca cinerea*), which is listed as threatened under the EPBC Act. This recovery plan has been adopted under the EPBC Act.

More information on recovery planning is available on the DPaW website: www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities

Wetland conservation

Ramsar wetlands

Twelve WA wetlands are listed under the International Convention on Wetlands (Ramsar Convention). In 2012–13, the work of completing state government and federal government approvals for ecological character descriptions for all 12 Ramsar sites continued.

The Ramsar information sheets for these wetlands were also revised.

Table 4: Management plans for Ramsar wetlands in WA:

Ord River Floodplain	Finalised: Ord River and Parry Lagoons Management Plan (DEC 2013)
Roebuck Bay	Draft for Yawuru Park Council Review: Roebuck Bay Intertidal Reserve-Joint Draft Management Plan (DEC 2013); Roebuck Bay Ramsar Site Management Plan (Roebuck Bay Working Group 2009)
Eighty Mile Beach	Draft: Eighty Mile Beach Ramsar Site Management Plan (DEC 2013)
Forrestdale and Thomsons lakes	Finalised: Thomsons Lake Nature Reserve Management Plan (DEC 2005) and Forrestdale Lake Nature Reserve Management Plan (DEC 2005)
Peel–Yalgorup System	Finalised: Peel–Yalgorup System Ramsar Site Management Plan (Peel–Harvey Catchment Council 2009) Finalised: Yalgorup National Park Management Plan 1995–2005 Finalised: Lake McLarty Nature Reserve Management Plan (DEC 2008)
Toolibin Lake	Finalised: Recovery Plan for Toolibin Lake (Toolibin Lake Recovery Team and Technical Advisory Group 1994) Final Draft: Review 2013 Toolibin Lake Recovery Plan (Toolibin Lake Recovery Team and Technical Advisory Group 2013)
Vasse–Wonnerup System	Finalised: Busselton Wetlands Conservation Strategy (WAPC 2005) Draft: Swan Coastal Plain—South Management Plan (DEC 2013)
Lake Warden System	Final Draft: Esperance and Recherche Parks and Reserves Management Plan (DEC 2013)
Becher Point Wetlands	Finalised: Rockingham Lakes Regional Park Management Plan (DEC 2013)
Lake Gore	Final draft: Esperance and Recherche Parks and Reserves Management Plan (DEC 2013)
Muir–Byenup System	Finalised: Perup Management Plan (DEC 2013)

Implementation of a foreshore and aquatic use plan for parts of the Ramsar-listed Lake Kununurra continued. Implementation of the plan was overseen by a multi-stakeholder committee of which the department is a member. DEC continued to work with the Department of Water (DoW) on the Lake Kununurra Biophysical Foreshore Assessment Guidelines, which will guide future rural, residential and agricultural developments adjoining the Ramsar-listed Lake Kununurra. A general guide to the management of the riparian area for native vegetation clearing and development pressures was also provided to the Shire of Wyndham – East Kimberley and Department of Planning.

The Vasse-Wonnerup Ramsar wetland system at Busselton supports about 35,000 waterbirds each year. There is a long history of mass fish deaths during summer in the lowest reaches of the system. The frequency and severity of these incidents can be reduced by timely openings of the Wonnerup Inlet sandbar and Water Corporation floodgates on the Vasse estuary's exit channels. Careful management of seawater inflows and estuary water levels is needed to prevent adverse impacts on adjoining low-lying properties, waterbirds and fringing vegetation. The Vasse Estuary Technical Working Group coordinates summer opening of the sandbar at the wetland system mouth; for water level and water quality monitoring; and for floodgate openings to release fish and manage water levels. This ongoing work was begun in 1997. Long-term mitigation of poor water quality in the estuary will be assisted by the implementation of the Water Quality Improvement Plan for the Vasse and Wonnerup River systems. The department is collaborating with DoW and NRM bodies on implementing the plan.

DEC provided logistic and technical support for research by Murdoch University's Marine and Freshwater Research Laboratory into the submerged aquatic plant communities, nutrient status and ecological health of the Vasse and Wonnerup estuaries.

DEC continued to work with other states and the federal government in developing a national wetlands policy regarding the implementation of international agreements. Toolkits for identifying, classifying and managing high ecological value aquatic ecosystems were finalised and are available on the federal government website at: www.environment.gov.au/water/publications/index.html#ecosystems.

Following the inaugural Wetlands Climate Change symposium in July 2010 and the 2011 climate change report card for aquatic ecosystems, DEC continued to participate in projects assessing the resilience of aquatic ecosystems across the south-west.

Adaptive management planning has begun with a focus on climate change adaptation planning for internationally recognised wetlands. DEC took part in a Society for Wetland Scientists Oceania workshop where principal discussions centred on how wetlands can be prioritised based on likely future viability and management response feasibility.


DEC continued to be the lead agency in coordinating proposals for possible nomination of nine wetlands for Ramsar listing. Candidate areas are Lake MacLeod, Lake Gregory, the Cape Range subterranean waterways, Lake Ballard, the Millstream pools, east Hamelin Pool (Shark Bay World Heritage area), the Ellen Brook swamps system, tributaries of the Lower Blackwood River (formerly Spearwood Creek) and Fortescue Marshes.

More information on internationally significant (Ramsar) wetlands is available on the DPaW website: www.dpaw.wa.gov.au/management/wetlands

Wetlands mapping and evaluation projects

During the year, the department maintained and added data to the corporate and publically available wetlands mapping layer, the *Geomorphic Wetlands Swan Coastal Plain* dataset that covers an area of 364,960 hectares from Moore River in the north to Dunsborough in the south and the base of the base of the Darling escarpment in the east. Statistics have been updated of wetland extent and values including management categories and wetland type. An audit of wetland vegetation loss was also conducted over a 21-year period from 1992 through to 2012.

More information on wetland management is available on the DPaW website: www.dpaw.wa.gov.au/management/wetlands



The department maintains the boundaries, classifications and evaluations of wetlands mapped in its *Geomorphic Wetlands Swan Coastal Plain* dataset. These wetland values or areas can change, either through natural or anthropogenic processes, and the department has developed a process to modify this dataset in response to these changes. The department receives requests from external proponents, such as environmental consultants, landholders and state and local government agencies, to modify wetland mapping in the dataset (management category, classification, or boundary reviews).

More information on wetland mapping is available on the DEC website:
www.dec.wa.gov.au/management-and-protection/wetlands/wetlands-mapping.

Management of marine fauna

During 2012–13, DEC attended 33 whale and dolphin incidents requiring a management response. These involved 206 individual animals of 10 species — humpback whale (*Megaptera novaeangliae*), southern right whale (*Eubalaena australis*), minke whale (*Balaenoptera bonaerensis*), Gray's beaked whale (*Mesoplodon grayi*), false killer whale (*Pseudorca crassidens*), sperm whale (*Physeter macrocephalus*), pantropical spotted dolphin (*Stenella attenuata*), common dolphin (*Delphinus delphis*), Risso's dolphin (*Grampus griseus*) and bottlenose dolphin (*Tursiops* spp.). One multiple stranding of about 150 pantropical spotted dolphins occurred in February at Two Peoples Bay, Albany. All but one of the dolphins were guided safely back out to sea.

Twenty nine humpback whales and one southern right whale were reported entangled in fishing gear and marine debris. DEC's disentanglement team successfully disentangled five of the whales; the fate of the others is unknown as distance from shore or unfavourable conditions prevented intervention.

There were 16 reported pinniped incidents, involving five species: Australian sea lion, New Zealand fur seal (*Arctocephalus forsteri*), sub-Antarctic fur seal (*A. tropicalis*), leopard seal (*Hydrurga leptonyx*) and southern elephant seal (*Mirounga leonine*).

In November 2012, DEC provided accredited large whale disentanglement training to New Zealand Department of Conservation staff.

Management of commercial activities involving fauna and flora

DEC ensured that wildlife-based activities that occurred during the year were licensed and managed in accordance with the WC Act and associated regulations, and were investigated to ensure compliance with legislation and the licences issued.

As part of nationally approved kangaroo management plans, aerial population surveys of kangaroos were undertaken in the Central Zone in October 2012. The south-west forest regions were not surveyed. The Central Zone survey and submissions provided information to assess the potential commercial harvest quotas for 2013.

Quotas and commercial harvests for 2012 were:

- western grey kangaroos (*Macropus fuliginosus*)—quota, maximum of 140,000; harvest, 93,319
- red kangaroos (*M. rufus*)—quota, maximum of 95,000; harvest, 34,262
- euros (*M. robustus*)—no commercial harvest during 2012.

Under the management plan for the commercial harvest and farming of crocodiles in WA, the following maximum annual quotas apply, though these are seldom filled, especially for freshwater crocodiles:

- estuarine (saltwater) crocodiles (*Crocodylus porosus*)—quota, 520 eggs/hatchlings, 50 non-hatchlings; none collected or received
- Australian freshwater crocodiles (*C. johnstoni*)—quota, 1,900 eggs/hatchlings, 200 non-hatchlings; none collected or received.



The management plan for the commercial harvesting of protected flora continued to be implemented and a new management plan was prepared and submitted to the federal government for approval under the EPBC Act.

Regulation

Flora and fauna licensing

In 2012–13, there were 8,739 fauna licences (other than damage, but including non-commercial) issued during the year, a decrease of just over two per cent from the previous year. The interest in pet herpetofauna (reptiles and frogs) remains strong, with 4,490 people currently licensed for up to three years to keep reptiles as pets, an increase of almost eight per cent on last year. Once again, there was a decrease in the number of avian fauna licences issued. The total number of flora licences and permits issued was 1,990, an increase of one and a half per cent from the previous year. DEC issued 269 commercial purposes licences, 201 commercial producer licences and nurseryman licences, and 1,307 scientific or other prescribed purposes licences in 2012–13.

Incidents of prohibited reptiles being brought into or kept illegally in WA continued to increase. During 2012–13, the majority of illegally kept reptiles were seized in the metropolitan area; however, increasing numbers have been seized from around the state including the South West, Midwest and Pilbara. Seized species included south west carpet python (*Morelia spilota imbricata*), black headed python (*Aspidites melanocephalus*), Stimsons pythons (*Antaresia stimsoni*), shingleback skinks (*Tiliqua rugosa*) and oblong turtles (*Chelodina oblonga*). Prohibited species seized included a jungle python (*M. s. cheynei*) and a diamond python (*M. s. spilota*) from the eastern states, and a corn snake (*Pantherophis guttatus*), a milk snake (*Lampropeltis triangulum*) and a king snake (*Lampropeltis* sp.), which are native to North America.

Damage and dangerous fauna licences

The department received reports of problem crocodiles in several parts of the Kimberley and the Pilbara. Nine licences were issued to remove saltwater crocodiles from the wild because they posed a threat to the public and one licence was issued to remove and relocate a freshwater crocodile. Twenty dangerous fauna licences were issued for aggressive magpies (*Cracticus tibicen*), 10 dangerous fauna licences were issued for kangaroos; and two dangerous fauna licences were issued for an Australian raven (*Corvus coronoides*) and a kookaburra (*Dacelo novaeguineae*). A number of dangerous fauna licences were issued to mitigate the risk of aircraft strike at Perth, Jandakot and regional airports. These licences applied to a range of species, mostly birds but including agile wallabies (*Macropus agilis*), red kangaroos, euros and western grey kangaroos.

A total of 405 licences were issued for the control of fauna causing damage, including five licences for emus (*Dromaius novaehollandiae*); 319 licences for western grey kangaroos (a decrease of 16 per cent in licence numbers and a 28 per cent decrease in the number taken); six licences for red kangaroos; three licences for euros or hill kangaroos; two licences for agile wallabies; nine licences for little corellas (*Cacatua sanguinea*) (a slight increase of three per cent); 23 licences for western long-billed corellas (*Cacatua tenuirostris*) (constant with previous year); seven licences for ringneck parrots (*Barnardius zonarius*); four licences for galahs (*Eolophus roseicapilla*); and six licences for Australian ravens. Eight licences were also issued to scare or destroy waterfowl causing damage. In total 75 damage licences were issued for birds, a decrease of seven per cent from 2011–12.

More information is available on the DPaW website:

Fauna and flora licensing: www.dpaw.wa.gov.au/plants-and-animals/licences-and-permits

Table 5: Fauna and flora licences issued in 2012–13

Fauna Licences		No. of licences issued
Scientific		
Collection (Reg 17)		682
Bird/bat banding (Reg 23)		123
Education and public		
To take (Reg 15) Marine interaction		245
To take (Reg 15) Other		222
To hold (Reg 16)		152
Avian fauna		
Keep and breed in captivity (Reg 12)		2,948
Deal (Reg 13)		35
Breed for commercial purposes (Reg 14)		0
Trap (Reg 11)		2
Species trapped commercially	Number	
Twenty-eight parrot (<i>Barnardius zonarius</i>)	145	
Red-capped parrot (<i>Purpuricephalus spurius</i>)	66	
Western rosella (<i>Platycercus icterotis</i>)	43	
Galah (<i>Eolophus roseicapilla</i>)	9	
Long-billed corella (eastern states species) (<i>Cacatua tenuirostris</i>)	26	
Keep in captivity (Reg 12A)		63
Herpetofauna (reptiles and amphibians)		
Keeping		2,644
Dealing		20
Farming		1
Taking		8
Removing		351
Emus (<i>Dromaius novaehollandiae</i>)		
Farming (Reg 14)		9
Dealing (Reg 8)		0
Dealing (emu eggshells Reg 13)		3
Processing (emu eggshells Reg 7)		2
Crocodiles		
Farming (Reg 14)		2
Skin dealing (Reg 10)		0
Processing (Reg 7)		2



Fauna Licences		No. of licences issued
Kangaroo		
Take for sale (Reg 6)		407
Deal in carcasses (Reg 8)		18
Skin dealing (Reg 10)		7
Processing (Reg 7)		18
Exports for interstate		
Skins of fauna (or other dead fauna)		42
Fauna (live)		245
Herpetofauna (reptiles and amphibians)		23
Export overseas		
Skins of fauna (or other dead fauna) from WA		7
Emu eggs or products (personal items) from WA		1
Fauna (avian) from WA (live)		3
Imports interstate		
Skins of fauna (or other dead fauna) into WA		6
Australian fauna (live)		255
Live exotic birds and other animals		166
Herpetofauna (reptiles and amphibians)		27
Total fauna licences		8,739
Flora Licences		No. of licences issued
Commercial purposes		269
Sandalwood (<i>Santalum spicatum</i>) (from Crown land)		22
Forest produce (from Crown land)		2
Commercial producers		201
Sandalwood (from private land)		19
Scientific/prescribed purposes		1,307
Permits to take declared rare flora		170
Total flora licences		1,990

Damage Licences	No. of licences issued	Total no. of each species authorised to be taken
Other Avian Fauna		
Australian raven (<i>Corvus coronoides</i>)	5	destroy 32
	1	trap/euthanase 2
Australian white ibis (<i>Threskiornis molucca</i>)	1	scare only
Baudin's cockatoo (<i>Calyptorhynchus baudinii</i>)	3	scare only
Carnaby's cockatoo (<i>Calyptorhynchus latirostris</i>)	2	scare only
Emu (<i>Dromaius novaehollandiae</i>)	5	destroy 122
Galah (<i>Eolophus roseicapilla</i>)	4	destroy 1,127
Little corella (<i>Cacatua sanguinea</i>)	7	destroy 2,900
	2	scare only
Long-billed corella (Cent. West) (<i>Cacatua butleri</i>)	23	destroy 14,450
Long-billed corella (Lake Muir) (<i>Cacatua pastinator</i>)	3	scare only
Long-billed corella (eastern states species) (<i>Cacatua tenuirostris</i>)	1	scare only
Pied Cormorant (<i>Phalacrocorax varius</i>)	1	destroy 10
Red-capped parrot (<i>Purpureicephalus spurius</i>)	1	destroy 50
Straw-necked ibis (<i>Threskiornis spinicollis</i>)	1	scare only
Twenty-eight parrot (<i>Barnardius zonarius</i>)	7	destroy 450
Waterfowl		
Australian Shelduck (<i>Tadorna tadornoides</i>)	1	destroy 10
Maned duck (<i>Chenonetta jubata</i>)	4	destroy 130
	1	scare only
Pacific black duck (<i>Anas superciliosa</i>)	1	destroy 50
	1	scare only
Mammals		
Agile wallaby (<i>Macropus agilis</i>)	2	destroy 600
Euro (<i>Macropus robustus</i>)	3	destroy 60
Red kangaroo (<i>Macropus rufus</i>)	6	destroy 405
Western grey kangaroo (<i>Macropus fuliginosus</i>)	319	destroy 14,394



Dangerous Fauna Licences	No. of licences issued	Total no. of each species authorised to be taken
Agile wallaby (<i>Macropus Agilis</i>)	2	destroy 31
	1	scare 25
Australian shoveler (<i>Anas rhynchotis</i>)	1	*destroy
	1	scare only
Australian bustard (<i>Ardeotis australis</i>)	2	destroy 25
Australian hobby (<i>Falco longipennis</i>)	1	*destroy
	1	scare only
Australian kestrel (<i>Falco cenchroides</i>)	1	*destroy
	1	scare only
Australian magpie (<i>Gymnorhina tibicen</i>)	19	destroy 27
	1	scare only
Australian magpie lark (<i>Grallina cyanoleuca</i>)	2	*destroy
Australian pelican (<i>Pelecanus conspicillatus</i>)	1	*destroy
	1	scare only
Australian raven (<i>Corvus coronoides</i>)	2	destroy 20
	1	scare only
Australian shelduck (<i>Tadorna tadornoides</i>)	1	*destroy
	1	scare only
Australian white ibis (<i>Threskiornis molucca</i>)	2	*destroy 50
	1	scare only
Banded lapwing (banded plover) (<i>Vanellus tricolor</i>)	2	*destroy 30
	1	scare only
Barn owl (<i>Tyto alba</i>)	1	*destroy
	1	scare only
Baudin's cockatoo (<i>Calyptorhynchus baudinii</i>)	1	scare only
Black kite (<i>Milvus migrans</i>)	3	destroy 38
Black-shouldered kite (<i>Elanus axillaris</i>)	1	*destroy
	1	scare only
Black swan (<i>Cygnus atratus</i>)	1	*destroy
	1	scare only
Brown falcon (<i>Falco berigora</i>)	1	*destroy
	1	scare only
Camaby's cockatoo (<i>Calyptorhynchus latirostris</i>)	1	scare only
Collared sparrowhawk (<i>Accipiter cirrocephalus</i>)	1	*destroy
	1	scare only
Crested pigeon (<i>Ocyphaps lophotes</i>)	1	*destroy
	1	scare only
Estuarine (saltwater) crocodile (<i>Crocodylus porosus</i>)	8	destroy 5
	1	trap & relocate 1

Dangerous Fauna Licences	No. of licences issued	Total no. of each species authorised to be taken
Eurasian coot (<i>Fulica atra</i>)	1	*destroy
	1	scare only
Euro (<i>Macropus robustus</i>)	3	destroy 80
Freshwater (Johnston) crocodile (<i>Crocodylus johnstoni</i>)	1	Trap and relocate 3
Galah (<i>Eolophus roseicapilla</i>)	3	destroy 300
	1	scare only
Great cormorant (<i>Phalacrocorax carbo</i>)	1	*destroy
	1	scare only
Great egret (<i>Ardea alba</i>)	1	*destroy
	1	scare only
Grey teal (<i>Anas gracilis</i>)	1	*destroy
	1	scare only
Laughing kookaburra (<i>Dacelo novaeguineae</i>)	1	*destroy
	1	scare only
Little black cormorant (<i>Phalacrocorax sulcirostris</i>)	1	*destroy
	1	scare only
Little corella (<i>Cacatua sanguinea</i>)	5	destroy 430
	1	scare only
Little Eagle (<i>Hieraetus morphnoides</i>)	1	*destroy
	1	scare only
Long-billed corella (western) (<i>Cacatua pastinator</i>)	1	*destroy
	1	scare only
Long-billed corella (eastern states species) (<i>Cacatua tenuirostris</i>)	1	*destroy
	1	scare only
Maned duck (<i>Chenonetta jubata</i>)	1	*destroy
	1	scare only
Osprey (<i>Pandion haliaetus</i>)	1	*destroy
	1	scare only
Pacific black duck (<i>Anas superciliosa</i>)	1	*destroy
	1	scare only
Peregrine falcon (<i>Falco peregrinus</i>)	1	*destroy
Pink-eared duck (<i>Malacorhynchus membranaceus</i>)	1	*destroy
	1	scare only
Purple swamphen (<i>Porphyrio porphyrio</i>)	1	*destroy
	1	scare only
Red kangaroo (<i>Macropus rufus</i>)	5	destroy 81
Red-tailed black cockatoo (<i>Calyptorhynchus banksii</i>)	1	scare only
Richard's pipit (<i>Anthus novaeseelandiae</i>)	1	scare only
Silver gull (<i>Chroicocephalus novaehollandiae</i>)	1	Destroy 50
Square-tailed kite (<i>Lophoictinia isura</i>)	1	*destroy
	1	scare only



Dangerous Fauna Licences	No. of licences issued	Total no. of each species authorised to be taken
Straw-necked ibis (<i>Threskiornis spinicollis</i>)	2	*destroy 50
	1	scare only
Swamp harrier (<i>Circus approximans</i>)	1	*destroy
	1	scare only
Tree martin (<i>Petrochelidon nigricans</i>)	1	*destroy
Twenty-eight parrot (<i>Barnardius zonarius</i>)	1	*destroy
	1	scare only
Wedge-tailed eagle (<i>Aquila audax</i>)	1	*destroy
	1	scare only
Welcome swallow (<i>Hirundo neoxena</i>)	1	scare only
Western grey Kangaroo (<i>Macropus fuliginosus</i>)	8	destroy 129
Whistling kite (<i>Haliastur sphenurus</i>)	4	*destroy 13
	1	scare only
White-faced heron (<i>Egretta novaehollandiae</i>)	1	*destroy
	1	scare only
Willie wagtail (<i>Rhipidura leucophrys</i>)	1	scare only
Yellow-billed spoonbill (<i>Platalea flavipes</i>)	1	*destroy
	1	scare only

*Perth Airport authorised opportunistically to destroy birds posing threat to aircraft. No fauna was destroyed.

Wildlife interaction licences

At 30 June 2013, 110 whale watching boat tour operators were licensed in WA. While these tours were primarily focused on humpback whales, southern right whales were also part of whale watching activity in the lower south-west, particularly at Albany, Augusta and Esperance. Pygmy blue whales (*Balaenoptera musculus brevicauda*) were also regularly encountered adjacent to Cape Naturaliste.

DEC issued 87 boat-based and one beach-based dolphin interaction licence, three in-water dolphin interaction licences and two boat-based dugong (*Dugong dugon*) interaction licences. Forty one boat-based Australian sea lion and New Zealand fur seal interaction licences were issued. Fourteen whale shark (*Rhincodon typus*) interaction licences were current for the year.

Offences

DEC staff provided guidance to members of the public visiting DEC-managed land regarding the legal requirements of parks and conservation legislation. During 2012–13, 523 caution notices were issued for minor offences. The number of infringement notices issued during the year increased to 607 (Table 6). Written reports were prepared for 97 offences under the WC Act and its Regulations, and the CALM Act and its Regulations. Action in 61 matters under both statutes was completed with prosecution pending in 36 others.

The unlawful taking of black cockatoos from the wild remains a serious concern with several reports alleging the illegal shooting being investigated. Interest in keeping pet herpetofauna continued to grow rapidly with a corresponding increase in the unlawful taking, possession and keeping of reptiles.

Table 6: Number of reported offences in 2011–12 and 2012–13

	2011–12 reported offences	2012–13 reported offences
	Finalised figures	At 30 June 2013
Total offences reported	1121	1227
Court convictions	25	21
Court dismissals	0	0
Infringement notices	580	607
Letters of warning	13	24
Caution notices	481	523
No further action	11	12
Pending	0	36
Withdrawn	11	4
Restitution		
Total court fines	\$15,800	\$16,875
Total court costs	\$1981	\$1937
Infringement penalties	\$42,610	\$40,665

Table 7: Offences under the *Wildlife and Conservation Act 1950* and Regulations and the *Agriculture and Related Resources Protection Act 1976* that occurred in 2012–13

Charges	Reported offences	Convictions	Fines \$	Costs \$	Dismissed	Withdrawn	Letter of warning	Caution notice	No further action	Pending
Wildlife Conservation Act 1950										
Illegal taking or possession of protected fauna	43	11	12,500	906		1	5	8	3	15
Illegal importation, selling or taking for sale of fauna	22	3	1,200	251				17	1	1
Illegal taking of protected flora	4								1	3
Illegal selling of protected flora	7							2	3	2
Use illegal device	1						1			
Failing to comply with licence conditions	83	1	300				4	77		1
Wildlife Conservation Regulations										
Offences relating to the acquisition, possession, control and disposal of fauna	70	6	2,875	780		2	4	46	1	11
Wildlife Conservation Reptile and Amphibian Regulations										
Offences relating to reptiles and amphibians	10							10		
Agriculture and Related Resources Protection Act 1976										
Import/possess fauna	3					1		1	1	
Totals	243	21	16,875	1,937		4	14	161	10	33



Table 8: Offences under the Conservation and Land Management Act 1989 and Regulations, and Sandalwood Act 1929 that occurred in 2012–13

Charges	Reported offences	Convictions	Fines \$	Costs \$	Dismissed	Infringement notice	Letter of warning	Caution notice	No further action	Withdrawn	Pending
Conservation and Land Management Act 1989 and Regulations											
Illegal taking or possession of forest produce	7		400			2		5			
Offences against officers	1							1			
Offences relating to disease risk areas	1							1			
Offences relating to activities on State forest, nature reserves and national parks	975		40,265			605	10	355	2		3
Totals	984		40,665			607	10	362	2		3



Conserving landscapes and seascapes; integrating off- and on-reserve conservation and managing threatening processes

Biodiversity conservation legislation

The department continued to provide advice to the government on possible legislative improvements to the WC Act and alternatives for biodiversity conservation. During 2012–13 the state government made a commitment to introduce a new Biodiversity Conservation Act to replace the WC Act, and the department has been working on the development of this legislation.

Native Vegetation Framework

The *National Framework for the Management and Monitoring of Australia's Native Vegetation* (the Native Vegetation Framework) was published in 1999 to guide policies, programs, legislation and activities related to native vegetation conservation throughout Australia. The NRM Ministerial Council directed that the framework be reviewed and revised.

The department contributed to this process, and the revised Australia's Native Vegetation Framework was published during the year. The framework sits under *Australia's Strategy for the Conservation of Biodiversity 2010–2030* and provides broad guidance on native vegetation management in Australia.

More information and the framework are available on the federal government website:
www.environment.gov.au/land/vegetation/nvf/index

Regional nature conservation plans

Each DEC region operated under a five-year nature conservation regional plan that collectively provided the basis for improved integration and coherence of departmental activities and functions aimed at conserving WA's biodiversity at a regional scale. These plans provide a focus for ongoing investment in priority areas for biodiversity conservation. The regional plans are five-year 'rolling' plans that are annually reviewed and updated.

Managing system-wide threats

Altered hydrology management, including salinity

Secondary salinisation is one of many threats to biodiversity arising from the replacement of perennial native vegetation with annual cereal crops and pastures. Other hydrological threats include waterlogging and increased rates of sedimentation. During 2012–13, DEC continued its collaboration with the Future Farm Industries Cooperative Research Centre (CRC). Work with this organisation is generating new planning and decision tools that are being applied through the natural diversity recovery catchment program.

During 2012–13, a major advance has been acquiring funding for a collaborative research project with the Horizon Digital Economy Research Institute at The University of Nottingham in the United Kingdom. This project is providing significant technical input for recovery catchment planning. The draft review of the wetland monitoring program in the south-west is being prepared for publication.

More information on salinity management is available on the DPaW website:
www.dpaw.wa.gov.au/management/salinity

Natural diversity recovery catchments

The natural diversity recovery catchment program continued to slow degradation and recover high value biodiversity assets in the south-west identified as being at risk from altered hydrology, particularly salinity. Key activities for 2012–13:

- At Buntine-Marchagee, a vegetation survey was completed for the primary saline, braided channel wetlands. This is an important step towards identifying the priority biological assets for management in this system. On-ground management and hydrological research continues to focus on the fresh-brackish wetland assemblages on private land, where planning is now complete for 40 hectares of revegetation.
- Within the Drummond Natural Diversity Recovery Catchment, work has focused on gaining a better understanding of the environmental controls on reproduction and recruitment of robin redbreast bush (*Melaleuca lateritia*), an important plant component of the claypan TEC.
- Hydrological modelling for Lake Bryde indicates that the constructed waterway is reducing waterlogging within Lakeland Nature Reserve. Consistent with this information, initial vegetation monitoring results show a reduction in losses of melaleuca and eucalypts, which are significantly threatened by waterlogging. As part of revegetation work in the catchment, 32,000 seedlings were planted on 20 hectares of land previously used for agriculture. Waterbird and invertebrate numbers and diversity are stable across wetlands in the catchment. Further ecophysiological research, partly funded by the Future Farm Industries CRC, will further assess the impacts of the constructed waterway.
- In the Lake Warden natural diversity recovery catchment, the Lake Wheatfield gravity pipeline and lower annual rainfall saw a continuation of the previous improvements in waterbird numbers and riparian vegetation. The management focus is now on the increasing salinity in Lake Warden and how to address potential nutrient issues. An analysis of values in the wetland system has been completed as part of initial planning with stakeholders.
- Work undertaken in the Muir-Unicup catchment over the past decade will now be analysed, published and used in planning and management. The *Report on waterbird counts for several lakes in and near the Lake Muir–Byenup System Ramsar site* is the first of a series of compilations and analyses. A PhD student from UWA has also begun basic modelling of regional hydrology for the wetland system. Combined with, and drawing on, the work of DEC hydrologists, this work will establish a conceptual hydrology for the catchment.
- At Toolibin Lake, major capital improvements to the ground water pumping system on the floor of the lake were completed. This included the installation of a telemetry system to improve the capture of pumping data, refurbishing the groundwater pumping system and improvements to control bio-fouling. Toolibin Lake catchment had one of its driest winters during 2012; however, an intense rainfall event of between 70–120 millimetres across the catchment occurred in December 2012. This enabled a comprehensive test of the pump and sump system. It also allowed surveying of flood information to assist with the review of surface water flows and monitoring in the catchment. This, along with new knowledge from geophysics and modelling, is developing a new understanding of how the catchment and lake function hydrologically.
- DEC's work through the *Biodiversity and Water* program of the Future Farm Industries CRC continued to provide new, important insights into the patterns of water use and growth in wetland plants. Current work aims to result in generating more general predictions about the links between particular plant traits and hydrological processes. Strong links with UWA continued to bring additional students and researchers into the recovery catchment program.

More information on natural diversity recovery catchments is available on the DPaW website: www.dpaw.wa.gov.au/management/salinity



Native tree crops/revegetation

The native tree crops program aims to promote and encourage the planting of trees and other plants to rehabilitate land and conserve biodiversity. The main focus is on biodiversity conservation through broadscale revegetation that generates hydrological benefits at landscape scales. This, in turn, contributes to the conservation of adjoining or downstream biological assets, particularly wetlands. Commercially viable revegetation integrated with agriculture is essential to drive the scale of revegetation required. Mallee eucalypts have also been shown to provide habitat for a range of native species, including some small mammals.

The prototype mallee harvester, successfully developed last year under a grant from the state's LEED fund with investments by a range of other partners including Biosystems Engineering and the Future Farm Industries CRC, received an innovation award from the Cooperative Research Centre Association. This national award is recognition of the technological advance represented by the mallee harvester. During 2012–13, the intellectual property in the harvester was sold to Biosystems Engineering, and the way is now open for commercial development.

Work has been completed on the mallee belt design collaborative project funded by the federal Department of Resources, Energy and Tourism, with the Curtin Fuels and Energy Technology Institute as the major partner. However, work on biomass yields, design and interactions with water and nutrients has continued with additional resources from Future Farm Industries CRC being provided to DEC and other project partners. This work will significantly improve mallee planting designs to maximize biomass production.

DEC staff made an important contribution to a project, funded by the National Climate Change Adaptation Research Facility, that assessed the value of combining biomass production and perennial based, dryland farming systems. Among other things, this work demonstrated that mallee as a biomass tree crop can be integrated into existing farming systems with minimal interruption. It was also found that a woody biomass crop can be profitable and diversify revenue risk.

DEC and the FPC collaborated in the harvest and supply of mallee biomass to processors. There was growing interest from regional industry in the use of biomass to generate combined heat and power. The aim is to increase harvest and supply of biomass as this is a critical step in industry development, and is essential to provide mallee farmers with confidence in the short-term future of a commercial industry. Although the pace of industry development has been slow, the current harvesting and supply trials show that there is considerable potential to establish a comparatively low-volume biomass industry.

The mallee project is a rare example of a conservation organisation using industry development to deliver biodiversity conservation objectives. In addition, the collateral benefits to renewable energy and regional development make this work a valuable contribution to enhancing state community benefits from the mixed land use of agricultural lands.

More information on the mallee industry program is available on the DEC website:
www.dec.wa.gov.au/management-and-protection/land/mallee-industry-research-and-development-program



Bold ecological restoration project aims to see Dirk Hartog Island Return to 1616

In December 2012, the Minister for Environment announced the Dirk Hartog Island National Park ecological restoration project *Return to 1616*. The project is intended to deliver world-class conservation outcomes over the next 20 or more years, with the Gorgon Barrow Island *Net Conservation Benefits* fund having committed \$11.54 million and DEC \$4.8 million over seven years to deliver the first stage.

The *Net Conservation Benefits* (NCB) program is funded by the Gorgon Joint Venture partners following agreement with the state government before the approval of the Gorgon project. Its objective is to deliver long-term conservation benefits to WA in areas with similar values to Barrow Island.

The Dirk Hartog Island National Park ecological restoration project is an ambitious project that will see some of the most extensive feral animal eradication ever attempted. Following the removal of sheep, goats and feral cats from the island, the project aims to reintroduce 10 native mammal species that are known to have existed on the island and introduce a further two species considered likely to have been present in the past. The project also involves weed management, vegetation restoration and fire management. Biosecurity protocols will be implemented to prevent the introduction of high-risk non-indigenous species.

The project is at the forefront of ecological restoration and threatened fauna recovery, and provides an outstanding opportunity to foster scientific research and further develop partnerships with science and tertiary institutions.

In 2012–13, DEC achieved numerous milestones for the initial phase of the project. These included publishing an informative brochure explaining the ecological restoration project, developing a community engagement strategy, finalising the location of the cat monitoring network and cat barrier fence across the island, and completing two research manuscripts for publication.

To ensure that existing conservation and heritage values and constraints on the island were properly taken into account in project planning and implementation, reviews of threatened and priority fauna, colonial heritage, dune stability, and visual impact on the island were undertaken.

An Aboriginal heritage agreement and field surveys for aboriginal heritage sites were completed for areas affected by proposed works. These reviews and assessments formed the basis of an overall environmental impact assessment which was approved by the department.

Since 2010, the department has conducted seven aerial shooting campaigns on Dirk Hartog Island with a total of 6,855 goats and straggler sheep removed, including 256 goats and two sheep removed this year with funding from the federal government *Caring for our Country* program.

Fire management, biosecurity and weed management plans have been prepared and a quarantine protocol developed for trial. An operations base master plan has been completed and shire approvals received for the establishment of temporary accommodation for staff.

The department has also commissioned construction of a specialised high-speed shallow-draft barge to transport staff, vehicles and equipment necessary to service the ecological restoration project. The name chosen for the barge is 'Wirruwana', the local Malgana name for Dirk Hartog Island.



Volunteers from Birdlife Australia and Rockingham Interchange (disability services) who helped DPaW staff plant Carnaby's cockatoo food plants at a site on Anketell Road in Jandakot Regional Park in June 2013.

Restoration

The *Banksia Woodland Restoration Project* was initiated to restore natural habitats in the Perth Metropolitan Region as an offset for vegetation clearing at Jandakot Airport. This project aims to re-establish local provenance native vegetation, to provide habitat for the endangered Carnaby's cockatoo and grand spider orchid (*Caladenia huegelii*). In 2012, five hectares at Forrestdale Lake and 11 hectares on Anketell Road in Jandakot Regional Park were established by topsoil transfer. In July 2012 and June 2013, BirdLife Australia volunteers assisted in planting banksia seedlings and other native plants at the Anketell Road site where an additional 10 hectares was direct seeded in collaboration with Greening Australia WA. So far more than 100 species of native plants have become established in these areas.

Invasive species control

Western Shield

During 2012–13, the *Western Shield* program continued to implement broadscale fox and feral cat baiting for native fauna conservation. About 3.9 million hectares of conservation reserves and State forest were baited, using more than 600,000 fox baits and 300,000 feral cat baits. Some rationalisation of the fox baiting program occurred this year using a prioritisation process that principally considered the known threatened fauna species in each 'management cell' area that would benefit from fox baiting.

A major internal review of the program began in March 2013 to provide direction and improve the focus, integration and cost effectiveness of fauna conservation outcomes delivered by the program. The review was planned to be completed by the end of 2013.

Corporate sponsorship was provided to the program by ongoing sponsors Alcoa World Alumina, BHP Billiton Worsley Alumina and Tronox.

Research continued on improving bait delivery for feral cat control and some progress was made towards the registration of the Eradicat® feral cat bait for operational use in WA. Staff involved in *Western Shield* also continued to investigate ways of improving fox control.

In the South Coast Region, a cat baiting trial entered its fourth year in areas including Cape Arid and Fitzgerald River national parks and, more recently, Two Peoples Bay and Mount Manypeaks nature reserves. The trial aims to test the effectiveness of Eradicat® in the south-west high rainfall zone, in the habitats of a suite of threatened and priority fauna including the critically endangered western ground parrot (*Pezoporus wallicus flaviventris*) and Gilbert's potoroo (*Potorous gilbertii*). Previous use of the bait has largely been in arid areas and at smaller scales. Feral cats and native fauna species are monitored as part of this adaptive management project that will help refine methods for long-term operational use of the bait.

The *Western Shield* program provided training in fauna management and the safe and effective use of I080 to DEC staff and volunteers. DEC staff continued to monitor native fauna across *Western Shield* sites.

Redevelopment of the *Fauna File* database, used to manage fauna survey and monitoring data continued. The upgraded system will make information easier to access and improve analysis and reporting capacity.

In the Exmouth District, a baiting program has been developed with a range of fox baits. This change in approach came out of a bait uptake monitoring project, started in 2011, that monitored bait preference by foxes for a year using remote cameras at Bungleup Beach in Cape Range National Park. Further refinements of fox control techniques is being investigated and tested.



DEC senior research scientist Dr Neil Burrows sets traps for feral cats at Lorna Glen. Photo – Judy Dunlop/DEC.



In the Goldfields Region, predator control for the protection of threatened fauna was carried out at Lorna Glen with 170,000 'I080' cat baits distributed across the 255,000 hectare former pastoral lease and 125,000 hectares of neighbouring pastoral leases. This resulted in a 40 per cent reduction in predators as assessed against the pre-baiting assessment of feral cat and wild dog numbers. Native species benefiting from this program include bilbies (*Macrotis lagotis*), brushtailed possums (*Trichosurus vulpecular*), golden bandicoots (*Isodon auratus*), mulgara (*Dasyercus cristicauda*), long-tailed dunnart (*Sminthopsis longicaudata*) and malleefowl (*Leipoa ocellata*).

More information on *Western Shield* is available on the DPaW website:
www.dpaw.wa.gov.au/management/pests-diseases

State Cane Toad Initiative

Cane toads (*Rhinella marinus*) are a declared pest under the *Biosecurity and Agriculture Management Act 2007*. Under the *Cane Toad Strategy for Western Australia*, the department has the lead responsibility for cane toad management, supported by the Department of Agriculture and Food (DAFWA) in the areas of quarantine and biosecurity. Work was continued with a focus on education and communication, quarantine and biodiversity survey. Key activities during 2012–13 included:

- Conducting inventory surveys in advance of the cane toad front line in the Kimberley Region. Five biodiversity surveys were completed in five conservation reserves and two areas proposed for joint management with traditional owners. The surveys involved Aboriginal ranger groups, Bush Ranger cadet units, primary school students, volunteers and DEC's Science Division.
- Continued work with the community groups Stop the Toad Foundation and the Kimberley Toad Busters whose field efforts aim to reduce the spread and impact of cane toads.
- Continuing work in identifying high-risk freight and establishment zones throughout the state to develop a quarantine strategy with the new detector dog.
- Implementing a rapid response strategy for cane toads transported to the Perth metropolitan area.
- Continuing to assist with cane toad-related research projects.
- Continuing to maintain databases of sightings and the distribution of cane toads, update the cane toad webpage and produce quarterly WA Cane Toad Update newsletters.
- Presenting cane toad and biodiversity information sessions to schools and community groups using the draft Cane Toad Education Manual.
- In collaboration with the UWA SPICE program, releasing a cane toad 'app', which is available as a free download from the iTunes store and helps people identify whether a suspected cane toad is a cane toad or a native frog.
- Developing and distributing cane toad information brochures, signs, stickers, magnets and posters.
- Participating in media and film events to raise awareness about hitchhiker risks and cane toad identification.
- Maintaining more than 20 live cane toad drop-off points throughout the east Kimberley at various locations including tourist operations at El Questro Station, Home Valley, Parry's Farm and Purnululu National Park.

During 2012–13, DEC received 154 reports of cane toad sightings with eight cane toads being positively identified and destroyed.

More information on cane toad management is available on the DPaW website:
www.dpaw.wa.gov.au/management/pests-diseases

Feral pigs, goats, camels, cattle and wild dogs

A range of pest animal control programs are undertaken in WA, often in partnership with DAFWA, biosecurity and NRM groups. These programs target foxes, wild dogs, feral goats, pigs, cattle and camels.

Throughout the year, DEC took part in cooperative management of feral pigs in the south-west. DEC feral pig control activities included monitoring, trapping and poisoning. DEC and the SWCC secured \$900,000 of state NRM funding for ongoing control programs undertaken with community groups and for an operational trial of infra-red survey to determine feral pig distribution and abundance.

Feral goat control in Cape Range National Park resulted in the eradication of 475 goats. A joint goat eradication program was conducted with the Department of Defence in the Bundera Coastal Protection Area in March 2013.

A feral deer control trial is being undertaken with SWCC in the Lake Muir (Ramsar) area.

More than 160 kilometres of electrified stock and camel exclusion boundary fence was maintained at Lorna Glen. This was done in association with the removal of more than 200 neighbouring stray stock and ongoing camel control, resulting in cumulative improvement to vegetation and soil conditions of the former pastoral lease.

DEC Pilbara has been contributing to a federal program aimed at reducing the impacts of camels. In collaboration with Kanyirninpa Jukurrpa Rangers, DEC has been monitoring the impact of camels on native species and water quality.

Through the *Caring for our Country*-funded integrated feral animal control at the Ningaloo Coast World Heritage area project, DEC entered into agreements with pastoralists in the Ningaloo Coast World Heritage area. This enabled DEC to contribute and facilitate feral animal control efforts in the World Heritage area.

A broadscale approach to feral animal control has been initiated and relationships developed with pastoralists in the area.

Cattle mustering programs were undertaken in Millstream Chichester and Karijini national parks in DEC's Pilbara Region, and in the King Leopold Ranges Conservation Park, Ord River Regeneration Reserve and Purnululu National Park in the Kimberley.

Invasive birds

DEC's introduced corella and rainbow lorikeet (*Trichoglossus haematodus*) control program finished at the end of 2011. Limited control work was carried out by private contractors trained by DEC in the Bunbury/Busselton area. A study to determine the seasonal movements of introduced corellas in the Perth metropolitan area has been under way for almost a year. Results confirm that corellas are moving through the metropolitan area with the biggest movement so far being a bird that was tagged in Guildford observed feeding in Rockingham. A response strategy involving local governments, the department and DAFWA is being developed to enable a coordinated effort and cost sharing arrangement in place to control introduced corellas and rainbow lorikeets.

Management of environmental weeds

Environmental weeds are plants that reduce the diversity and/or abundance of native species or adversely affect the integrity, conservation value and function of natural ecosystems. They can do this by out-competing native plant species for light and water, impacting on the habitat of native fauna species, or by altering natural disturbance regimes (e.g. by changing fire frequency and intensity). This can have profound effects on the structure and diversity of vegetation communities.

Management of weeds focuses on reducing their impacts as cost effectively as possible and on preventing new incursions.



Weed management on DEC-managed lands was prioritised in each region according to policy outlined in the *Environmental Weed Strategy for Western Australia* (1999). During 2012–13, work continued on a species-based prioritisation project that aims to prioritise the 1,350 weed species for control in each of DEC's nine regions. The project enables weeds to be assessed based on their invasiveness, impacts, potential and current distribution and feasibility of control. The results from these assessments will also potentially help other land managers.

Of the 1,350 weed species assessed, 15 species have been identified as a high priority for control as eradication is achievable; another 119 species are a priority because of their high impact and rapid invasiveness. As it is not possible to control all infestations of these species, priorities for management will be assessed through the department's proposed asset-based prioritisation process. This process aims to maximise the efficiency and effectiveness of weed control efforts through a consideration of priority weed species, biodiversity and other values at risk from these weeds and an assessment of available resources, so that appropriate management actions can be applied by each region.

In addition to DEC region-based weed risk assessments, a database of 300 of the most serious environmental weeds in the Swan Region, available online via the department's FloraBase website, has been updated and maintained.

The main environmental weeds targeted for management by DEC in 2012–13 included silver wattle (*Acacia dealbata*), ruby dock (*Acetosa vesicaria*), bridal creeper (*Asparagus asparagoides*), tagasaste (*Chamaecytisus palmensis*), rubber vine (*Cryptostegia grandiflora*), rough tree fern (*Cyathea cooperi*), Paterson's curse (*Echium plantagineum*), African lovegrass (*Eragrostis curvula*), Geraldton carnation weed (*Euphorbia terracina*), hesperantha (*Hesperantha falcata*), Victorian tea-tree (*Leptospermum laevigatum*), African boxthorn (*Lycium ferocissimum*), cape tulip (*Moraea flaccida*), date palm (*Phoenix dactylifera*), blackberry, harlequin flower (*Sparaxis bulbifera*), *Tamarix* sp., verbesina (*Verbesina encelioides*), *Watsonia* sp., arum lily (*Zantedeschia aethiopica*) and Bathurst burr (*Xanthium spinosum*).


Work continued on a PhD project towards understanding the cause of blackberry (*Rubus* sp.) decline in the south-west of WA. This project is a collaboration between Murdoch University, CSIRO and DEC. It aims to investigate the organisms causing blackberry decline, and the potential for biological control of this weed. Restoration of decline sites along the Warren and Donnelly Rivers is being undertaken by Warren Catchment Council in conjunction with DEC and CSIRO with funds from the federal *Biodiversity Fund*.

In DEC's Warren Region, Donnelly District worked with SWCC to map and control weeds in the Muir-Byenup System Ramsar site and the Lake Muir-Unicup recovery catchment. The focus of this project has been on bulrush (*Typha orientalis*) in wetlands.

DEC's Swan Region continued research into environmental weeds that are invading native plant communities. In spring 2012, a project was initiated to revisit 20-year-old floristic plots in seasonal clay based wetlands to investigate change over time including the impacts of weed invasion. As a part of the *Banksia Woodland Restoration Project*, serious weeds were mapped across 14 regionally significant bushlands (total of 900 hectares) and weed management action plans have been developed for 20 bushland areas with implementation starting in June 2013.

DEC's Goldfield Region continued working with stakeholders associated with the Great Western Woodlands, and co-ordinating weed-related activities across the three relevant DEC regions (South Coast, Wheatbelt and Goldfields). The *Great Western Woodlands Strategic Weed and Feral Animal Management Plan* was released for public comment in 2012–13. The management plan is intended to be implemented across tenures and across the variety of government agencies, mining enterprises and pastoralists responsible for land management in the project area. DEC also continued to engage with local shires and the community regarding the control of cacti species, major infestations of which occur off DEC-managed lands.

During 2012–13, DEC continued efforts in the Kimberley to eradicate rubber vine, a recognised weed of national significance. As a partner to the West Kimberley Steering Group for rubber vine DEC funded control operations which were managed by the Rangelands NRM Group. The Aboriginal rangers for reserve 31165,



next to Lake Argyle in the east Kimberley, continued to work in collaboration with DAFWA to control rubber vine infestations and reduce their rate of spread. These rangers have also been controlling a recently discovered infestation of another weed of national significance, *Mimosa pigra*, at Lake Argyle.

Across the Kimberley, DEC nature conservation officers and the Yawuru, Bunuba, Wunggur and Uunguu Aboriginal land management groups implemented weed control programs for a range of species including mission grass (*Pennisetum polystachion*), hyptis (*Hyptis suaveolens*), prickly acacia (*Acacia nilotica*), passion vine (*Passiflora foetida*), bellyache bush (*Jatropha gossypifolia*), grader grass (*Themeda quadrivalvis*), parkinsonia (*Parkinsonia aculeata*), taro (*Colocasia esculenta*), calotrope (*Calotropis procera*) and gallons curse (*Cenchrus biflorus*). DEC has trialled CyberTracker software (see: www.cybertracker.org) on hand-held computers for mapping and recording weed data with great success.

During 2012–13, DEC's South Coast Region continued work in partnership with the Friends of the Porongurup Range to control environmental weeds in and around Porongurup National Park. The long-running project targets species such as blackberry, valerium, dolichus pea (*Dipogon lignosus*) and introduced acacias.

Myrtle rust (also known as eucalyptus and guava rust) is a plant fungus that has affected plants within the Myrtaceae family in New South Wales, Victoria and Queensland. Myrtle rust is not known to be in WA at this time. DEC, FPC and the Western Australian Local Government Association (WALGA) have been supporting DAFWA, which is drafting a WA response plan. DEC developed a specific Preparedness and Response Plan, and two associated standard operating procedures, that outline the response measures, responsibilities and hygiene protocols to be used should myrtle rust be reported on DEC-managed land. DEC also assisted with training courses with as part of an inter-agency response. In May 2013, training courses were conducted in collaboration with DAFWA and the FPC in Perth, Bunbury and Albany. The 152 course participants included representatives from government, local government, industry, other stakeholders and the general public.

More information on control of invasive plant species is available on the DPaW website: www.dpaw.wa.gov.au/management/pests-diseases

Phytophthora dieback management

The following were among the 2012–13 achievements in the management of *Phytophthora* dieback attributed primarily to *Phytophthora cinnamomi*:

- Monitoring continues in Cape Arid National Park at a site where DEC successfully eradicated an infestation of *Phytophthora* dieback, with assistance from the state NRM program. It is hoped that the department will be able to demonstrate that permanent eradication has been achieved. Monitoring also continues in Fitzgerald River National Park where *Phytophthora* dieback infestations had previously been contained.
- The Vegetation Health Service (VHS) processed more than 1,937 diagnostic samples collected by the department's disease interpreters, private contractors and land managers from across the south-west of WA. In addition to *P. cinnamomi*, isolates of 11 species (including several undescribed species) were identified in association with dying native flora. The VHS has continued to work in partnership with the Centre for Phytophthora Science and Management (Murdoch University) to DNA-sequence recent and historical WA isolates from the VHS culture collection. At 30 June 2013, the total tested was 850. This ongoing program has so far identified 13 *Phytophthora* taxa that are also known from overseas, and at least 18 previously undescribed *Phytophthora* species, as well as several unique WA isolates that are *Phytophthora* hybrids. The formal descriptions of 10 of the new *Phytophthora* species discovered in WA natural ecosystems have been published so far.
- The 'green card' hygiene system continued to be used in DEC's South Coast Region to ensure all operations on DEC-managed lands were conducted using appropriate hygiene procedures to prevent accidental introduction or further spread of *Phytophthora* dieback. The 'green card' hygiene training program was adapted for other DEC regions across the south-west of WA and other organisations.



- Aerial application of phosphite continued in vegetation in the south-west to protect threatened flora and ecological communities, including the 'Montane thicket of the eastern Stirling Range' TEC in Stirling Range National Park.
- Seed was collected from some 15 populations of 12 threatened flora at risk from *Phytophthora* dieback.
- Work continued on a *Phytophthora* dieback protection plan for Fitzgerald River National Park.

Fire management on unallocated Crown land and unmanaged reserves

DEC continued its targeted fire preparedness works on 89 million hectares of unallocated Crown land and unmanaged reserves outside the Perth metropolitan area and town sites through the installation and maintenance of firebreaks, vegetation modification in strategic buffers, wind-driven open edge prescribed burning, and large-scale block ignition using aircraft. A specific focus continued in the Kimberley, Pilbara and Goldfields regions. For more details see pages 101 to 104.

Kimberley Science and Conservation Strategy

The government's *Kimberley Science and Conservation Strategy* was released in June 2011, with an implementation budget of \$63 million over five years and a commitment to ongoing funding for key initiatives. During 2012–13, the state government committed an additional \$15 million to create the proposed Wanjina National Park and Horizontal Falls Marine Park and extensions to the North Kimberley Marine Park. The strategy provides the framework for the conservation of the Kimberley's spectacular natural values and to create new opportunities for Aboriginal employment and nature-based tourism. For more details about the work undertaken see page 9 of this report.

The *Kimberley Science and Conservation Strategy* is available on the DPaW website at: www.dpaw.wa.gov.au/management/kimberley-strategy

Great Western Woodlands

During 2012–13, DEC continued implementing A *Biodiversity and Cultural Conservation Strategy for the Great Western Woodlands* using \$3.8 million allocated by the government in 2010–11 to better manage and protect the area. A reference group met during the year to provide advice to DEC on the management of the Great Western Woodlands and implementation of the strategy.

Further prescribed burning was undertaken in unallocated Crown land at Forrestania, east of Hyden as an operational scale trial involving fire mosaics across the landscape. Weather conditions and fire behaviour were documented in detail during burning operations, fuel characteristics were assessed before burning, and monitoring sites established to examine plant community responses to fire. Techniques for determining the age of gimlet (*Eucalyptus salubris*) stands based on tree growth rings and tree size have been identified, showing that stands can remain unburnt for centuries. Better knowledge of the age structure of semi-arid woodlands will aid in understanding the role of fire in these ecosystems, and in determining whether current fire regimes are compatible with long-term conservation of woodlands. Floristic composition and vegetation structure in gimlet woodlands at different ages after fire have been determined. They illustrate that composition changes with time since fire, and that floristic diversity is high in long-unburnt vegetation and shortly after fire, but lower over the intervening period. More information about the vegetation mapping and gimlet woodland fire research is accessible through the *NatureMap* web portal <http://naturemap.dec.wa.gov.au/default.aspx>.

More information about work done under the Great Western Woodlands strategy can be found on page 18 of DEC's 2012–13 Annual Report, available at www.dpaw.wa.gov.au/about-us/annual-report-and-yearbook.



A *Biodiversity and Cultural Conservation Strategy for the Great Western Woodlands* and more information about the woodlands are available on the DPaW website at: www.dpaw.wa.gov.au/management/forests

Net Conservation Benefits program

The *Net Conservation Benefits* (NCB) program is funded by the Gorgon Joint Venture partners following agreement with the state government before the approval of the Gorgon project. Its objective is to deliver long-term conservation benefits to WA in areas with similar values to Barrow Island. In addition to the original allocation of \$23.43 million for four major projects funded through the program, a further \$2.99 million was awarded to the Dirk Hartog Island National Park ecological restoration project taking its overall NCB program funding to \$11.54 million. For details about what is planned for the island and work done during 2012–13 see page 48.

Assessment of land and resource use impacts on biodiversity conservation

During 2012–13, the department continued its significant role in providing advice to proponents and decision-making authorities on a range of major resource and other development proposals affecting DEC-managed lands and waters and other conservation values. The aim was to guide the effective management of development projects and activities to maintain or improve nature conservation outcomes for lands and waters managed under the CALM Act and species protected under the WC Act.

The department also has a role in providing significant support for implementing the responsibilities of the Minister for Environment, the Conservation Commission and MPRA in their consideration of applications, under sections 24 and 24A of the *Mining Act 1978* and section 15A of the *Petroleum and Geothermal Energy Resources Act 1967*, to access lands and waters managed under the CALM Act. This role focuses on the provision of advice and recommendations on whether, and under what conditions, access (mining tenements and 'entry onto land') to areas of CALM Act-managed lands and waters should be granted.

DEC also fulfilled various responsibilities for advice and decision-making under the provisions of State Agreement Acts for resource development projects affecting land managed by the department.

Banded iron formations of the Yilgarn Craton

The distribution of flora and fauna of conservation significance on the banded iron formation (BIF) ranges in the Yilgarn Craton continued to be identified through surveys of BIF and non-BIF habitat associated with development proposals. Several development and expansion proposals had the potential to impact on conservation values associated with BIF within the Yilgarn Craton.

Two hot spots have been identified as supporting the most significant conservation values (the Mount Manning and the Karara-Mungada areas). In these areas, recommendations for reservation under the CALM Act have been proposed following Environmental Protection Authority (EPA) assessments and project approvals. As Native Title and mining interests affecting these areas have not been resolved, the recommended conservation reserves have not yet been created.



Encouraging public understanding and support for biodiversity conservation and other DEC programs and activities

DEC continued its support for the *Desert Rangelands Project* in collaboration with Kanyirrinpa Jukurrpa, Rangelands NRM and the Central Desert Native Title Services. This project is a regional partnership to coordinate threatened species management across six Native Title areas in the Pilbara, Goldfields and Kimberley. DEC's contribution has largely involved data management, mapping and analysis.

The Goldfields Region continued to foster relations with traditional owners of Native Title determined lands to encourage and assist the management of off-reserve landscapes including the Birriliburu Native Title area through biological survey and advice on threatened species management and the application of mosaic burning in association with traditional burning practices.

Public participation programs

Environmental Community Grants

The final round of funding under the Minister for Environment's four-year, \$6 million *Environmental Community Grants* program was distributed in 2012–13, with \$1.6 million of grants awarded to 155 community groups and individuals in July 2012.

A list of grant recipients is available on the DEC website:

www.dec.wa.gov.au/community-and-education/community-programs/environmental-community-grants-2012

Healthy Wetland Habitats

Healthy Wetland Habitats is a voluntary off-reserve conservation program that provides technical and financial assistance to private land managers for the management of wetlands of high conservation value on the Swan Coastal Plain. Management action planning and funding of up to \$10,000 are offered to eligible landholders with high conservation value wetlands to help in managing their wetland habitats under a voluntary management agreement.

Following review and redrafting of the voluntary management agreement format and contents, work started on a new agreement for the Waterbird Conservation Group to assist in conservation management of Folly and Maramanup pools.

Since the program started in 2006–07, 87 expressions of interest have been received and 22 agreements signed.


More information about *Healthy Wetland Habitats* is available on the DPaW website:

www.dpaw.wa.gov.au/management/off-reserve-conservation

Provision of private land biodiversity conservation support and advice

Roadside conservation

DEC's administration of the Roadside Conservation Committee (RCC) continued with funding support from Main Roads WA. The RCC seeks to facilitate best practice management of remnant vegetation in transport corridors through raising awareness, liaison and cooperation. The RCC met four times during 2012–13.



During the year the RCC:

- coordinated a workshop on roadside vegetation values for the Shire of Manjimup works crews
- with a Native Vegetation Conservation Branch representative, presented information about clearing and threatened flora legislation at a meeting in Lake Grace for regional local government works supervisors
- conducted roadside vegetation surveys in the Shires of Williams, Woodanilling, Boyup Brook and Moora. This included training volunteers in survey and mapping techniques
- in conjunction with DEC's GIS section, used the results of roadside vegetation surveys to develop roadside conservation value maps, and presented these maps with an accompanying report to the Shire of Woodanilling
- updated and received Ministerial endorsement for the Roadside Environmental Weeds List to enable prioritisation of roadside weed control operations
- undertook surveys of two roads nominated by the public as Flora Roads
- undertook a range of activities to raise awareness of roadside conservation and engage with stakeholders including holding a display at Wagin Woolarama, publishing an article in the Malleefowl Preservation Group's newsletter, *Malleefowl Matter*, and producing material to be distributed to local governments to raise awareness of the values of roadside vegetation.

More information about roadside conservation and the RCC is available on the DPaW website: www.dpaw.wa.gov.au/management/off-reserve-conservation/roadside-conservation

Wetlands Coordinating Committee

DEC continued to chair and provide executive officer support to the state's Wetlands Coordinating Committee. The committee was actively involved in the implementation of the Wetlands Conservation Policy for Western Australia (1997).

The committee continued to establish, undertake and endorse a range of activities and projects relating to the strategic coordination and implementation of state government management actions for wetlands in WA. The committee prepared a revised guideline for the determination of wetland buffer requirements, endorsed several wetland mapping projects in the Midwest and the *Guide to managing and restoring wetlands in Western Australia*. This publication can be accessed through the DPaW website at www.dpaw.wa.gov.au/management/wetlands.

Urban Nature

The *Urban Nature* program provides technical advice and on-ground support to land managers working to protect, manage and restore biodiversity in the Swan Region and beyond.

Working with more than 62 stakeholders from community groups, private landholders, local government, DEC, state agencies and universities, *Urban Nature* conducted more than 150 on-ground activities to facilitate best-practice bushland management and provided technical advice to more than 170 stakeholders. Much of the work involved adaptive management and research trials, and liaison with land managers to implement the results of those trials in 20 high-priority sites.

Work continued on a collaborative study by *Urban Nature* and the Centre of Excellence for Climate Change and Woodland and Forest Health. The study, now in the third year, examines how the flora and fauna of long-unburnt tuart woodland responds to fire, and aims to develop and implement adaptive post-fire management actions. The results of this study are informing the development of long-term fire management guidelines. In addition, trials have been established in Leda Nature Reserve, south of Kwinana, to gain an understanding of the response of the invasive Geraldton carnation weed to fire. Weed management trials to facilitate the recovery of native wild rose across its range on public and private lands continued.



Technical support continued for managers of the threatened communities of clay-based wetlands with an annual workshop and field day. In spring 2012, work started on relocating and rescoring 32 floristic plots established in clay-based wetlands in the early 1990s. The objective of this project is to study change in these wetlands and address management implications.

Training and technical support for bushland management included eight workshops and field days, eight presentations, three newsletter articles, 17 reports, two abstracts, three scientific publications and one conference proceeding. About 1,900 copies of the quarterly newsletter *Bushland News* were distributed to support community involvement in bushland conservation and management.

More information about the *Urban Nature* program is available on the DPaW website: www.dpaw.wa.gov.au/management/off-reserve-conservation/urban-nature

Land for Wildlife

The *Land for Wildlife* (LFW) program is a non-binding voluntary management agreement between the department and private land managers. During 2012–13, 96 new properties were registered with LFW bringing the total area of LFW sites to 326,712 hectares. LFW staff visited 134 properties, of which 96 were new properties, and 38 were formally revisited for stewardship matters. During these visits, staff recorded 130 occurrences of rare or threatened fauna, flora or ecological communities. Fifty landholders resigned from LFW during the year, mainly because of property sales, leaving 2,024 properties registered.

LFW supported 14 funding applications by landholders. Support included provision of voluntary management agreements, GIS maps, project development and letters of support.

Four editions of *Western Wildlife* were produced, and LFW staff contributed 11 articles to the print media, gave two radio interviews, organised 14 displays at agricultural shows or similar, and gave 48 talks at workshops, seminars, schools or other groups. Staff continued to work with the Carnaby's cockatoo recovery program to identify suitable habitat in the Wheatbelt and ascertain what management conservation assistance is required by landholders.

In January 2013, a questionnaire was provided to *Western Wildlife* readers to assess the usefulness of the program and guide future development. Ninety four per cent of respondents found LFW staff knowledgeable and helpful, and 84 per cent said the LFW gave them an ecological perspective of their land.

More information about LFW is available through the DPaW website: www.dpaw.wa.gov.au/management/off-reserve-conservation

Nature Conservation Covenants

The *Nature Conservation Covenant* program assists private landowners with the conservation of bushland of high nature conservation value by placing a protective covenant on the land's title, and by providing management advice and assistance through incentives and a stewardship program. At 30 June 2013, covenants were cumulatively established over 203 titles and 17,292 hectares of land, including several threatened species and ecological communities. A further 30 were in negotiation.

In 2012, the program received funding from *Caring for our Country* for a *Protected Areas on Private Lands* project, to operate from January 2012 to June 2013. It operates cooperatively with similar projects being undertaken by Wheatbelt NRM and WWF-Australia and focuses on increasing the number of covenants in the poorly reserved Avon Wheatbelt bioregion. Over the course of this project, nine new covenants were assessed with a total area of 1,565 hectares and of these; six covenants have been registered or prepared for registration.

More information about the *Nature Conservation Covenant* program is available on the DPaW website: www.dpaw.wa.gov.au/management/off-reserve-conservation/nature-conservation-covenant-program



Animal ethics

The *Animal Welfare Act 2002* prohibits the use of animals for scientific purposes without a licence issued under the provisions of the Act. Staff in the department are also required to comply with licence conditions and abide by the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes, 7th Edition, 2004*, and ensure that the licence is displayed at each place that animals are normally used.

Since 2001, the department's Animal Ethics Committee has assessed applications on behalf of the AWC, in view of the close links between AWC and the department on fauna translocation programs. Since 2002, the department has assessed projects for the WA Museum and federal Department of Agriculture, Forestry and Fisheries. It also has memoranda of understanding with the following institutions for jointly managed projects: UWA, Murdoch University, Edith Cowan University, University of Queensland and James Cook University.

The Animal Ethics Committee met six times during 2012–13 and it assessed and approved more than 281 items. These were: 25 new applications, 14 amendments to existing projects, 52 project renewals for existing projects, 151 annual reports and 39 unexpected animal death reports. As of June 2013, there were 140 active projects covering fauna translocations (18 per cent), fauna surveys (10 per cent), fauna monitoring (35 per cent), feral animal control research (12 per cent), general fauna research (15 per cent), marine (4 per cent) and educational projects (6 per cent).



Native vegetation in the Midwest.

Native Vegetation Conservation Branch

Native Vegetation Conservation Branch

Applications to clear native vegetation: assessment and activity

Under the *Environmental Protection Act 1986* (EP Act), clearing of native vegetation is an offence unless it is done under the authority of a clearing permit or is subject to an exemption.

Under Section 20 of the EP Act, the Chief Executive Officer (CEO) has delegated decision-making on clearing applications to the Department of Mines and Petroleum (DMP) for either of the following activities:

- an activity under an authority granted, or a requirement imposed, under the *Mining Act 1978*, the *Petroleum and Geothermal Energy Resources Act 1967*, the *Petroleum Pipelines Act 1969* or the *Petroleum (Submerged Lands) Act 1982*; or
- an activity under a government agreement administered by the Department of State Development.

DEC's clearing permit system database recorded details of all clearing permit applications and decisions made during the year for DEC and the Department of Mines and Petroleum (DMP), and formed the basis of the published records available on DEC's website.

DEC received 516 applications to clear native vegetation in 2012–13 and made 499 decisions. Under delegation from DEC, DMP received 236 applications and made 235 decisions (some carried over from previous reporting periods). Tables 9 and 10 provide details on clearing application decisions for 2012–13.



A wandoo woodland..

Table 9: Permit areas granted to clear under section 51E of the EP Act

Purpose	Area (ha)
Mineral production	8,273
State agreement	1,656
Mineral exploration	460
Drainage	434
Geotechnical Investigations	406
Extractive industry	333
Grazing and pasture	314
Road construction or maintenance	289
Restoration	245
Cropping	232
Building or structure	143
Timber harvesting	126
Industrial	108
Horticulture	57
Water/gas pipeline installation	35
Fence line maintenance	35
Stockpile	26
Petroleum exploration	22
Recreation	21
Railway construction or maintenance	18
Dam construction or maintenance	18
Hazard reduction or fire control	16
Apiculture	16
Infrastructure maintenance	11
Bore construction	5
Petroleum production	2
Landscaping	2
Miscellaneous	1
Total	13,304

Table 10: Areas refused a permit to clear under section 51E of the EP Act

Purpose	Area (ha)
Horticulture	105
Grazing and pasture	20
Extractive industry	15
Dam construction	10
Hazard reduction or fire control	10
Total	160

In the first five years of the clearing provisions being contained in the EP Act, the total number of permit applications received was consistent at about 600 per annum. The number of applications has subsequently steadily increased since the 2008–09 reporting period with 689 applications received during 2009–10, 758 in 2010–11 and 833 in 2011–12. During 2012–13, 752 applications were received by DEC and DMP.

Initially, a target timeframe of 90 days was set for a decision to be made, consistent with the previous 90-day 'notification' process under the *Soil and Land Conservation Act 1945*. Under current target timeframes, 80 per cent of applications are to be decided within 60 calendar days of receipt, and the remaining 20 per cent to be decided within 90 calendar days.

Since 2007, DEC progressively reduced its backlog in processing applications, and up to December 2009 had no applications older than 90 days. However, the large increase in the number of applications being received since 2009–10 has resulted in a few decisions taking longer than 90 days. In 2012–13, 15 of DEC's 499 decisions were made after 90 days.

During 2012–13, 64 per cent of decisions on clearing applications were made in 60 calendar days, 33 per cent in 90 days and three per cent of decisions took longer than 90 days. The ongoing timely delivery of decisions corresponds to the risk-based approach to assessments that is based on sensitivity of the environment, magnitude of impact/s and urgency of the clearing, the department's ongoing monitoring of its performance and continual improvements to processes. The department's performance in achieving timeframes for all native vegetation clearing decisions is published in quarterly reports that are available on DER's website at www.der.wa.gov.au/your-environment/native-vegetation/45-quarterly-performance-reports.

More information on approvals performance is available on the DER website: www.der.wa.gov.au

Table 11 shows the number of decisions made by DEC for each quarter in 2012–13 and includes the percentage of applications that were decided within target timeframes. Statistics are also provided on how many decisions were subject to 'stop the clock' and the mean time (in days) that applications were in 'stop the clock'.

'Stop the clock' may only be used where there is legislative power or a requirement to do so, such as where the CEO requires more information from the applicant before making a final decision; where the CEO has been notified by the EPA that a proposal has been referred and that the CEO is constrained in making a decision on the application; or where the applicant has requested in writing that the process be put on hold.

Table 11: Timeframes for DEC decisions on clearing permit applications

	Jul–Sept 2012	Oct–Dec 2012	Jan–Mar 2013	Apr–Jun 2013
No. of applications carried over from previous periods	151	162	148	157
No. of applications received	131	125	125	135
No. of decisions that were subject to stop the clock	37	73	60	62
Average time in stop the clock for decisions in days	75	108	108	75
Average time for decision in days (excluding time in stop the clock)	51	47	52	49
No. decisions on applications	119	138	116	126
No. of outstanding applications at end of quarter	163	149	157	166
Percentage of applications finalised within benchmark timeframe				
60 days (80% of applications finalised)	61%	74%	61%	60%
90 days (20% of applications finalised)	37%	23%	35%	36%
>90 days	2%	3%	4%	4%

Monitoring and compliance of native vegetation clearing

During 2012–13, DEC continued its vegetation monitoring program and identified several areas of vegetation change that were investigated.

In 2012–13, DEC received 106 complaints of vegetation clearing and recorded 73 incidents of vegetation loss.

In 2012–13, 116 investigations were completed and 63 complaints or incidents remain under investigation.

Of the 116 investigations completed, one resulted in a prosecution brief being prepared, 12 in letters of warning, 10 in the issue of Environmental Field Notices, 19 in letters of education and three were referred to other agencies for action. The remaining 71 were found to be either exempt clearing, not native vegetation, or there was insufficient evidence to identify the person who carried out the clearing or to establish that any identified clearing was not in compliance with the EP Act.

Vegetation conservation notices

Vegetation conservation notices may be given under section 70 of the EP Act if the CEO suspects, on reasonable grounds, that unlawful clearing is likely to take place, is taking place or has taken place on any land.

In 2012–13, seven vegetation conservation notices were given for four separate properties, requiring the people bound by the notices to undertake specified measures to repair or mitigate the environmental harm caused by clearing.



Hygrocybe polychroma is widespread throughout the wetter areas of the jarrah forest and woodlands, and coastal heath regions of the south-west.
Photo – Richard Robinson/DEC.

Sustainable Forest Management



Sustainable Forest Management

The Sustainable Forest Management service ensures the provision of economic, social and cultural benefits from State forest and timber reserves, while conserving biodiversity, maintaining soil and water values, and sustaining health, vitality and productive capacity of the forest for current and future generations.

Consistent with the statutory purpose of State forest and timber reserves as defined in the CALM Act, forest management is provided for on an ecologically sustainable basis. This includes implementing government policies, and providing for the harvesting, regeneration and growth of forest products in accordance with the *Forest Management Plan 2004–2013* (FMP).

Implementation of approved forest management plans and government policies and programs

Forest Management Plan 2004–2013

The FMP continued to be implemented. Work relating to the remaining land category changes proposed in the FMP continued. The land category changes were incorporated into the *Proposed Forest Management Plan 2014–2023*.

DEC continued to maintain the spatial and measurement datasets required to sustainably manage State forest and timber reserves.

DEC continued to facilitate the implementation of the *Wungong Catchment Environment and Water Management Project* for the Water Corporation.

More information about the FMP 2004–2013 is available on the DPaW website:
www.dpaw.wa.gov.au/management/forests

Preparing the Forest Management Plan 2014–2023

The *Forest Management Plan 2014–2023* will take effect from 1 January 2014. The plan was prepared by the Conservation Commission through the agency of the department and, at 30 June 2013, progress on the plan was well advanced.

A major milestone in the development of the plan was the release of the *Draft Forest Management Plan 2014–2023* in August 2012 for public comment. The release of the draft plan was supported by public information sessions held in Perth, Bunbury and Manjimup, as well as information sessions for key local government, industry, conservation and Aboriginal stakeholders.

Extensive background information was developed to support the draft plan, which was open to comment for 12 weeks.

More information about the *Forest Management Plan 2014–2023* is available on the DPaW website:
www.dpaw.wa.gov.au/management/forests/59-preparing-the-forest-management-plan-2014-2023



Community forest inspection program

Community forest inspections provide community representatives with the opportunity to inspect first-hand the systems and processes that are in place to manage the harvest of native forest trees from State forest, and to note compliance with existing management systems and processes.

Members of the voluntary conservation movement, representatives from local government, and staff from the FPC, DEC and the Conservation Commission inspected harvesting in the Warren Region in April 2013.

Inventory, assessment and modelling of natural resources

A wide range of technical services related to the inventory, assessment and modelling of natural resources was provided within DEC and to the FPC, Conservation Commission and external clients. Major areas of activity were:

- gathering and analysing wood inventory data to assist the FPC, DEC and the Conservation Commission in planning, managing and monitoring timber production in State forest and timber reserves
- interpreting digital images of State forest acquired between 2009 and 2013 to map forest characteristics and stratify areas for wood inventory
- updating the existing jarrah (*Eucalyptus marginata*) inventory with measurement of a selection of inventory plots
- undertaking vegetation mapping to inform silvicultural decisions, old-growth forest assessments, disease impact predictions and the protection of poorly represented vegetation complexes
- undertaking field measurement programs to monitor the yields and silvicultural standards realised in timber harvest operations, with enhanced data processing
- providing specialist services to DEC divisions, the FPC, other government agencies, natural resource management groups and external clients (services included aerial photography, photo-interpretation, photogrammetry, vegetation and disease mapping surveys, and database design and development)
- deploying and integrating modelling software and developing natural resource models to support the *Forest Management Plan 2014–2023*
- upgrading and developing forest resource management systems to support the *Forest Management Plan 2004–2023*.

Maintenance and enhancement of biodiversity and other values

Measures undertaken to sustain, or where possible enhance, biodiversity and other forest values included the provision of information about *Phytophthora* dieback, and maps of occurrence, to enable operations to be undertaken with the lowest risk of spreading the disease. Other Sustainable Forest Management service responsibilities included implementing an approvals, monitoring and compliance management system, and setting standards for the management of a range of values.

The department's Regional Services Division delivered other sustainable forest management outcomes, and the Science Division undertook research to enhance management of biodiversity, ecosystem health and vitality, and soil and water values.



Health and vitality in natural landscapes

Mapping the presence of symptoms of the plant disease caused by *Phytophthora cinnamomi* was carried out during the year to determine areas suitable for protection. Hygiene requirements were specified for activities likely to result in the movement of soil (and, as a consequence, *P. cinnamomi*) on lands managed by DEC. An area of 19,620 hectares was mapped to assist the planning of roads and timber harvesting operations undertaken by the FPC. This included 8,450 hectares previously mapped that were checked for further spread. Mapping and hygiene planning were undertaken on a further 210 hectares for DEC's purposes, and 160 hectares for external parties.

Integrated planning support

The maintenance and enhancement of biodiversity and other values across landscapes required a high level of integrated planning within DEC in 2012–13. This outcome was supported through:

- planning support to Regional Services Division to guide the selection and management of public firewood and flora harvesting areas
- monitoring and collating information about areas burnt by bushfire and prescribed fires across the forest to support integrated fire planning and reporting
- assisting the Regional Services Division to evaluate the biodiversity assets at risk from disturbance when assessing proposals for roads, utilities and other infrastructure.

Management of soil disturbance in timber harvesting

The FMP provides for increased protection of soils during timber harvesting by introducing soil damage risk periods based on a trafficability index and prescribing measures to be applied in each risk period to protect soil during timber harvesting. The department continued to manage an approvals process for access during moist soil conditions. Authorisation of access to harvest areas during winter and spring was based on consideration of the risk associated with soil attributes. Access was not granted to areas with an inherently high risk of soil disturbance.


Implementation of fauna habitat zones

The FMP introduced fauna habitat zones in State forest and timber reserves. Design, analysis, survey and liaison work were undertaken for fauna habitat zones adjacent to proposed disturbance activities, and the location of 11 fauna habitat zones was finalised. The zones cover a gross area of more than 2,400 hectares of State forest.

Management system for approvals, monitoring and compliance

All operations in State forest require consideration and approval.

Departmental staff monitored the compliance of operations with the conditions of approval and environmental management standards. Where non-compliance in timber harvesting operations is identified, the proponent may be issued with an incident report (IR) for minor issues, a works improvement notice (WIN) if the non-compliance can be rectified by further field operations, or a management letter (ML) if it cannot. In 2012–13, staff issued nine WINs and four MLs; no IRs were issued. Of the WINs issues, five related to systems and process issues, two related to soil and water, one related to biodiversity and one related to ecosystem health and vitality. Of the MLs issued, two related to productive capacity, one related to biodiversity and one related to



ecosystem health and vitality. All of the WINs and MLs issued in 2012–13 remain open. Of the previously issued WINs that remained open, 12 have been closed. Of the previously issued MLs that remained open, five have been closed.

Forest monitoring

The *FORESTCHECK* program continued to monitor the effects of timber harvesting on biodiversity. Eight new *FORESTCHECK* monitoring grids were established and sampled in Donnelly District in 2013.

Data collected during the monitoring period from 2007–12 continued to be analysed and compared with data from the first round of monitoring undertaken from 2002–06 to investigate changes in forest structure and biodiversity.

High resolution photography was used to measure seasonal variation in leaf area index at 48 *FORESTCHECK* monitoring grids in order to validate estimates of forest canopy density made using remote sensing techniques.

Monitoring of the outbreak of gum-leaf skeletonizer (*Urabalugens*) in the southern jarrah forest continued using a new technique based on pheromone lures. The density of gum-leaf skeletonizer populations declined from the very high level observed in 2010 and defoliation was less severe and extensive than in the previous two summers.

A review paper examining the contribution of prescribed fire to mitigating the impacts of high intensity bushfires was published in the international scientific journal *Forest Ecology and Management*.

The critical role of groundwater in generating stream flow in jarrah forest catchments was demonstrated using stream flow and stream salinity data collected over the period 1976–2011. Disconnection of groundwater from surface water has contributed to much reduced stream flow during the past decade. Findings from this study were published in the international scientific journal *Journal of Hydrology*.

Forest auditing

Forest management practices and operations were audited to ensure compliance with the FMP and associated guidance documents.

The audit examined the processes for monitoring native forest timber harvesting operations in the Swan, South West and Warren regions ensuring compliance with requirements of the FMP.

Native forest harvesting—monitoring of native forest harvesting

Timber harvesting operations in State forest and timber reserves in the area of the FMP continued to be approved and monitored in accordance with guidance documents that specify a range of requirements relating to silvicultural outcomes, protecting soil and water values and demarcating informal reserves not available for timber harvesting. Field monitoring of these operations was undertaken by regional and district staff.

Native forest harvesting—coupe management and environmental protection

The FPC conducts harvesting operations on DEC-managed land where compliance is required with a range of environmental standards, as detailed in the FMP and associated guidance documents.

This audit assessed a sample of these environmental management and protection elements in selected active coupes and one dormant coupe in jarrah forest.



Table 12: List of coupes sampled

Coupe	Region	Status	Species
Amphion	Swan	Dormant	Jarrah
Arcadia	South West	Complete	Jarrah
Greenbushes	South West	Complete	Jarrah
Gregory	South West	Complete	Jarrah
Tanjanerup	South West	Complete	Jarrah
Beaton	South West	Complete	Jarrah
Warup	Warren	Complete	Jarrah

Planning checklists

Planning checklists must be completed by the FPC and approved before timber harvesting can begin. All coupes sampled had correctly completed planning checklists for each relevant harvesting operation.

Coupe demarcation

Management boundaries, including coupe, river, stream, travel route and diverse ecotype zones, must be identified and demarcated before harvesting starts. The management boundaries of seven coupes were assessed and all reserve boundaries were correctly demarcated.

Table 13: Summary of coupe demarcation

	Stream zone	Other reserves	Total
Length assessed (m)	5,719	9,386	15,105
Length correctly marked (m)	5,719	9,386	15,105
Percentage correct	100	100	100

Protecting water—informal reserves

Informal reserve boundaries should be protected during all phases of the harvesting operation.

Table 14: Summary of incidents

	Stream zone	Other	Totals
Length assessed (m)	5,719	9,386	15,105
Number of minor incidents	3	5	8
Length of minor incidents (m)	40	71	111
Number of major incidents	0	0	0
Length of Major incidents (m)	0	0	0
Percentage of edge protected intact	99	99	99

The management boundaries of seven coupes were sampled for compliance. No incidents were recorded in two coupes. Eight minor incidents totalling 111 metres were recorded in five coupes. These incidents involved machine activity crossing into stream zones and reserve boundaries. No major incident was recorded for any of the sampled coupes.

Stream zones were demarcated at or above the prescribed width requirement.

Phased logging

In all second-order catchments in the intermediate and low rainfall zones of multiple-use jarrah forest subject to harvesting, at least 30 per cent of each second-order catchment has a retained basal area of greater than 15 square metres per hectare for a period of at least 15 years after harvesting of the remainder of the catchment.

Areas were sampled in the field and had been retained as specified.

Identifying habitat retention

To ensure the sustained availability of suitable refuge hollows for fauna after timber harvesting, habitat trees and ground logs are retained. The requirements for habitat trees and ground logs were

- five primary habitat trees per hectare—trees that have a moderate to high probability of bearing hollows
- six to eight secondary habitat trees per hectare—trees that have a lower probability of bearing hollows at the time of tree marking, but provide for the sustained availability of hollows through time (these trees also contribute the structural diversity in the coupe)
- one ground log per hectare—natural logs with a diameter greater than 10 centimetres and a length greater than three metres.



Table 15: Habitat retention

Standing habitat

No. of Coupes assessed for habitat trees	Area sampled (ha)	No. of primary habitat trees in samples	No. of secondary habitat trees in samples	Average no. of primary habitat trees / ha	Average no. of secondary habitat trees / ha	Average number of all habitat trees / ha
7	40	368	267	9.2	6.7	15.9

Ground habitat

No. of coupes assessed	Area sampled (ha)	Number of habitat logs in samples	Average number of habitat logs per hectare
7	40	52	1.3

In the seven coupes sampled, the average number of primary habitat trees was above the required retention rate. The required standard for retention of secondary habitat trees was achieved in three of the seven coupes sampled. For ground habitat requirements, five coupes achieved the required retention rate and two coupes recorded below this rate.

Protecting crop trees

Marked crop trees are required to be protected from damage during harvesting operations.

Damage was defined as:

- exposure of more than 100 square centimetres of cambium
- felling, breaking or uprooting of a crop tree
- removal of more than 30 per cent of the crown.

As well as avoiding physical damage, all debris created by a harvesting operation should be removed from the base of crop trees.

Table 16: Crop trees assessment

No. of coupes assessed	No. of crop trees assessed	No. of crop trees undamaged	No. of crop trees damaged
7	740	710	30
	100%	96%	4%

Table 17: Crop trees tops disposed and not disposed

No. of crop trees assessed	No. of crop trees tops disposed	No. of crop trees not tops disposed	Compliance
740	665	75	90

Six of the seven coupes assessed were below the allowable five per cent limit for crop tree damage. The highest level of damage recorded was seven per cent and the lowest two per cent.

As well as avoiding physical damage, all debris created by a harvesting operation should be removed from the base of crop trees. This task is commonly known as 'tops disposal' and is designed to protect crop trees from fire damage. All woody material greater than 75 millimetres in diameter must be removed at least one metre from the bole of the crop tree.

Of the seven coupes assessed, only two achieved the compliance level of 95 per cent. The highest level of completed tops disposal was 97 per cent and the lowest level 84.

Protecting soil

When extraction is completed in any feller's block, and prior to machinery leaving, spreader banks must be constructed across all extraction tracks and disturbed firebreaks with exposed soil to minimise the risk of erosion. The minimum size and angle of banks is set and the prescribed spacing is dependent on the slope and soil type.

Table 18: Erosion control

No. of coupes assessed	Length of snig track assessed (m)	Length of track meeting specification (m)	Length of track not meeting specification (m)
7	7,014	7,014	0
	100%	100%	0%

All seven coupes assessed achieved 100 per cent compliance with erosion control measures.

Rehabilitating landings

There is an annual program in place to rehabilitate landings. At the completion of harvesting, landings are ripped and scarified and then seeded and fertilised when conditions are right. Preparation work for landing rehabilitation, ripping and scarifying, had been undertaken in most completed coupes sampled, except where products still remained on the landings.

Protecting threatened flora

Before any activity was undertaken on DEC-managed land resulting in the clearing of native flora, field searches were required to be conducted to determine whether threatened flora is present. Records of field searches for the presence of threatened flora populations were available for all coupes assessed.

Protecting threatened fauna

Areas planned for harvesting were assessed in a desktop study against a matrix that determined the probability of habitats of threatened fauna occurring, supplied from the *Fauna Distribution Information System*. Databases containing records of known habitats, populations and sightings were also consulted. Printouts from the fauna distribution database were available for all coupes sampled.



Adaptive management

DEC continued to contribute to the coordination and implementation by the Water Corporation of the *Wungong Catchment Environment and Water Management Project*. This adaptive management trial in the 12,845-hectare Wungong Catchment aims to increase water availability by managing vegetation density.

The care and maintenance program initiated in 2010–11 continued into 2012–13. Treatment to control woody weeds also continued in areas of the catchment to be converted back to the native forest structure.

Provision for harvesting, regeneration and growth of forest products

Silviculture guidelines

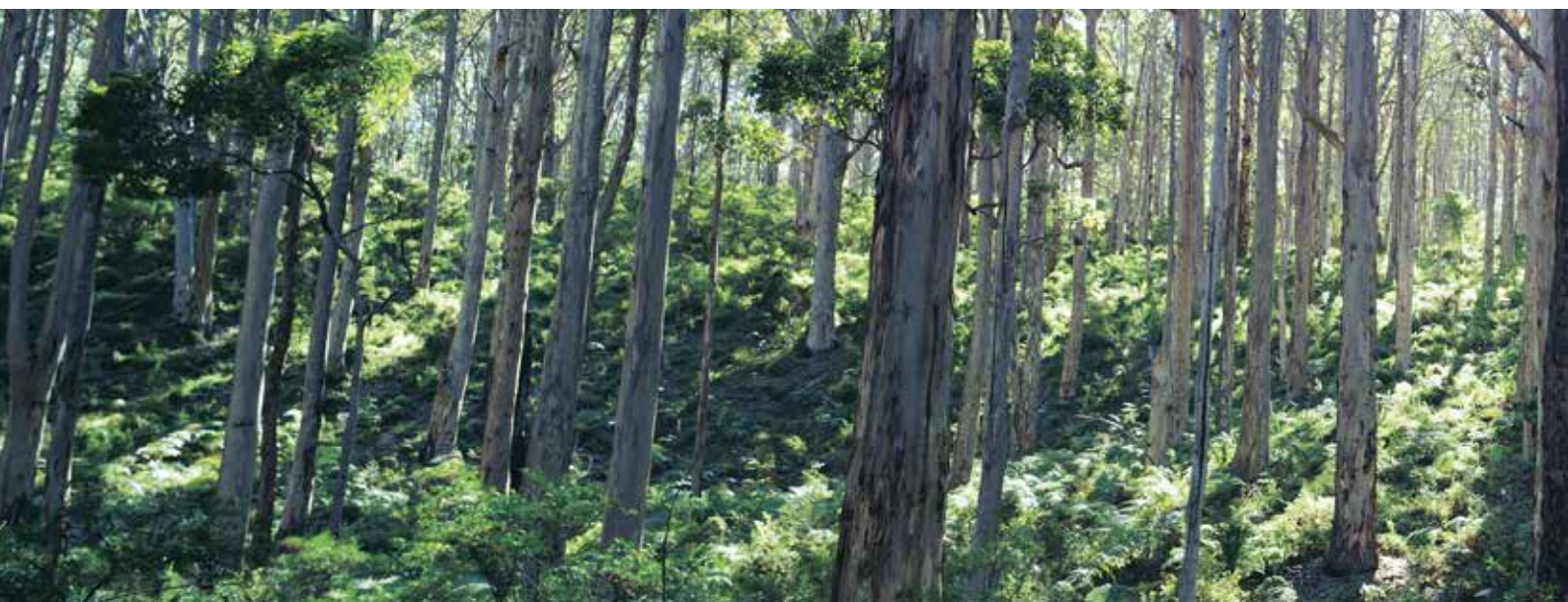
Proposed revised jarrah silvicultural guidelines were developed and published and are available at www.dec.wa.gov.au/component/docman/doc_download/7563-proposed-revised-jarrah-silviculture-guidelines.html?Itemid=.

Monitoring procedures to assess protection levels for growing stock and habitat trees, and for the assessment of tree marking, continued to be implemented and improved following feedback from field operational staff.

Training continued through the delivery of briefings and through informal coaching in the application of silvicultural practices and the implementation of monitoring procedures.

Monitoring of areas subject to timber harvesting and associated treatments

Monitoring was undertaken in areas subject to commercial timber harvesting, silvicultural treatments and forest disturbance activities under the direction of the FPC. In the 12 months to December 2012, 8,570 hectares of native forest were harvested with the following silvicultural or management objectives.



Boranup State forest, near Margaret River. Photo – Tourism WA.

Table 19: Silvicultural objectives

Forest type	Silvicultural objective	Area cutover (ha)
Jarrah	Release of regeneration (gap)	850
	Establishment of regeneration (shelterwood)	3,680
	Promote growth on retained trees (thinning)	920
	Single tree selection (retention in <i>Phytophthora</i> dieback areas)	410
	Selective	900
Subtotal		6,760
Karri	Establish jarrah/karri regeneration	30
	Establish regeneration (clearfall karri)	340
	Establish regeneration (partial karri clearfall)	0
	Promote growth on retained trees (thinning)	650
Subtotal		1,020
Wandoo	Establishment of regeneration	0
	Promote growth on retained trees (thinning)	0
Subtotal		0
Other/any forest type	Other (mining and clearing for utilities)	790
Total		8,570

Jarrah silvicultural objectives for 1,380 hectares harvested in this or previous years were achieved by follow-up treatment during the year. Karri regeneration was completed on 310 hectares harvested in either this or previous years.



Table 20: Trends in the area of native forest harvested

	Jarrah forest (ha)	Jarrah/wandoo forest (ha)	Karri forest	
			Clearfelled or cut to seed trees (ha)	Thinned (ha)
1976–77	32,320	1,170	2,610	-
1977–78	26,020	740	4,450	-
1978–79	25,540	530	2,710	-
1979–80	25,150	860	2,110	60
1980–81	22,930	1,440	2,080	180
1981–82	24,680	610	2,180	320
1982–83	23,740	330	990	190
1983–84	21,540	580	1,490	260
1984–85	20,010	1,440	2,360	500
1985–86	22,640	650	1,590	340
1986	19,340	1,150	1,090	490
1987	17,180	1,380	1,310	700
1988	23,400	490	1,180	840
1989	15,130	200	1,510	910
1990	12,960	100	1,560	340
1991	10,910	-	1,920	230
1992	13,990	30	1,540	310
1993	14,250	40	1,630	80
1994	14,050	50	1,440	-
1995	17,830	30	2,410	-
1996	22,320	50	1,300	60
1997	18,240	60	1,870	60
1998	19,250	60	1,970	320
1999	14,200	50	1,890	360
2000	20,570	10	1,310	70
2001	15,760	*	1,380	120
2002	13,260	30	700	350
2003	8,520	-	720	485
2004	8,860	-	330	920
2005	6,220	30	460	1,070
2006	8,440	300	400	1,130
2007	8,120	60	560	1,000
2008	7,280	0	390	660
2009	8,990	10	740	920
2010	4,520	0	400	1,220
2011	**7,500	30	470	850
2012	6,760	0	370	650

*Total includes small areas of other forest types cleared for mining or landings

**The figure given in the 2011–12 Yearbook (7,500 ha) was incorrect as it included clearing for mining



The art trail at Swarbrick Forest Discovery.

Parks and Visitor Services

Parks and Visitor Services

Public involvement, visitation and appreciation of the natural environment on DEC-managed lands and waters continued to be a focus. The provision of parks and visitor services included

- preparing and implementing management plans in accordance with the CALM Act
- preparing and implementing recreation site development plans
- providing, managing and maintaining appropriate access, recreation opportunities and visitor facilities
- protecting natural areas, visitors and facilities from bushfire
- training departmental staff and volunteers
- working with local visitor centres and commercial tour operators
- involving Aboriginal people in park management
- involving Aboriginal people in the provision of visitor facilities and services
- providing visitor information, and designing and initiating educational and interpretive activity programs that enrich visitor experience and help develop greater community awareness and support for parks, natural areas, astronomy, nature-based tourism, and recreation services and policies
- undertaking scientific, visitor and social research, in cooperation with other research institutions
- providing services to the Conservation Commission and the MPRA.

This work was carried out by staff around the state, with the support of thousands of volunteers as well as local visitor centres, tourism operators, and local community organisations.

Planning for management

During 2012–13, the Minister for Environment approved management plans for Yanchep and Neerabup national parks and reserves, Ord River and Parry Lagoons nature reserves and Murujuga National Park. This brought the total number of current terrestrial management plans prepared under the CALM Act to 54.

A further 10 terrestrial management plans were in preparation. These were for: Albany coastal reserves, Barrow group nature reserves, Esperance and Recherche parks and reserves, Kalbarri National Park, Leeuwin-Naturaliste Capes area, Northern Yilgarn conservation reserves, Yawuru out-of-town conservation area, Yoorrooyang Dawang proposed conservation parks, Swan Coastal Plain South and Tuart Forest National Park.

During 2012–13, the draft management plan for the Esperance and Recherche parks and reserves was released for public comment.

The public contributed to the content of management plans through public and stakeholder workshops and meetings, formal advisory committees, newsletters and invitations to comment on draft plans. Aboriginal people were also engaged through the involvement of Aboriginal Native Title representative bodies and Aboriginal park councils.

For a list of the number of marine and terrestrial management plans in place and in preparation at 30 June 2013 see DEC's 2012–13 Annual Report, which is available on the DPaW website: www.dpaw.wa.gov.au/about-us/annual-report-and-yearbook.



Acquisition and administration of protected areas

Reserve acquisition

The formal process of adding land to the state's system of protected areas continued throughout the year.

DEC purchased 11 parcels of freehold land of high conservation value and one pastoral lease, covering about 51,000 hectares for future addition to the conservation reserve system. Details of these acquisitions are recorded in DEC's 2012–13 Annual Report, which is available on the DPaW website: www.dpaw.wa.gov.au/about-us/annual-report-and-yearbook.

The department's priorities for purchases were areas containing ecosystems not adequately represented in existing conservation reserves, areas containing threatened species and ecological communities, or additions to existing reserves that would greatly improve their diversity or facilitate their management.

The purchases were funded from a number of sources: DEC's capital allocation for acquiring conservation land; proceeds of asset sales; and environmental offset funds (provided from a variety of sources as a result of approved developments and land clearing). The total expenditure from all funding sources for 2012–13 was \$3.977 million.

Other programs and processes led to the acquisition of lands suitable for inclusion in the conservation reserve system, examples of such instance include land ceded to the state as a condition of subdivision, land acquired from negotiated exchanges, and reserves no longer required by other agencies and organisations. Work continued on the implementation of tenure changes proposed in the *Forest Management Plan 2004–2013* and towards the implementation of outstanding tenure recommendations in other management plans.

DEC also continued to provide advice on land proposals referred from other organisations, such as the Department of Regional Development and Lands, and advised on issues including the use or disposal of unallocated Crown land and surplus Crown reserves.

Leasing activities

Lease arrangements are maintained for a wide range of purposes. At 30 June 2013 there were 286 current formal arrangements for uses on DEC-managed lands including recreation, tourism accommodation, utilities and sawmills. The formal arrangements comprised 185 leases, 31 written agreements, 52 licences, 15 memoranda of understanding and three sawmill site permits.

DEC entered into 54 formal agreements in 2012–13. Major achievements were:

- the negotiation and formalising of 43 new licences for the Donnelly River Huts
- a new lease for the management and operation of the Wharnccliffe Mill in Bramley National Park
- a new lease for the West Australian Rifle Association's new state headquarters.

During the year, a number of other formal arrangements expired and, at 30 June, were at various stages of being renewed.

Apiary site management

At 30 June 2013, there were 3,272 current apiary site permits. Of the 1,687 on DEC-managed lands, 896 were located on State forest, 103 on timber reserves, 369 on national parks, 218 on nature reserves, 64 on conservation parks and 37 on other lands vested in the Conservation Commission.

During 2012–13, 639 apiary site permits were processed, comprising:

- 38 authorities transferred between beekeepers
- 84 site permits from applications to occupy new or previously cancelled sites
- 16 site permit relocations
- 333 site permit renewals
- 125 site permit cancellations
- 43 replacement sites issued.

Park presentation and resource protection

One of the aims of the department was to provide high-quality visitor services and facilities that are planned, designed, developed and managed in a sustainable way. Over the past seven years, DEC coordinated the investment of more than \$95 million of capital funding in parks and reserves around WA.

Capital works

The Parks and Visitor Services capital works program continued work to improve and maintain recreation and tourism assets in national parks, conservation parks, State forest and other reserves across the state.

Works were typically associated with the construction, upgrading and maintenance of roads, day-use and camping facilities, and ensuring visitor safety. Works are also undertaken to protect environmental, social and landscape values at these sites.

During the year, capital works funding was spent on park improvements and roads. A description of projects undertaken in each DEC region is provided in the Regional activities section (see pages 101 to 109).

Roads

DEC continued work on developing a road asset management system for its 37,000-kilometre road network. This project will assist in identifying high priority road improvement works, planning strategic road requirements, managing identified road hazards, and identifying present and future funding requirements. Information was collected in the initial stage and during 2012–13 DEC continued rectifying road data against databases from Landgate and Main Roads WA to ensure its accuracy.

Work continued with other agencies, such as Landgate, Main Roads WA, the WALGA and the FPC, in developing policies and interagency agreements to ensure that appropriate standards and user requirements are met. Collaborative work with local government authorities and Main Roads WA on inter-regional road construction and maintenance work across agency boundaries is ongoing.

Recreation planning and design

DEC prepared visitor services plans, master plans, concept plans and site development plans for many projects around the state. These documents assist with strategic planning decisions and funding applications, and enable capital works projects to be built to a high standard.

During 2012–13, planning for visitors was completed for Kalbarri National Park in the Midwest and for Credo and Goongarrie former pastoral properties in the Goldfields. Planning started for Yawuru conservation parks and Dirk Hartog Island and Cape Le Grand national parks. Plans were prepared for upgrading visitor access and



facilities at Black Point in D'Entrecasteaux National Park, and designs for four new camp sites on the Munda Biddi Trail were completed.

The site design has been completed for the *Fitzgerald River National Park Improvement Project* on the South Coast. Construction drawings were prepared in conjunction with the Shire of Ravensthorpe for a number of sites including Point Ann, West Beach, Cave Point and Hamersley Inlet.

Planning and design were undertaken on *Royalties for Regions*-funded projects, including low-cost in-park camping, visitor infrastructure and *Naturebank* sites. Work continued on site plans for low-cost in-park camping facilities at Nanga in Lane Poole Reserve and a new campground at Logue Brook. Site plans were completed for park visitor infrastructure for the Loop and Z Bend in Kalbarri National Park. Design development for The Gap precinct in Torndirrup National Park continued.

Design and/or construction documentation drawings were prepared for many small structures such as boardwalks, toilets, steps and lookouts, including viewing platforms at The Gap and Natural Bridge in Torndirrup National Park, and renovation of shelters at Point Ann and a viewing platform at Cave Point in Fitzgerald River National Park.

Planning, training and design advice was given on numerous projects associated with DEC, and staff represented the department on working groups including the Coastwest Technical Assessment Group.

Visual impact assessment, recommendations, guidelines and specialist advice were provided for a number of proposals throughout the year. A visual landscape impact assessment was prepared for Dirk Hartog Island National Park. Expert advice continued to be provided on visual landscape planning relating to development proposals along the Leeuwin-Naturaliste coastline.

Visitor communication and management

Interpretive planning and design

Work continued on providing information to visitors to help them interpret, understand and appreciate WA's parks and reserves. During 2012–13, interpretation project plans were prepared for major site developments with interpretive facilities. Of particular note were projects being undertaken as part of the *Kimberley Science and Conservation Strategy*, including plans being prepared in consultation with the Kandiwal Aboriginal Corporation for King Edward River, comprising Munurru camp, picnic and art sites.

Signs were made for Yawuru lands around Broome, Yanchep National Park, Jurien Bay Marine Park, Leeuwin-Naturaliste National Park and Ngari Capes Marine Park, the Great Western Woodlands, Shark Bay World Heritage Area and parks and reserves in the Midwest Region and on the Swan Coastal Plain.

Work continued on installing or updating signs and displays to help inform visitors to DEC-managed areas across the state.

Interpretive projects of particular note included:

- At Purnululu National Park, all interpretive signs for the park entry, park visitor centre, airstrip and all sites between and including Piccaninny and Echidna site were revised and replaced. New trailside signs interpreting traditional local Aboriginal plant use were prepared and installed at Stonehenge in the park.
- In Mirima National Park, shelter panels, trailheads and trailside signs were replaced to reflect joint management with the Miriuwung-Gajerrong Park Council.
- A prospectus was prepared for the Milyering Discovery Centre to attract funds for a redevelopment after 25 years and reflect the Ningaloo Coast World Heritage listing. Design started on the display exhibits for

stage one with the focus on visitor safety, things to do and places to go, the retail merchandise display and the World Heritage values.

- At Hangover Bay in Nambung National Park, trailside vista interpretive signs were installed for visitors travelling on the Indian Ocean Drive and accessing Jurien Bay Marine Park.
- Designs were prepared for the former Goldfields pastoral station Earraheedy; Lucky Bay in Cape Le Grand National Park near Esperance; West Beach in Fitzgerald River National Park; and Lake Cronin and Billyacatting Hill nature reserves in the Wheatbelt.
- At Peak Charles National Park, interpretive signs were revised and replaced and new panels featuring Aboriginal art were installed. A set of new identification, directional and management signs were designed and installed.

Community liaison, consultation and advisory services

Consultation with special interest groups, agencies, individuals and Aboriginal communities is a key aspect of site developments and their interpretation on and off DEC-managed areas.

DEC staff worked with the Miriuwung-Gajerrong Park Council and the Mirima Language Centre in Kununurra on signs in Mirima National Park, and on the Yawuru lands and waters around Broome.

Liaison, consultation and support continued with the National Trust of Australia (WA), WA Museum, Interpretation Australia and the Forum Advocating Cultural and Ecotourism.

Advice was provided to local authorities and various 'friends' groups on the planning, design and production of signs and displays. In Kalamunda National Park Trailhead and trailside signs were installed with the Friends of Piesse Brook. Trailside signs were installed in the bushland within Murdoch University after collaborative planning and design with the university.

Guided interpretive programs

Guided interpretive programs continued to be provided regularly in major areas throughout the state. These included the *Nearer to Nature* program provided in Perth's regional parks, and at the Perth Hills Discovery Centre, Yanchep National Park, Penguin Island Conservation Park and the Perth Observatory.

In the regions, guided tours and/or interactions were provided at Geikie Gorge National Park in the Kimberley, Monkey Mia Reserve in the Shark Bay World Heritage area, Valley of the Giants and Coalmine Beach near Walpole, Barna Mia in Dryandra Woodland, and Perup-Nature's Guesthouse near Manjimup. DEC regional staff also continued to respond, where appropriate and available, to requests for specific presentations and guided experiences in local areas.

Aboriginal liaison, consultation and heritage

A high priority is placed on liaising, consulting and working with Aboriginal elders, traditional owners and other interested stakeholders to enhance management of DEC-managed lands and waters. The Aboriginal Heritage Unit helped implement these activities. During the year DEC undertook a wide range of work including:

- working with elders in local Aboriginal communities regarding traditional land use and protocols
- liaising with elders conducting Welcome to Country for DEC events
- advice on traditional owners for DEC-managed estate
- assisting interagency engagement in the Wheatbelt to support heritage protection
- participation in NAIDOC community activities



- contributions to an Aboriginal employment expo
- support for and provision of cultural information at the Rottnest Island Heritage Week
- involvement in DEC's display at the Perth Royal Show
- support for the South West Native Title Unit and the Wheatbelt Region in a community liaison activity with the Badjebup Aboriginal Corporation
- provision of advice on the use of Aboriginal images in DEC marketing
- input to ensure Aboriginal news, events and achievements were promoted in DEC and at external forums.

Planning and relationship building

Building relationships with Aboriginal and non-Aboriginal individuals and organisations both within and outside the department remained a priority. In 2012–13, this included:

- providing ongoing cultural advice and assistance to DEC staff regarding Aboriginal consultation and involvement on DEC-managed lands and waters
- providing links between DEC regional and district staff and Aboriginal communities
- maintaining ongoing relationships with a range of agencies and organisations such as NRM groups and officers
- participating and providing executive support to the DEC Aboriginal Employee Reference Group
- implementing Reconciliation Action Plan strategies by providing opportunities for DEC staff to participate in key Aboriginal and Torres Strait Islander events and dates of significance including NAIDOC and National Reconciliation Week
- developing guidelines for the recruitment of Aboriginal staff to DEC
- participating in public sector forums focusing on Aboriginal employment.

Education and training

During 2012-13 DEC continued efforts to increase awareness in WA of the culture, history and diversity of Aboriginal and Torres Strait Islander people. In 2012–13 this was done through:

- the *Nearer to Nature* program, which provided cross-cultural education programs to 287 schools and community groups totalling more than 12,000 people
- training and assistance for DEC staff, including cultural protocol workshops at Walyunga National Park, helping to organise Welcome to Country ceremonies for events, and training in the correct protocol for acknowledgment of traditional owners at DEC meetings and events
- developing of an agency Cultural Learning Package with a focus on cultural awareness training
- exploring further learning and training opportunities for DEC staff in the areas of heritage site training and Native Title
- providing training for Aboriginal staff in facilitation and presentation
- supporting work place opportunities for Aboriginal cadet and school-based trainees
- contributing to DEC's community education strategy for customary activities regulations and developing and delivering training for DEC regional staff on the customary activities regulations
- providing training to enhance community development skills.

Business management

Providing accurate park information, promoting responsible behaviour by visitors and providing services to the tourism industry are important functions of the department.

The Commercial Business Unit provided guidance and assistance in identifying new opportunities on DEC-managed lands. In 2012–13, advice was provided for Mirima National Park in the East Kimberley and a business options plan was being developed for Perup–Nature's Guesthouse in the Donnelly District.

To assist regional and district offices in identifying commercial opportunities, a template plan was developed to assist in commercial operations planning. The plan also has a marketing section that can be used to identify promotional activities to raise awareness about what people can do in parks.

Park passes and fees

National park passes were distributed at 82 points around the state including DEC offices, selected national parks and 45 independent retail outlets.

Table 21: Breakdown of pass distribution 2012–13

Type of park pass	Number distributed	Change from 2011–12
Holiday	7,501	decrease 2,037 – 21%
Annual local	7,406	increase 330 – 5%
Annual all	5,851	increase 204 – 4%
Annual all concession	3,514	decrease 365 – 9%
Goldstar	997	increase 634 – 175%

Note: Includes passes sent to DEC offices but not yet sold

In 2012–13, DEC approved 332 requests for entry fee waivers. The value of foregone revenue was about \$190,286 based on estimated visitor numbers of 39,797 (see Table 17 for the regional breakdown of the estimated number of visitors). Fee waivers were approved to support aged and infirm visitors, disabled groups, carers, educational groups, community service groups and not-for-profit organisations.

Table 22: Fees waived 2012–13 by region

Region	Swan	Midwest	Pilbara	Kimberley	Warren	South Coast
Number of visitors	28,516	2,957	2,895	95	1,048	4,286

Commercial operations and events

Commercial operations licences

Commercial operations were licensed to monitor and manage the commercial use of DEC-managed lands and waters pursuant to the CALM Regulations. The *Commercial Operator Handbook* detailed licence conditions applicable to commercial operators conducting such activities.



At 30 June 2013, 307 commercial operations licences were current for activities in marine and terrestrial reserves, comprising 266 general 'T' class licences, and 41 'E' class licences for operations where the numbers of licences granted are restricted. The number of commercial operations licences decreased from 312 licences at 30 June 2012.

Under the *Review of Nature Based Tourism* recommendations, there is a requirement for all licence holders to achieve recognised quality assurance accreditation. The implementation of this requirement was rolled out over 18 months. At 30 June 2013, all licensed operators were accredited, or had applied for accreditation.

Several accreditation schemes were recognised by the department. These schemes were Australian Tourism Quality Assured endorsed accreditation schemes that assessed businesses and operators to the highest level.

Newly licensed operators were given six months from the issuing of a licence to gain accreditation. Two-month licence holders were exempt from having to be accredited.

More information about commercial operations on lands and waters managed by the department is available on the DPaW parks website: parks.dpaw.wa.gov.au/for-business/commercial-operations-licensing

Naturebank

The *Naturebank* program involves the identification and preparation of suitable sites on DEC-managed lands for sustainable ecotourism initiatives. This program is a partnership between Tourism WA and DEC.

At 30 June 2013, eight sites had been identified as *Naturebank* or potential *Naturebank* sites. These were:

1. Purnululu National Park, World Heritage area (Kimberley) *
2. Windjana Gorge National Park (Kimberley) *
3. François Péron National Park, Shark Bay World Heritage area (Midwest) *
4. Wharndcliffe Mill, Bramley National Park (South West) *
5. Cape Le Grand National Park (South Coast) *
6. Millstream Chichester National Park (Pilbara)
7. Mt Hart Wilderness Lodge, King Leopold Ranges Conservation Park (Kimberley)
8. Ngamoowalem Conservation Park, Aboriginal land close to Kununurra (Kimberley).

* *Naturebank* site assessments and clearances funded through *Royalties for Regions*.

In 2010, the state government announced *Royalties for Regions* funding of \$5.2 million over four years to support the preparation of five of the eight *Naturebank* sites and, in some cases, the provision of infrastructure to assist in the development of commercial ecotourism accommodation facilities.

Naturebank sites in Purnululu National Park, King Leopold Ranges Conservation Park and Bramley National Park were released to the private sector via an open and competitive expressions-of-interest (EOI) process and are now fully operational. Environmental and cultural clearances have been completed for the François Péron National Park site, which has been advertised via an EOI. Environmental and cultural clearances have been completed in Ngamoowalem Conservation Park and a site prospectus is being developed by Tourism WA prior to the site being released via an EOI. Both Windjana Gorge National Park and Cape Le Grand National Park are the subject of negotiations with the traditional owners to formalise heritage agreements.

Legislation and policy for parks and visitor services

Legislation

Significant changes in the department's enabling legislation occurred during the seven years of DEC's operation. These changes recognised Aboriginal connection to lands, and enabled Aboriginal people to become more involved in managing land and using parks and reserves for customary activities.

The CALM Act, CALM Regulations, Wildlife Conservation Regulations and Forest Management Regulations were amended on 8 December 2012 to enable Aboriginal people to undertake certain acts for customary purposes on reserves and other lands. These amendments built on amendments to the CALM Act made in March 2012, which establish legal frameworks to enable joint management of lands and waters between the department and other parties and introduce a new management objective to protect and conserve the value of the lands and waters to the culture and heritage of Aboriginal people.

The ability to carry out customary activities is an important part of Aboriginal culture as it defines Aboriginal people's fundamental connection to the land. The 2006 *Aboriginal Customary Laws: Final Report* by the Law Reform Commission of Western Australia summarises its importance as: "... (it) expresses the vital linkage of Aboriginal people to their country, reinforces their spiritual beliefs governing their existence and responsibility for their land, and provides a means for passing on social and cultural knowledge to their children".

Policy

During 2012–13, the development, review or final drafts of policies continued in the following areas:

- memorials, merchandising, events and organised group activities
- cave and karst features protection and management
- commercial filming
- moorings
- non-Aboriginal cultural heritage
- Recreation, Tourism and Visitor Services – Policy Statement 18
- delegations of power under various legislation.

More information about legislation and policy is available on the DPaW website:
www.dpaw.wa.gov.au/about-us/36-policies-and-legislation

Recreation activities and trails

During 2012–13, DEC continued to coordinate the management of outdoor recreation activities consistent with the protection of natural and cultural values on the lands and waters it managed.

Work continued with the Department of Sport and Recreation, Outdoors WA, Westcycle and other key stakeholders on important recreation initiatives including the WA State Mountain Bike Strategy and an Outdoor Strategy for WA. DEC also continued to work with the Department of Corrective Services, with crews from Bunbury and Pardelup regional prisons assisting in the development of the Munda Bidli Trail.



Bibbulmun Track

DEC continued its strong partnership with the Bibbulmun Track Foundation in 2012–13, with the memorandum of understanding between DEC and the Foundation reviewed and endorsed at the Bibbulmun Track Foundation's annual general meeting in October 2012. Foundation volunteers continued their much-valued maintenance and support of the Bibbulmun Track, contributing more than 17,000 hours of volunteer maintenance along the length of the trail.

During 2012–13, DEC developed an improved trail counter program to collect data on track usage and started installing new trail counters along the trail. Bibbulmun Track Foundation volunteers are being trained to assist in collecting data, to enable better estimation of the total annual usage of the Bibbulmun Track and help prioritise works programs.

More information on the Bibbulmun Track is available on the DPaW website:
www.dpaw.wa.gov.au/parks/alerts-and-updates/bibbulmun-track

Mountain biking

In 2012–13 DEC worked closely with the Department of Sport and Recreation, Westcycle and the WA Mountain Bike Association in the management of mountain biking in the state. Work started included:

- the development of the WA State Mountain Bike Strategy
- the development of the South West Mountain Bike Master Planning in the DEC Wellington, Blackwood and Donnelly districts to guide future trail management and development.

DEC staff continued to work with the mountain bike community and facilitated the maintenance and construction of trails on the Kalamunda Circuit within the Perth Hills District, trail improvements around Collie, in the Wellington District, and Margaret River in the Blackwood District.

More information on mountain biking in parks is available on the DPaW parks website:
parks.dpaw.wa.gov.au/activity/mountain-biking

Munda Biddi Trail

During 2012–13, the extension of the Munda Biddi Trail was completed and the 1,000km off-road cycle trail from Mundaring to Albany was officially opened on 28 April 2013. This was the culmination of many years of hard work by departmental staff assisted by the Munda Biddi Trail Foundation.

The final stages of the trail's development involved the construction of four new trail camp sites in the Walpole Wilderness Area between Northcliffe and Denmark, the completion of 405 kilometres of new trail between Manjimup and Denmark, and the development of the remaining three trail maps.

The trail opening coincided with the end of the Munda Biddi Trail Foundation's inaugural Epic 1000 ride. Twenty six riders set out from Albany on 7 April and finished their ride three weeks later at the official opening in Mundaring.

Since 2009, the South West and Great Southern development commissions have contributed \$2.5 million to the trail's development via *Royalties for Regions* funding. A further \$500,000 in *Royalties for Regions* funding was received by the Munda Biddi Trail Foundation, for a community development program to support communities along the trail to become 'cycle-tourism ready'. DEC contributed more than \$1 million to the project.

More information on the Munda Biddi Trail is available on the DPaW website:
www.dpaw.wa.gov.au/parks/alerts-and-updates/munda-biddi-trail



Environment Minister Albert Jacob opening the Munda Biddi Trail. Photo – Ron d'Raine.

A path through the forest—the Munda Biddi Trail

After more than a decade of hard work, on 28 April 2013, Environment Minister Albert Jacob opened the Munda Biddi Trail, WA's premier long distance off-road cycle touring trail.

Recreational mountain biking has seen a steady increase in WA over the past 20 years. Following the completion of the new and extended Bibbulmun Track in 1998, there was an increase in conflict between walkers and the rising number of mountain bikers who were starting to ride the Bibbulmun Track.

The idea of a long distance off-road cycle trail evolved, initially driven by the WA Mountain Bike Association (WAMBA), who partnered with CALM staff to form the Friends of the Hardwood Trail.

Funding was sought through the Department of Sport and Recreation and Lotterywest to investigate the development of a sustainable, world-class, long distance off-road cycle trail that would showcase the outstanding natural and cultural features of the state's south west.

A development plan for the trail was completed in April 2000, and in December that year, the trail was renamed the Munda Biddi Trail. Munda is Noongar for bush and Biddi means path or trail. The Friends of the Hardwood Trail evolved into the Munda Biddi Trail Foundation, with the aims of assisting CALM in the planning, development and volunteer maintenance of the trail, while also promoting and marketing the trail to the public.

By July 2004, the dream of creating WA's first long-distance off-road cycling trail was becoming a reality. The first 332 kilometres of the Trail was opened between Mundaring and Collie. This section of trail included five dedicated Munda Biddi Trail camp sites all given Noongar language names relating to the local area, Carrinyah, Wungong, Dandalup, Bidjar Ngoulin and Yarri.

In 2008 another 166 kilometres of trail was completed from Collie to Nannup, including the development of the Sidings Rail Trail between the Jarrahwood and Nannup. This section included two more dedicated campsites, *Nglang Boodja* and *Nala Mia*.

Nannup also represented the half-way point of the planned trail from Mundaring in the Perth Hills to Albany 1000 kilometres away on the South Coast.

In 2009, the strength of the ongoing partnership between the Foundation and DEC was recognised and \$3 million in *Royalties for Regions* funding was allocated to the project through the South West and Great Southern development commissions and the Munda Biddi Trail Foundation, which added to a contribution of more than \$1 million from DEC.

The final stages of trail planning for the remaining 500 kilometres of trail between Nannup and Albany then began in earnest, with the trail alignment heading through Manjimup, Quinpinup, Pemberton, Northcliffe, Walpole and Denmark. Five dedicated camp sites complete the facilities available in this southern part of the trail, *Karta Burnu*, *Yirra Kartta*, *Kwokralup Beela*, *Booner Mundak* and *Jinung Beigabup*.

The development and completion of the Munda Biddi Trail was a result of the combined efforts of many dedicated DEC staff and volunteers, the Munda Biddi Trail Foundation, numerous government agencies, local governments and local communities.

These efforts were well rewarded when, in early 2013, the Munda Biddi Trail was listed in National Geographic's Top 10 cycling adventures in the world.



Motorised recreation

During 2012–13, DEC continued to promote the responsible use of public lands by four-wheel drivers and other visitors in, or on, motorised vehicles by working with the WA Four-wheel Drive Association, Track Care WA, the Recreational Trailbike Riders' Association of WA and Motorcycling Western Australia. Through the Motorised Recreation Working Group, DEC continued to work with the groups in developing track classification systems for both four-wheel drive and trail-bike tracks as part of the motorised recreation management guidelines.

DEC worked closely with Track Care WA and the WA Four-wheel Drive Association to train volunteers to assess and classify the Powerlines Track in Mundaring. A works program is being developed for the future management of this popular 4WD track.

Track Care WA and the WA Four-wheel Drive Association continued their support for DEC through the track and rangelands adoption program, with a number of existing and new projects and adoptions in DEC's Swan, South West, Midwest, Goldfields and Pilbara regions.

In collaboration with the Recreational Trailbike Riders' Association, DEC continued the program of improvements to trail bike trails in the gazetted off-road vehicle areas at Pinjar and Gngangara.

More information on four-wheel driving in parks is available on the DPaW parks website: parks.dpaw.wa.gov.au/activity/4wd-adventure-motorcycling

Community involvement

Volunteers make a valuable and significant contribution to the management of parks and reserves and to a range of conservation programs throughout the state. Over the last seven years, more than 10,000 new volunteers registered with DEC. During 2012–13, the department continued to enlist community support and provide meaningful and interesting opportunities for volunteers to take part in conservation activities.

The *Department of Environment and Conservation Volunteer Strategy 2011–2016* sets out ways for volunteers and groups that have the necessary skills, knowledge, experience and qualifications to be increasingly self-managed.

In 2012–13, a total of 4,717 volunteers contributed 564,350 hours of support to projects across WA.



DEC's campground hosts gather for the annual two-day Campground Host Forum. Photo – DEC.

Table 23: Community involvement volunteers

Year	Cumulative total number of volunteers registered since 1999	New volunteers	New projects	Number of volunteers contributing	Total number of hours worked	Average hours per volunteer
1999–2000	3,800		12	1,400	121,000	86
2000–01	4,499	699	26	1,600	190,000	119
2001–02	5,683	1,184	20	2,500	217,000	87
2002–03	5,160	-523	32	3,150	264,000	84
2003–04	6,100	940	30	2,700	355,000	131
2004–05	7,600	1,500	28	4,000	422,000	106
2005–06	8,230	630	6	3,882	470,600	121
2006–07	9,726	1,496	8	3,250	406,000	125
2007–08	7,784	-1,942	9	3,439	424,500	123
2008–09	9,558	1,774	7	4,004	426,200	106
2009–10	11,082	1,524	23	3,038	451,040	148
2010–11	12,759	1,677	27	3,602	436,216	121
2011–12	14,604	1,845	51	3,838	457,557	119
2012–13	16,446	1,842	28	4,717	564,350	120

Volunteer awards and activities

An annual Volunteer of the Year and Outstanding Service awards function is held to acknowledge to the important support provided by volunteers. Two volunteers were awarded Volunteer of the Year awards in 2012, with a further 19 awarded Outstanding Service awards.

A long-standing volunteer, June Butcher AM, was nominated in the Lifetime Contribution to Volunteering category of the 2013 Volunteering WA Volunteer of the Year awards for more than 40 years of dedication to wildlife rehabilitation. DEC's Community Involvement Unit was nominated in the Excellence in Volunteer Management category.

Ongoing projects, such as the *Campground Host Program*, Bibbulmun Track Foundation (office support and track maintenance), Reptile Removalists, *Wildlife Rehabilitators*, *Wildcare Helpline*, honorary CALM officers and projects at the WA Herbarium, continued to contribute to the protection and care of the environment. At 30 June 2013, the department had more than 300 volunteer projects across the state.

The *Campground Host Program* continued to attract volunteers with 73 new hosts joining this year, making a total of 424 across the state. During the year, 176 campground hosts contributed 146,943 hours in welcoming visitors and helping to manage campgrounds around the state.

The revised DEC volunteer rewards system was introduced on 1 July 2012. A review of the rewards system identified inconsistencies in the steps to gaining rewards and these have been addressed. Volunteer timesheets are now collected quarterly instead of annually, enabling pro-rata recognition and distribution of some rewards for volunteer submissions.



Table 24: Breakdown of the new rewards system for volunteers

Volunteer milestone	Reward received	When issued
20 hours	Subscription to e-Newsletter Plus 20% discount voucher at DEC outlets	Quarterly
50 hours	Volunteer park pass	1 August annually
150 hours	Limited edition WA native species lapel badge	Quarterly
300 hours	\$30 DEC voucher	Quarterly
500+ hours	LANDSCOPE Subscription and Volunteer park pass Campground hosts only also receive free camping	1 August

DEC's Community Involvement Unit transferred volunteer records to a new web-based database. The system has improved communications with volunteers, both individually and by project, group, region or district and has enabled faster sharing of information including important messages, media statements or volunteer recruitment opportunities.

The quarterly newsletter to all DEC-registered volunteers continued to be well received and assisting in recruiting volunteers by offering cross promotion of volunteering opportunities, advertising new projects and highlighting volunteer achievements.

Partnerships with organisations such as Conservation Volunteers Australia (CVA), the Department of Corrective Services, Fiona Stanley Hospital and four-wheel drive clubs continued to provide volunteering opportunities. In particular, the CVA *Earth Assist* project, sponsored by Rio Tinto and supported by DEC and the Department of Education, remained a remarkable collaborative effort especially beneficial to young people.

Across the state, 28 new projects were registered with the Community Involvement Unit during 2012–13. New projects included:

- Australian sea lions conservation and research
- national parks ranger support
- coastal rehabilitation and restoration works
- Avon Valley National Park camera trap monitoring
- satellite tracking Carnaby's cockatoo and roost monitoring
- Golden Valley Tree Park community tree planting.

During 2012–13, DEC provided training programs to more than 550 DEC volunteers with support from specialist services in DEC and external agencies. Training included the Campground Host Forum; safe work practices as part of DEC's corporate induction; risk management; basic fire awareness; first aid; cross cultural awareness; the basic wildlife rehabilitators' course (at regional and metropolitan locations); advanced and special topics for wildlife rehabilitation; and *Wildcare Helpline* evaluation and training. Volunteers attended training in various locations including in Perth and Katanning.

A volunteer e-learning program was introduced in January 2013. It was developed in consultation with various DEC sections and Perth Zoo. The program modules include an introduction to DEC for new volunteers, wildlife rehabilitation and legislation (for basic wildlife rehabilitation course attendees), and a campground host training. The modules complement existing training and the uptake and feedback has been positive.

Tourism and marketing

Rediscover Parks

To encourage people get outdoors and enjoy the benefits of spending time in nature, DEC distributed about 20,000 copies of the booklet *National, marine and regional parks in Western Australia—a visitor's guide to the state* during the year. The booklet provides important visitor information and outlines the features, facilities and activities available in more than 100 DEC-managed parks and reserves.

In March 2013, a DEC *Rediscover Parks* display at the *Perth Caravan and Camping Show* provided a showcase for DEC's developing range of digital information including the *Park Finder* section of the DEC website, the campground booking system, Facebook and Twitter social media profiles and electronic trail guides on the *EveryTrail* mobile application.

Potential park visitors were assisted in holiday planning with advice about online sales of park passes and general information on various attractions as well as specific information in response to questions.

DEC continued to support and engage the recreation and tourism industries through a variety of activities, including:

- regular meetings with DEC's Tourism Industry Reference Group to assist with communication between DEC and the nature-based tourism industry
- provision of editorial assistance to Tourism WA as well as various independent organisations in the park related content of their publications to ensure accuracy and variety of content
- participation in planning for the addition of the Great South West Edge to Tourism Australia and Parks Australia's *National Landscapes* program
- significant progress on the development a new parks-focused *Rediscover Parks* website
- the development of additional electronic park guides that can be accessed through a smart phone application.

Campground booking system

The campground booking system trial was continued for the following campgrounds around the state: Kurradjong and Walardi in Purnululu National Park, Kurradjong, Pilgramunna, Tulki and Yardie Creek in Cape Range National Park; the Perth Hills Centre in Beelu National Park; and Charlie's Flat, Chuditch, Stringers, Tony's Bend and Yarragil in Lane Poole Reserve. By allowing visitors to book a camp site, the system provides certainty for people planning to camp at popular sites.

During 2012–13, bookings through the system increased by 51 per cent with 10,215 bookings made online.

Social and visitor research

During 2012–13, several projects were undertaken in collaboration with various branches and divisions within DEC, tertiary institutions and other agencies. Projects included:

- the development of an online survey to determine the effectiveness of DEC's volunteer program and the expectations, motivations and satisfaction of DEC volunteers, the results will assist in the management and future development of volunteer programs
- ongoing involvement in an Australian Research Council linkage project *Promoting and managing national parks into the 21st century* that will improve our understanding of the place that parks occupy in Australian society



- completion of a trial survey undertaken in collaboration with whale shark tour operators in Ningaloo Marine Park to obtain data about the whale shark experience and visitor satisfaction
- ongoing involvement and support of the Kimberley Marine Research program in investigating human use, values and aspirations for the coastal waters of the Kimberley
- the completion of studies at Coalseam Conservation Park, Karijini National Park and Walpole-Nornalup National Park to determine visit and visitor characteristics, activities and satisfaction
- refinement of methodology for long trail monitoring with data currently being collected for the Bibbulmun Track
- ongoing involvement in a survey to determine visit and visitor characteristics, activities, knowledge of marine parks, and satisfaction with services and facilities at Shoalwater Islands and Marmion marine parks.

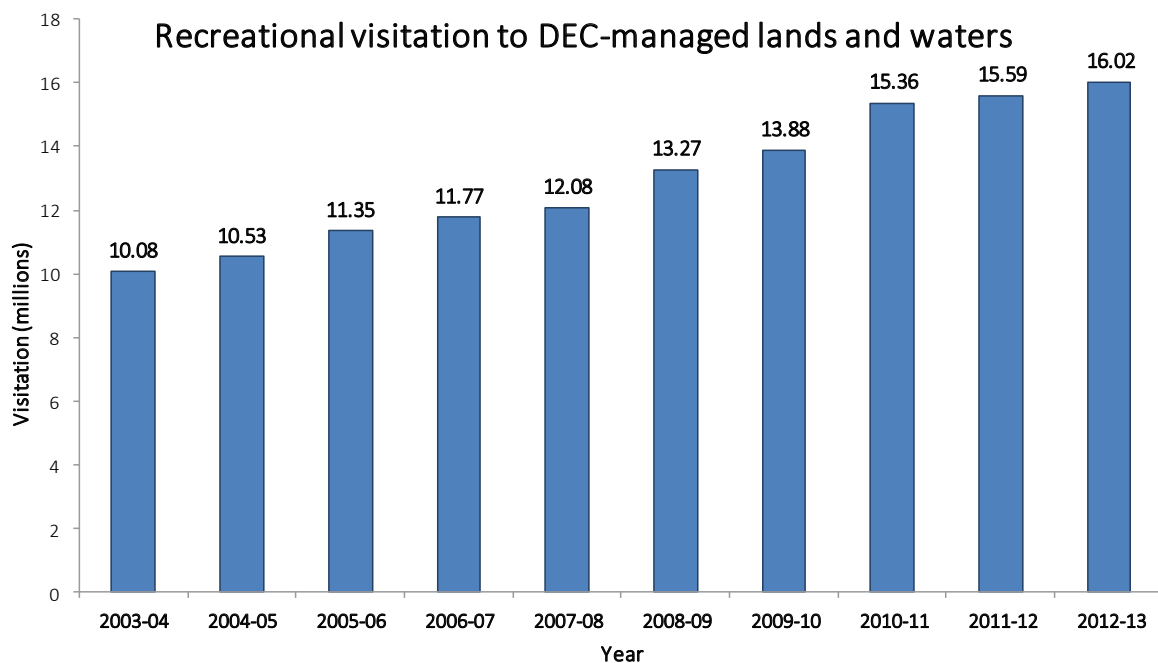
DEC continued to work closely with Western Australia's major tertiary institutions through the Nature Based Recreation and Tourism Research Reference Group, comprising academic staff from all five Western Australian universities as well as DEC staff and representatives from Tourism WA. This group provides funding to honours, masters and PhD students and projects. The projects funded for 2012–13 were:

- an honours study at Shark Bay that will investigate the nature of site evolution and visitor management at Monkey Mia and explore current visitor profiles and levels of satisfaction at Monkey Mia and Hamelin Pool
- a masters study in the Kimberley that will examine how joint management arrangements with Aboriginal groups facilitate greater opportunities for sustainable tourism development in parks and protected areas.

Visitor-use monitoring

In 2012–13, visitor use was monitored at 646 sites using a variety of methods including traffic classifiers and counters, pedestrian counters, observation surveys, and ticket sales in national parks, State forest and other reserves throughout the state. The total reportable visitation to DEC-managed lands and waters during the year was 16.02 million, an increase from the 15.59 million visits reported during 2011–12 (see Figure 1).

Figure 1: Total reported visits to DEC-managed lands and waters



Visitor survey program

DEC’s visitor survey program continued to provide visitor feedback that was used to assess visitor needs and expectations, as well as gauge visitor satisfaction with recreation and tourism facilities and services provided by DEC.

During 2012–13, the following information was gathered through the *Statewide Visitor Survey Program*:

- The most common activities were: sightseeing, bushwalking/hiking, relaxing and camping.
- The main purpose of visits was to enjoy nature and the outdoors, and to rest and relax.
- Visitors were most satisfied with feeling safe, other visitors being well behaved and their ability to enjoy nature in the park.

As part of the program, a benchmark visitor satisfaction index has been adopted to compare visitor satisfaction levels each year. This benchmark has been set at 85 per cent. The 2012–13 index, averaged from visitor responses to the survey at the selected parks, reserves and forest areas around the state, was 88 per cent. The results from 2012–13 and previous years of the visitor survey program are illustrated in Figure 2.

Figure 2: A comparison of annual visitor satisfaction levels within DEC-managed lands and waters





Astronomy

During 2012-13, astronomy activities were conducted at the Perth Observatory, Bickley. The Observatory provided a range of opportunities in public outreach, education and information.

Public outreach, education and information

The Observatory's outreach program enabled the public to see the splendour of the night sky through a range of telescopes with guidance from experienced volunteers and an outreach coordinator. During 2012-13, 3,928 members of the public took part in the program that brings science to life through astronomy. Another 4,298 people attended lectures, talks, field nights and consultations that are also part of the outreach program.

The Observatory's day tours cater for school and other groups. Work started on incorporating the Western Australian education curriculum in the schools program.

A solar telescope and viewing facility was opened as a part of the *Earth and space sciences* unit and additional teaching aids were being introduced to increase the number of students and members of the public attending day tours. During 2012-13, 1,021 people took part in a day tour. Work is progressing on an online telescope as part of a global network with access to telescopes around the world so the night sky can be viewed during Australian daylight hours.

Observatory staff informed the public of astronomical events through 135 media items, 658 emails and 10,400 phone queries. The Observatory also provided information via its website, which received more than 162,000 page views, and through its Facebook page.

The David Malin photographic exhibition was hosted from April to May with 848 attendances.

Professor Phil Bland from Curtin University delivered the annual Summer Lecture and spoke on developing a network of cameras that can image bright meteors and determine where an individual meteor came from, and where to look for fragments of the meteor that may have reached the ground. The Observatory again participated in *Astrofest*, an expo run by the local astronomical community and held at Curtin University.

The construction of a permanent housing for the Observatory's portable 30-inch telescope was started during 2012-13. This will greatly enhance the night tour program.

Volunteers

The Observatory's highly trained and motivated volunteers are a vital part of its program. During 2012-13, volunteers assisted with 81 star viewing nights, with four volunteers assisting each night, as well as assisting with the day tour and school program.

Research activities

The *Probing Lensing Anomalies Network* collaboration continued to observe changes in brightness caused by the gravitational focusing of light from a star. This lensing effect occurs when two stars are aligned, when viewed from the Earth.

During the year a member of staff was involved in the development of software and electronics for the Murchison Widefield Array (MWA) radio telescope. This radio telescope is one of two telescopes being built as a precursor for the Square Kilometre Array Radio Telescope. A worldwide consortium of universities (including UWA and Curtin University) is building the MWA radio telescope.

Support to the Conservation Commission and the Marine Parks and Reserves Authority

Support is provided to the Conservation Commission of Western Australia in accordance with the CALM Act and the 2011 *Operational Relationship Agreement*.

During 2012–13, DEC assisted the Conservation Commission with corporate services support of the Conservation Commission Service Unit, which in turn supported the Conservation Commission in:

- facilitating liaison between DEC and the Conservation Commission Management Plan Review Committee for the delivery of the Conservation Commission's statutory responsibilities in management planning under the CALM Act
- preparing the final management plans (released after 30 June 2012) for parks and reserves of Yanchep and Neerabup and Ord River and Parry Lagoons nature reserves
- preparing the Esperance and Recherche parks and reserves draft management plan
- undertaking management plan and issues based performance assessments, including the performance assessment reports: *Biodiversity Outcomes of Prescribed Burning and Parks of the Perth Hills*
- making old-growth forest recommendations for the following blocks: Alco, Andrew, Boorara, Challar, Cleave, Court, Crowea, Diamond, Gray, Iffley, Lane, Lewin, Mattaband, Morgan, Muirillup, Murtin, O'Sullivan, Quinninup, Solai, Storry Sutton, Wattle, Weld and Yanmah
- reporting on community nominated old-growth forest in the Warrup forest blocks, compartments 02 and 08
- facilitating liaison between DEC and the Conservation Commission on the coordination and analysis of submissions during the public comment period on the *Forest Management Plan 2014-2023*
- preparing the *Forest Management Plan 2014–2023* and submitting the Public Environmental Review document to the EPA
- facilitating liaison and advice relating to the statutory functions of the Conservation Commission for leases, licences and permits, land tenure, mining proposals and ecologically sustainable forest management.

Support is provided to the MPRA in accordance with the CALM Act and a memorandum of understanding.

During 2012–13, DEC assisted the MPRA by providing policy advice, development of indicative and final management plans for proposed marine parks and reserves and executive support services. Highlights for the year included:

- creation of Eighty Mile Beach Marine Park
- gazettal of the final management plan for the Ngari Capes Marine Park
- periodic audit of the implementation of the management plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area
- annual performance assessment workshop for WA marine parks and reserves.

Other initiatives

Memoranda of Understanding

A number of significant partnerships that are formalised through a memorandum of understanding (MOU) continued to be maintained.

A long-standing MOU with the Department of Corrective Services allows prisoners to make a valuable contribution to departmental projects and the community through maintenance and construction of walk trails



and other facilities including the Bibbulmun Track, the Munda Biddi Trail and the Cape to Cape Track. Prisoners assist with signage work, construction of picnic tables and benches, weed control, maintenance of firebreaks, and cleaning and repair of campground facilities in many parks and reserves around the state including Mirima, Millstream Chichester, Porongurup and Leeuwin-Naturaliste national parks and Coalseam Conservation Park.

The MOU between DEC and Leave No Trace Australia continued with further projects to promote visitor behaviour that has minimal impact.

During 2012–13, the successful partnership between DEC, Conservation Volunteers Australia (CVA) and Rio Tinto continued with Rio Tinto's *Earth Assist* program. The continued involvement of the Department of Education enabled students in Perth and regional Western Australia to take part in the program, which offers environment-based volunteer opportunities to high school students.

Links between CVA and the Black Cockatoo Preservation Society at Martin enabled significant conservation and restoration work to continue.

The MOU between DEC, Department of Health, Department of Housing and Works in support of the Fiona Stanley Hospital and Health Precinct project continued to contribute significantly to rehabilitation of land at Beeliar Regional Park, research into Carnaby's black cockatoo and the *Wildcare Helpline*.

The MOU between DEC, Track Care WA and the WA Four-wheel Drive Association was reviewed in February 2013 to affirm the existing relationship between the three organisations and continue work on projects to promote minimal-impact use of four-wheel-drive vehicles. The new MOU includes a volunteer track and area adoption program that has resulted in a number of successful partnership projects across the state.

A total of 189 volunteers and 131 four-wheel drive vehicles took part in clean ups of two popular DEC-managed four-wheel drive area clean ups in September 2012. Members of Track Care WA and several four-wheel drive clubs worked with staff from the Swan Coastal District to clean up Wilbinga, between Two Rocks and Guilderton. Track Care WA and the WA Four-wheel Drive Association worked with staff from the Perth Hills District and the Recreation and Trails Unit to clean up the Powerlines Track, which runs parallel to the Great Eastern and Great Southern highways from Mundaring to York. Four-wheel drive clubs have adopted seven new DEC-managed areas to assist with their conservation.

In May 2013, DEC formalised an agreement with Fairbridge Western Australia Inc. to work together to explore potential opportunities for young Aboriginal people.

World and national heritage

Day-to-day management of three of the state's four World Heritage areas, Shark Bay, the Ningaloo Coast and Purnululu National Park, continued.

The Ningaloo Coast World Heritage program manager, recruited in 2011–12, has developed and begun implementing a communication and interpretation strategy to raise awareness about the area's World Heritage values. Establishment of the Ningaloo Coast World Heritage Advisory Committee made progress with the recruitment of committee members.

The Shark Bay World Heritage Project Officer continued to provide valuable executive support to the Shark Bay World Heritage Advisory Committee and oversee the implementation of the *Shark Bay World Heritage Property Strategic Plan 2008–2020*.

In Purnululu National Park, two *Caring for our Country* funded projects were undertaken to protect the park's World Heritage values by reducing the impact of hot late-season fire and upgrading a walk trail to protect fragile soils, vegetation and places of cultural importance in the park. The Purnululu World Heritage Area project officer also made progress on the establishment of a new advisory committee.

Formal management arrangements with Aboriginal people

Miriuwung Gajerrong

DEC has had a central role in implementing the Ord Final Agreement Indigenous Land Use Agreement, in partnership with the Yawoorroong Miriuwung Gajerrong Yirrgeb Noong Dawang Aboriginal Corporation (Miriuwung Gajerrong Corporation) and other partners. DEC and the Miriuwung Gajerrong Corporation had joint responsibility for developing management arrangements for six new conservation reserves (totalling 150,000 hectares) in the east Kimberley. Achievements for 2012–13 included:

- A study exploring tourism opportunities and activities was undertaken; this included an on-ground assessment with Miriuwung Gajerrong rangers and meeting 'dawang' representatives and representatives from the Mirima Language Centre and Waringarri Aboriginal Arts.
- Four Yoorrooyang Dawang Regional Park Council meetings were held to oversee the management of the new conservation parks.
- The Miriuwung Gajerrong Corporation approved the draft management plan for the six new conservation areas.
- Progress was made on a formal joint management agreement between DEC and the Miriuwung Gajerrong people.
- A new boardwalk was installed for the Walking with Plants trail in Mirima National Park. New interpretive signs with a strong focus on Miriuwung language and culture were also installed in the park.
- Boundary signs were erected for five of the new Miriuwung Gajerrong conservation parks, and direction signs have been delivered for four day-use sites in Ngamoowalem Conservation Park.
- Site development concept plans prepared for three new day-use sites were endorsed by the Yoorrooyang Dawang Regional Park Council.
- Visitor risk signage was installed at popular sites in the new Miriuwung Gajerrong conservation parks.
- Work on upgrading 30 kilometres of access tracks to recreational sites on the Ord River in Parry Lagoons Nature Reserve was completed.
- A 17-kilometre boundary fence was erected to protect high-value crocodile breeding habitat in the Ord River Nature Reserve.
- Weed management plans were prepared and implemented in the Miriuwung Gajerrong conservation parks. Extensive control work was carried out on Weeds of National Significance including belly ache bush and *Mimosa pigra*.
- The *Indigenous Ecological Knowledge Project* funded under the federal government's *Caring for our Country* program was completed. The purpose of this project was to identify and record ecological knowledge from senior Miriuwung and Gajerrong people that could be used to improve the management of both the cultural and natural value of conservation estate on Miriuwung and Gajerrong country.

Yawuru

An Aboriginal land use agreement was signed on 25 February 2010 with Yawuru Native Title holders over 5,297 square kilometres of land in, and around, Broome. This agreement enabled the creation of terrestrial and marine conservation reserves to be jointly managed by the Yawuru people, DEC and, within the Broome town site, the Shire of Broome. These areas included a coastal park covering the intertidal area, terrestrial reserves around Broome and its north, and a marine park from Gantheaume Point to Cape Villaret.



Achievements for 2012–13 included:

- The Yawuru Agreements for the joint management of new Yawuru conservation estate were implemented.
- The Yawuru Park Council (Yawuru, DEC, Shire of Broome) continued to oversee the development and implementation of management plans for new Yawuru conservation estate.
- Three of four management plans for new Yawuru conservation estate progressed to near final draft stage with recreation master planning completed.
- Four trainee Yawuru Rangers in the Yawuru joint management team (comprising nine staff members, of whom seven are Yawuru) were trained and employed. Training for Conservation and Land Management studies included cultural components such as formal language lessons and informal training opportunities with senior Yawuru people.
- In 2013, a Yawuru trainee completing his Certificate III received the *Aboriginal Trainee of the Year Award*.
- The first Yawuru Conservation Park sign was installed.
- On-ground activities, such as maintenance of site infrastructure, development of walk trails, access management, weed control and patrols, continued.
- A school holiday program and community events continued to focus on marine and terrestrial reserves within Yawuru conservation estate.
- Research and monitoring was carried out at Roebuck Bay, a Ramsar site, including monthly benthos sampling for invertebrates, bird monitoring and stormwater sampling for excess nutrient flow.

Bunuba Rangers

Funded under the *Kimberley Science and Conservation Strategy*, the *Bunuba Ranger Program* continued to grow. The rangers began their Certificates II and III in Conservation and Land Management and continued to undertake conservation work in the West Kimberley parks, including weed and feral animal control and prescribed burning.

Burru (Murujuga)

In January 2013 the Murujuga National Park was created. The Murujuga National Park is held in freehold by the Murujuga Aboriginal Corporation, leased to the state and jointly managed as a national park. The Murujuga Park Council, the joint management body, comprises representatives from the Murujuga Aboriginal Corporation, the department and the Minister for Aboriginal Affairs. Work continues with the Murujuga Aboriginal Corporation and the Murujuga Ranger team, who undertake on-ground land management activities.

Regional activities

Goldfields Region

- The joint management project with the Wiluna Native Title claimants and the local community continued at Lorna Glen and included fence maintenance, erosion control, road maintenance and fire management.
- Joint management activities with the Spinifex Aboriginal community in the Great Victoria Desert included the installation of a new shed tank, repairs and maintenance to an existing tank, weed control and fire management.
- Three meetings were held with the Tjuntjuntjara community to further progress joint management. One of the meetings included a demonstration by the Goldfields Specialty Timber Group in basic woodworking and wood turning skills.
- The three local Aboriginal trainees, who received training under the MATES program as part of a three-year joint management project with Cliffs Asia Pacific Iron Ore Pty Ltd, achieved their Certificate III in Conservation and Land Management. Two have continued to work for DEC on contract, while the third has a permanent position with Cliffs.
- The land management position and project officer within the Goldfields Land and Sea Council, funded through the Great Western Woodlands, has facilitated consultation, monitoring and clearance work, relating to fire management with the various Aboriginal groups in the Goldfields.
- Campground hosts contributed more than 1,300 volunteer hours at Lorna Glen, about 1,500 hours at Credo, more than 2,000 hours at Lake Mason and about 1,300 hours at Goongarrie former pastoral stations.
- A new day-use area was established at Rowles Lagoon, including a long vehicle parking bay, road improvements and six new picnic sites.
- The recreation master plan for the Credo and Goongarrie complex was formally approved and implementation continued. Work included ongoing maintenance and improvements to the homestead and shearers' quarters.
- The multi-use centre at Credo was completed. It includes a main hall, showers, toilets (one wheelchair accessible) and a laundry room, and has been used on several occasions by CSIRO conducting research in the Great Western Woodlands.
- The bathroom in the caretaker's house at Lorna Glen was renovated.
- The garbage tip area at Lake Mason was consolidated and tidied up.
- The access roads to Goongarrie station and Cave Hill recreation site were upgraded.
- Interpretive signage has been designed for the Earraheedy former pastoral station.
- A formal annual inspection was undertaken at all recreation sites to assess visitor risks and quarterly and annual reviews were carried out to monitor progress on actions taken to mitigate hazards.

Kimberley Region

- Engagement and negotiations continued with Native Title and other Aboriginal groups to facilitate the implementation of the *Kimberley Science and Conservation Strategy*.
- Geikie Gorge National Park hosted the Bunuba Native Title Determination ceremony when the Federal Court held a bush sitting in December 2012 for the reading of the determination.
- Construction of new walk trails in Purnululu National Park started with funding from the federal government's *Caring for our Country* program. Fee-for-service work was undertaken by the Kija and Djaru people.



- Different fire management techniques were trialled to identify the most appropriate regime to protect the outstanding universal values of Purnululu National Park. This was undertaken with *Caring for our Country* funding.
- Additional ranger accommodation was constructed at Purnululu National Park.
- The Spring Creek Track access into Purnululu National Park was improved with funding provided under *Royalties for Regions*.
- During the 2012–13 wet season, three months of weed management was undertaken at Mitchell River National Park.
- During 2012, more than 30,000 visitors were recorded at Windjana Gorge National Park. This is only the second time this milestone has been reached. The last time was in 2005.
- Ron Shimmon retired after 38 years as a mobile ranger, migrating with the seasons, spending summers working in national parks in the state's south-west and winters in the Kimberley. The last of the mobile rangers, Ron ended his career in September 2012 with a final stint at Windjana Gorge National Park.
- Australian National University (ANU) researcher Sue O'Connor led a team of archaeologists conducting a two-month dig at Carpenters Gap in Windjana Gorge National Park. They were assisted by Bunuba Rangers and ANU students. The site has been recognised as one of the oldest pre-European habitation sites in Australia. Professor O'Conner first undertook research at the site 20 years ago.

Midwest Region

- Operations continued to be refined at the Pinnacles Desert Discovery in Nambung National Park and Monkey Mia Visitor Centre in the Shark Bay World Heritage area, with the focus on improving efficiency.
- In Nambung National Park, the road and visitor infrastructure works at Hangover Bay were completed and the day-use site, was opened by the Minister for Environment. The facilities will cater for an increase in visitation associated with the completion of Indian Ocean Drive.
- The Pinnacles Lookout was refurbished and worn and degraded pine decking was replaced with recycled wood-composite decking materials.
- In Moora District, an increase in the numbers of visitors, illegal camping and the use of unlicensed off-road vehicles, particularly in the vicinity of the shack communities of Wedge and Grey, required significant management in coastal reserve areas. DEC staff attended meetings with the Wedge and Grey community associations and other key stakeholders to discuss a range of management issues.
- A series of studies are being undertaken to identify the potential for Wedge and Grey to provide the public with low-impact, nature-based, affordable visitor facilities and accommodation, including caravan and camping facilities. The option of shacks being retained at a level that contributes to opportunities for public use.
- Waste management at Wedge and Grey was improved through the establishment of waste transfer stations with skip bins for the weekly removal of putrescibles and separation of scrap metal and bulk waste materials. The disused rubbish tip at Wedge was fenced off and rehabilitated.
- Work completed under the *Caring for our Country* funded *Shark Bay World Heritage Area Communication Strategy* included designing visitor interpretation for Shell Beach Conservation Park and Monkey Mia Reserve and publishing the *Shark Bay Watch*, a quarterly newsletter about DEC activities in the district.
- A community engagement strategy for the Dirk Hartog Island National Park ecological restoration project *Return to 1616* was prepared and key actions implemented including the launch of the *Return to 1616* web page on sharkbay.org.au.
- Regional staff coordinated the preparation of a concept plan for a proposed operations base on Dirk Hartog Island National Park.

- Regional staff assisted with the assessment of expressions of interest and proposal requests for a proposed *Naturebank* site in François Péron National Park.
- Under the *Royalties for Regions*-funded infrastructure and roads initiative at Kalbarri National Park, work started on sealing 12 kilometres of the 32 kilometre Loop-Z Bend Road and a tender was awarded for the construction of new visitor facilities at the Loop and West Loop.
- A visitor risk management training course for regional staff was held at Shark Bay.
- DEC participated in the Midwest and Gascoyne regional planning committees convened by the Western Australian Planning Commission (WAPC) to prepare 20-year regional planning and infrastructure frameworks and sub-regional plans.

Pilbara Region

- Murujuga National Park was created, and the formal joint management agreement enacted.
- DEC continued to take an active role in joint management and Aboriginal issues in the Pilbara region.
- Displays were presented at various regional festivals including the FeNaCING, Whale Shark and Nameless-Jarndunmunha festivals. Free entry days to Cape Range National Park were held in conjunction with Exmouth's Whale Shark Festival.
- Information about various parks and reserves in the Pilbara Region continued to be gathered and prepared for publication on *EveryTrail*.
- DEC social media avenues were explored and used to promote parks and visitor services and broader issues and outcomes to the wider community.
- Brochures, maps, signs and interpretive products for a number of Pilbara parks were reviewed and updated.
- A range of compliance and enforcement activities involving other agencies were undertaken across DEC-managed lands and waters. Agencies included the Department of Fisheries, WA Police and Customs and Border Protection.
- Road maintenance was undertaken in a number of reserves.
- Support continued for campground host and volunteer programs across the Pilbara Region, including volunteer conservation work in Millstream Chichester National Park, and a track adoption agreement with Karratha's Red Dog 4WD Club to improve tracks in Karijini National Park.
- Support for events and activities on DEC-managed lands and waters continued, with Millstream Chichester National Park hosting a triathlon in October 2012, and components of the inaugural Red Dog Festival in June 2013.
- A Parks and Visitor Services business plan was finalised for the Pilbara Region parks to identify priorities and guide capital works for the next five years.
- Hamersley Gorge car park, road and lookout works were completed, with a combination of DEC capital funds, *Royalties for Regions* and support from Rio Tinto.
- Park passes were produced for the Fortescue Metals Group (FMG) Solomon Project based near Karijini National Park to improve compliance with entry fee payments and the FMG workforces' general awareness and appreciation of natural areas.
- Two new houses and a mobile ranger pad were constructed at Karijini National Park staff headquarters. Work was completed on water and electrical infrastructure improving water quality and providing more reliable power to resident park staff, their families, and visiting staff and volunteers.
- Planning for a new office and two new staff houses at Millstream Chichester National Park continued, with regional and Perth-based staff involved in site planning and tender processes.



- Staff continued to take an active part discussions and planning for the proposed Nyiminjarra Road in Karlamilyi National Park that will provide direct road access between the two Martu communities living in the park.
- Recreational shacks in the Dampier Archipelago continued to be improved or replaced, as part of an overall plan to improve structural integrity, wastewater management, and site presentation. The Shire of Roebourne is assisting in improving the waste treatment systems.
- In Cape Range National Park, Kurrajong campground improvements were completed, including the refurbishment of existing camp sites and addition of several new public camping sites, as well as a purpose-built camping area for large groups.
- The *Naturebank* proposal for Millstream Chichester National Park was progressed, with traditional owners from Ngarluma and Yindjibarndi endorsing two favoured areas. The sites were mapped paving the way for cultural heritage and biological surveys to be undertaken.
- Management of and liaison with commercial tour operators continued. The licence conditions for tour operators in Ningaloo Marine Park were reviewed and modified and whale shark tour operations continued to be monitored using electronic logbook returns via satellite tracking.
- Programmed capital asset maintenance was carried out across all parks and progress was made on a range of capital works in Cape Range, Millstream Chichester and Karijini national parks.
- Solid progress was made on re-establishment of Millstream Chichester, Karijini and Karlamilyi national park councils. Regular discussions continued with the Yindjibarndi Aboriginal Corporation regarding joint management of Millstream Chichester National Park and a new memorandum of understanding was signed by DEC and the Yindjibarndi Aboriginal Corporation.
- Staff continued to be involved with certain resource sector offset projects, which seek to manage the impacts of workforce recreation associated with resource projects in locations such as Onslow, Karratha and Karijini National Park.
- Refurbishment of the Milyering Visitor Centre in Cape Range National Park continued with the combining of the retail shop and information sections into the one area.
- Kayak and snorkel trails were introduced in Ningaloo Marine Park near popular camping and access areas in Cape Range National Park.
- Regional staff attended customary activities and joint management workshops to improve understanding and enable implementation of new legislation and policy aimed at protecting and conserving the value of the land to the culture and heritage of Aboriginal people.
- Staff in the region continued to be actively involved with the management and oversight of commercial lease areas such as Sal Salis in Cape Range National Park and Karijini Eco Retreat in Karijini National Park.
- Numerous commercial filming and photography permits were issued for DEC-managed lands and waters.
- Staff issued numerous permits for a range of activities including abseiling, landing of helicopters and remote walking.
- The DEC campground booking system was used for several camping areas in Cape Range National Park. Improvements continued to be made to the system, paving the way for the inclusion of other key parks such as Karijini National Park.
- DEC's visitor risk management system was implemented across the region. This included undertaking annual inspections and assessments of formal recreation areas, updating regional databases and taking action to mitigate risk. Staff continued to respond to incidents involving visitors on DEC-managed lands and waters.

South Coast Region

- Work continued to progress on the \$40 million *Fitzgerald River National Park Improvement Project* with all road construction work being completed, including 43 kilometres of sealed roads, several car parks and 26 kilometres of upgraded gravel roads. Progress was made on the construction of two coastal walk trails in the

park, Mamang Trail between Point Ann and Fitzgerald Inlet in the western part of the park, and Hakea Trail from Cave Point to Quoin Head in the eastern part of the park. Much of the work on the Mamang Trail was completed. Construction started on Hakea Trail.

- A new concept design was drafted for The Gap lookout structure in Torndirrup National Park. Existing structures were reinforced to comply with Australian standards as part of the \$1.8 million *Royalties for Regions* project.
- Further rehabilitation and stabilisation of old tracks was completed at West Cape Howe National Park.
- The Gordon Inlet and Doubtful Island roads in the Fitzgerald River National Park were reformed to improve drainage and mitigate dieback risk, with gravel caps installed in boggy areas.
- The *Esperance and Recherche parks and reserves draft management plan 2012* was released for public comment in November 2012.
- A recreation redevelopment project was completed at Peak Charles National Park that included the provision of separate day and overnight facilities and the installation of new toilets, visitor interpretation and a day-use shelter.
- Fencing and signage was installed at caves on the Nullarbor that were due to be transferred to DEC control in 2015. Visitor risk management issues were considered at other DEC-managed caves on the Nullarbor.
- Work continued on the concept development plan for Lucky Bay in Cape Le Grand National Park to improve the visitor facilities at the popular campground.
- Twelve kilometres of Lucky Bay Road was resealed.
- Progress was made on developing and promoting New Island Bay at Cape Le Grand National Park as a potential *Naturebank* ecotourism development site.
- Engagement with traditional owners continued with successful discussions held with the Ngadju people on a range of matters including fire management in Peak Charles National Park.
- Visitor numbers continued to increase in all the major national parks in the South Coast Region with increased visitation during off-peak periods
- Visitor risk management assessments were undertaken at all recreation sites and action was taken to mitigate risk.

South West Region

- In Wellington National Park, installation of interpretation signs along the River's Edge Path at Honeymoon Pool continued with funding and support from the *Collie Noongar Interpretive Trails* project run by the Ngalang Boodja Aboriginal Corporation. Widening and sealing of 1.1 kilometres of Falcon Road was completed and one kilometre of River Road was resurfaced with gravel.
- The Stirling Dam picnic area near Harvey was reopened after being closed for several years while the dam's spillway was upgraded. The new facilities include universal access, gas barbecues, toilets, picnic tables and interpretation.
- After being extensively damaged by a bushfire in 2009, work started on the rebuilding of the Wrights Bridge campground on the Blackwood River, with the removal of hazardous trees, realignment of roads, new park furniture and toilet facilities, and information/interpretation signs.
- In partnership with the Shire of Augusta-Margaret River, the remaining 470 metres of Lefthanders Road was sealed. While the road is on unallocated Crown land it is destined for inclusion in the Leeuwin-Naturaliste National Park. The newly sealed road provides safer and easier access to the popular beaches and surf breaks south of Gracetown.
- Working partnerships continued with the Mitsubishi Four-wheel Drive Club at Leschenault Peninsula Conservation Park and various mountain biking groups as part of the planning process for the State Mountain Bike Strategy and the development of the South West Master Plan.



- In Margaret River, a number of mountain bike trails were developed in partnership with the Margaret River Off Road Cycling Association and preparation started on an area development plan for mountain biking in parts of Bramley National Park.
- In collaboration with the Crooked Brook Community Group, planning for a “nature playground” and a new toilet block were completed.
- At Leschenault Peninsula, 12 hectares of dune rehabilitation was completed with support from Coastwest and Leschenault Catchment Council, work included brushing, 500 metres of fencing erected, 3,500 seedlings planted and 23 signs installed.
- In Leeuwin-Naturaliste National Park, local Aboriginal groups, the South West College and the Department of Corrective Services worked with DEC to protect an ancient Aboriginal burial site in the dunes from disturbance and erosion.
- *EcoEducation* programs continued to be delivered at Wellington Discovery Forest and Margaret River Eco Discovery Centre. Sustainable forestry excursions were also conducted at the Dwellingup Forest Heritage Centre and a number of incursions were conducted in schools. A total of 2,213 students participated in 109 *EcoEducation* excursions and incursions.
- The *Monitoring Marsupials* program, which contributes to *Western Shield* research, was again popular with most available trapping nights being booked by schools. A chuditch was trapped for the first time in this program.
- A range of promotional events were attended with displays set up and activities organised to promote DEC and the *EcoEducation* and *Western Shield* programs. These included a Sustainable Forestry professional learning day for the Geography Teachers Association of WA, attendance with South West Catchment Council at several ‘beach to bush’ days, a stall at the South West Science Spectacular and a popular and well-received display at the Balingup Small Farm Field Day.
- Fifty-one rock fishing anchors and 35 abseiling anchors in Leeuwin-Naturaliste and Wellington national parks were load tested to ensure ongoing suitability for use.
- In Leeuwin-Naturaliste National Park, a consultant geologist was engaged to inspect cliff sites at Huzzas, Hamelin Bay, and Wilyabrup Cliffs.
- Tree pruning was carried out at several recreation sites to minimise the risk to visitors from falling branches. Sites included: Honeymoon Pool, Potters Gorge, Chapman Pool, Contos, Boranup and Point Road campgrounds; Hoffman Mill, Leschenault Peninsula, Sues Bridge, Wellington Discovery Forest, Lake Brockman Tourist Park, Crooked Brook Forest, and trails and abseil sites near Giants, Calgardup and W116 caves.
- Visitor risk management assessments were undertaken at all recreation sites and action was taken to mitigate risk.

Swan Region

- In partnership with the WA Mountain Bike Association and the broader mountain bike community, mountain bike trails were developed in the Mt Gungin area. Perth Hills District supported the upgrade and maintenance of the Kalamunda Circuit trail. Work continued at the Langford Park Mountain Bike Circuit with trail signage being installed.
- At Lane Poole Reserve, the Baden Powell caravan and camping site redevelopment was completed with *Royalties for Regions* funding. The new facilities include a sealed access road, camp kitchens, camp sites for tents, camper trailers, small caravans and groups.
- Redevelopment of the Nanga Mill caravan and camping site started with *Royalties for Regions* funding.
- Redevelopment works started at Martins Tank campground at Yalgorup National Park.
- The Pinjar motorcycle area was further developed with signs, resurfacing works, car parks and paths.
- At the Metro Road off-road vehicle area, interim trail works and demonstration trails were developed.

- Partnership work was undertaken with Motorcycling WA, the WAPC and the City of Swan to develop a Junior Training and Education Motorcycling Centre at Gidgegannup.
- The *Swan Region Caravan and Camping (2012) Strategy* was updated and an investment plan was prepared.
- Significant work was undertaken on the *Swan Region Business Plan (2012)* including the listing of capital works infrastructure needing to be replaced or upgraded.
- DEC commissioned a consultant to work with park stakeholders to report on tourism and marketing opportunities for Yanchep National Park. The report identified a number of commercial opportunities and several other park innovations.
- The adoption of new technology continued with the development of *EveryTrail* guides and the use of quick response (QR) codes. The region is experimenting with the use of QR codes linking to videos as part of the visitor interpretation toolbox.
- Infrastructure maintenance was carried out on the Bibbulmun Track and Munda Bididi Trail.
- Partnership work continued with a range of stakeholder organisations including: Peel Development Commission, City of Wanneroo, City of Swan, WAPC, Outdoors WA, the WA Four-wheel Drive Association, Track Care, WA Mountain Bike Association, the Recreational Trail Bike Riders Association of WA, Canoeing WA and Motorcycling WA.
- All recreation sites were inspected to assess visitor risks. This included quarterly and annual reviews to monitor the progress of action being taken to mitigate risk, resulting in the closure of the main railway bridge in John Forrest National Park.
- A viewing deck was constructed and opened at Alfred Cove in the Swan Estuary Marine Park. Interpretive signs were updated and installed in the Swan Estuary Marine Park at Milyu, Alfred Cove and Pelican Point.

Regional parks

- In Yellagonga Regional Park, paths were upgraded to improve drainage and visitor access and conservation and stabilisation works were completed at Perry's Cottage and Stables in Perry's Paddock.
- Improvements along Nyerberup Circle, the entrance road to John Graham Reserve at Woodman Point Regional Park, included landscaping and the installation of rail crossings and fencing.
- Liaison continued with the Friends of Woodman Point Recreation Camp Inc. regarding a survey of heritage structures in Woodman Point Regional Park and the preparation of a heritage management plan.
- An asbestos structure impacted by severe coastal erosion was removed from a lease site in Rockingham Lakes Regional Park.
- The Regional Parks Unit continued to administer eight community advisory committees for regional parks, the committees met on 35 occasions during 2012–13. The unit also assisted with the administration of the Minister for Environment's *Environmental Community Grants* program.
- DEC continued to work with the City of Bunbury, Department of Planning and the WAPC regarding interim management arrangements for the proposed Preston River to Ocean Regional Park in Bunbury.
- Advice continued to be provided on land-use planning and development proposals affecting regional parks. Major projects included the proposed Roe Highway extension (Beeliar Regional Park), the proposed Keane Road strategic link (Jandakot Regional Park), and the proposed Mangles Bay tourist precinct (Rockingham Lakes Regional Park).
- DEC continued to manage Araluen Botanic Park, with the Araluen Park Foundation contracted to deliver park management and visitor and ancillary services.
- Prescribed burning was completed in the pine seed orchard following the removal of dead pines in Yellagonga Regional Park.
- Work continued on the rehabilitation of land in Beeliar Regional Park and community-based conservation programs associated with the Fiona Stanley Hospital and Health Precinct.



- The water supplementation program continued at Thomsons Lake Nature Reserve in Beeliar Regional Park. The program is being undertaken in conjunction with the Water Corporation to maintain water levels and improve waterbird habitat.
- DEC continued to liaise with the Water Corporation regarding environmental restoration works associated with the installation of the Gnangara branch sewer in Yellagonga Regional Park.
- The 2010–15 midge management partnership for Yellagonga Regional Park continued with the Cities of Joondalup and Wanneroo.
- The removal of introduced animals continued as part of conservation works in the regional parks.
- Numerous weed control and revegetation projects were undertaken at various sites, including:
 - North Lake, Thomsons Lake Nature Reserve, the Spectacles wetlands and Mount Brown in Beeliar Regional Park
 - Greenfield Street and Masons Landing in Canning River Regional Park
 - Glendalough South in Herdsman Lake Regional Park
 - Paganoni Swamp, Lake Coo loongup, Lake Wal yungup and Cape Peron in Rockingham Lakes Regional Park
 - John Graham Reserve in Woodman Point Regional Park
 - Luisini Winery (in conjunction with the National Trust) in Yellagonga Regional Park.

Warren Region

- The completion of the Wilderness View boardwalk and lookout structure at Mount Frankland marked the end of the final phase of the Walpole Wilderness Discovery Centre project that included the creation of the art loop at Swarbrick and construction of an outdoor classroom at the Valley of the Giants.
- The Munda Biddi Trail and camp sites were completed in the southern section between Manjimup and Denmark.
- The car park and finger jetty were completed at Coalmine Beach boat ramp in Walpole and Nornalup Inlets Marine Park. This project was jointly funded by DEC and the *Department of Transport Recreational Boating Facilities Scheme* grants.
- A draft master plan for the Walpole town jetty precinct was prepared. This is collaborative project with the Shire of Manjimup and will address safety and user conflict issues and generally improve visitor infrastructure associated with the marine park.
- In D'Entrecasteaux National Park, the refurbishment of the camping and day-use facilities at Lake Jasper was completed, and the construction of 30 new camping sites, entry station and associated roads at Black Point was completed.
- Boardwalks were replaced at Mt Chudalup in D'Entrecasteaux National Park after they were burnt in the Babbington fire in 2012.
- Planning and design was undertaken for the upgrade of Madfish Bay Road in William Bay National Park.
- Maintenance grading was completed on about 400 kilometres of recreation site access roads.
- Trail infrastructure maintenance work was carried out on the Bibbulmun Track sections in the Frankland and Donnelly districts. Work included the installation of and repairs to steps, small bridges, huts and toilets.
- DEC staff prepared and presented more than 70 themed activities including school holiday programs, NAIDOC Week and Keep Australia Beautiful activities and specific school and conference presentations on request.
- Valley of the Giants staff conducted site interpretive tours, three times a day for 364 days during 2012–13, and hosted more than 200 visiting media and trade visitors at the Tree Top Walk.

- More than 30 interpretive projects were completed, including site interpretive and management signage, park notes, publication reviews, and displays for community events.
- Coastal car park stabilisation work was undertaken at three sites in the Walpole-Nornalup National Park.
- The William Bay National Park master plan was completed by DEC and endorsed by the Denmark Shire Council which has responsibility for some road infrastructure in the park.
- More than 10 facilitated site visits and presentations were made to Aboriginal working groups.
- The management of horse riding and the provision of trails were reviewed in conjunction with the shires of Manjimup, Bridgetown-Greenbushes and Denmark.

Wheatbelt Region

- Barna Mia nocturnal tours continued to give visitors to Dryandra Woodland a special wildlife encounter experience. During the year a second viewing enclosure was completed so additional tours could be held to cater for the increase in interest. The new enclosure will allow more people to see the animals and comply with animal welfare requirements.
- The Toyota Land Cruiser Club of WA continued to assist with volunteer maintenance work at Emu Rocks on the Holland Track. A special project to protect important environmental assets at Emu Rocks started this year with the help of the club.
- Redevelopment continued in Kokerbin Nature Reserve with the completion of the new ablution block. The Shire of Bruce Rock continued work on the project to relocate camping from Kokerbin to Kwolyin town site with DEC providing advice when required. The existing camp site at Kokerbin will be turned into a day-use area which will alleviate degradation issues in the nature reserve resulting from overuse.
- Following on from the work completed in 2011–12 at Gathercole Nature Reserve in collaboration with the Wongan Hills community and the Shire of Wongan–Ballidu, an opening ceremony was held at the reserve with 50 attendees.
- In Wongan Hills Nature Reserve, the Wongan Hills bushcare group continued to assist DEC with maintenance on the Mount Matilda walk trail.
- Consultation continued with the Hyden-Kondinin communities to develop a plan for recreational facilities and access at Lake Cronin Nature Reserve. Infrastructure was installed after an Aboriginal heritage survey was completed.
- A 10-year strategic capital works plan was completed.
- Work started on a new campground in Dryandra woodland to accommodate increasing demand by campers.
- Visitor risk assessments for all parks and recreation sites were completed.



DEC Pollution Response Unit officer Robert Beaglehole using a multi-gas detector to determine the extent of environmental contamination after a fuel tanker crash near Katanning.

Environmental Regulation

Environmental Regulation

Regulatory powers are used to manage and protect the environment and minimise risks to public health, particularly in areas where human activities have the potential to pollute or otherwise impact on the quality of air, land or water. Under the provisions of Part V of the EP Act, works approval applications for new industries are assessed, licences are issued to industries to restrict emissions, incidents of non-compliance or pollution are responded to, and enforcement action is taken when required. The transport of controlled waste is also regulated to minimise the potential for pollution or environmental harm. The management of contaminated sites is enabled by the *Contaminated Sites Act 2003*. In addition, ambient air quality is monitored and air quality management plans are developed for priority airsheds to provide long term protection of public health and the environment. Support in managing environmental noise, litter, illegal dumping and minor pollution issues is provided to local government.

To ensure consistent, efficient and legally sound delivery of industry regulation work and project approvals, operations are undertaken within a policy framework and management system that also ensure that approvals are processed within target timeframes. A major review of its industry regulation services and has introduced a sweeping reform project, Re-Engineering For Industry Regulation and Environment (REFIRE).

Air quality program

Perth Air Quality Management Plan

The *Perth Air Quality Management Plan* (Perth AQMP) is a 30-year government initiative started in 2000. The plan aims to steadily improve Perth's air quality by reducing the emission of air pollutants. During 2012–13, DEC continued to focus on strategies to address vehicle emissions and haze from domestic wood heaters, as well on air quality investigations and environmental regulation.

During the reporting period DEC continued to provide support to the Air Quality Coordinating Committee, which is responsible for overseeing the implementation of the Perth AQMP. Through the committee, work started on redrafting the Perth AQMP and lead agencies are preparing a draft for public comment in 2014. The 2012 Air Quality Forum report was released. The Air Quality Coordinating Committee also provides comment on matters relating to air quality management, this included comment on the draft *State Planning Strategy* released by the WAPC.

Vehicle emissions

The *CleanRun* program targets motor vehicle emissions and aims to develop and implement a range of initiatives to reduce the impact of motor vehicle emissions in line with the objectives of the Perth AQMP and the National Environment Protection (Diesel Vehicle Emissions) Measure. *CleanRun* continued to focus on vehicle emissions reduction and driver behaviour. The Remote Sensing Device was used to conduct on-road vehicle testing to obtain a comprehensive real-world dataset of vehicle fleet emissions and identify vehicle fleet characterisation over time. Vehicle emissions data from about 42,000 vehicles have been analysed and a report is being prepared for publication.

CleanRun EcoDrive continued to support organisations with diesel truck fleets. The program assists fleet operators save on fuel cost while reducing air emissions and creating a healthier, less stressful driving experience for their workforce. In 2012–13, *CleanRun* EcoDrive resources were presented at workshop and industry events. For many organisations using the program, *CleanRun* EcoDrive has helped improve environmental and business performance. The department is working with organisations using the program to develop case studies to document improvements. *CleanRun* EcoDrive is suitable for both industry and government fleets and provides

resources to develop an EcoDrive training program in-house with driver training materials developed by experts in the transport industry.

More information and the free resources are available on the DER website:
www.der.wa.gov.au

Haze from domestic wood heaters

The *BurnWise* program (formerly known as the *Halt the Haze*), is an initiative of the Perth AQMP. DEC developed the *BurnWise* program to educate wood heater users about the correct operation of their heaters and provide support and tools to local government environmental health officers who are responsible for responding to domestic smoke nuisance complaints. A suite of new materials for the *BurnWise* program was the final stage of development and included a wood smoke management guide and a wood heater demonstration trailer.

Under the Environmental Protection (Domestic Solid Fuel Burning Appliances and Firewood Supply) Regulations 1998, DEC investigated complaints about and undertook audits of wood heater retailers and wood yards. Under the Regulations, wood with an internal moisture content greater than 20 per cent is not permitted to be sold as high moisture content wood creates excessive smoke.

The Air Quality Management Branch also provided advice on request to members of the community.

Background air quality study—Midland

The measurement phase of the *Midland Background Air Quality Study* was completed following the deployment of a Fourier transform infrared spectrometer, to monitor hydrogen fluoride and hydrogen chloride gases over shorter periods in the Midland area, and the processing and validation of the data.

Background air quality study—Kwinana

Phase IV of the study started and a Fourier transform infrared spectrometer is being used to investigate levels of ammonia and volatile organic compounds for 12 months at various locations in the Kwinana area. The program has been expanded to include concurrent canister sampling to improve the robustness of the measurement program.



Fourier transform infrared monitoring equipment using a lightbeam, it can detect ammonia and organic compounds along an open path of between 60 and 100 metres.

Regional air quality investigations

DEC continued to investigate ambient air quality issues in regional areas, including Port Hedland, Goldfields, Collie and the Burrup Peninsula as part of its commitment to manage environmental impacts in key regional centres of WA. In Port Hedland, active engagement in managing air quality issues resulting from high particulate concentrations continued through environmental assessments, licence conditions and by supporting the implementation of the *Port Hedland Air Quality and Noise Management Plan* (March 2010).

DEC continued to support and work collaboratively with the CRC for Contamination Assessment and Remediation of the Environment to engineer and trial the novel application of Light Detection and Ranging (LIDAR) technology. During 2012–13, LIDAR technology was deployed in Port Hedland for three weeks. DEC continued to chair the Port Hedland Health Studies Subcommittee of the Port Hedland Dust Taskforce, a group established to undertake a health risk assessment of the particulate emissions in the Port Hedland area. Industry emissions in the Goldfields and Collie regions continued to be a focus with management of these emissions effected through works approvals and licences.

Fixed ambient air quality monitoring network

An ambient air monitoring network is operated throughout the Perth metropolitan region. Fixed ambient air monitoring stations are also located in selected regional centres. The operation of the monitoring network and the results measured against National Environment Protection (Ambient Air Quality) Measure standards are used to produce annual 'efficiency' and 'effectiveness' indicators.


Monitoring stations

During 2012–13, DEC maintained and operated eight metropolitan and five regional air quality monitoring stations in WA. The location and period of operation of these sites are listed below.

Table 25: Summary of monitoring stations

	Parameters measured	Period of operation
Albany	PM ₁₀ & Met	July 2012 to June 2013
Bunbury	PM ₁₀ , PM _{2.5} & Met	July 2012 to June 2013
Busseton	PM _{2.5} & Met	July 2012 to June 2013
Caversham	CO, NO, NO ₂ , O ₃ , PM ₁₀ , PM _{2.5} & Met	July 2012 to June 2013
Collie	PM ₁₀ & Met	July 2012 to June 2013
Duncraig	CO, NO, NO ₂ , PM ₁₀ , PM _{2.5} & Met	July 2012 to June 2013
Geraldton	PM ₁₀ & Met	July 2012 to June 2013
Quinns Rocks	NO, NO ₂ , O ₃ , PM _{2.5} & Met	July 2012 to June 2013
Rockingham	NO, NO ₂ , O ₃ & SO ₂	July 2012 to June 2013
Rolling Green	NO, NO ₂ , O ₃ & Met	July 2012 to June 2013
South Lake	CO, NO, NO ₂ , O ₃ , PM ₁₀ , PM _{2.5} , SO ₂ & Met	July 2012 to June 2013
Swanbourne	NO, NO ₂ , O ₃ & Met	July 2012 to June 2013
Wattleup	SO ₂ & Met	July 2012 to June 2013

CO—carbon monoxide, NO—nitric oxide, NO₂—nitrogen dioxide, O₃—ozone, PM₁₀—particles measuring 10 micrometres or less, PM_{2.5}—particles measuring 2.5 micrometres or less, SO₂—sulfur dioxide, Met—meteorological parameters



The stations monitor a range of pollutants including carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide and particles as PM₁₀. Particles as PM_{2.5} are also monitored at selected sites as part of a nation-wide program.

The data gathered are used to report on ambient air quality through the annual *Western Australia Air Monitoring Report*, periodic *State of the Environment* reports and are updated regularly on the department's website, as detailed below.

A mobile monitoring station is also available to rapidly respond to air quality needs within the state.

Public access to air quality data

The air quality web page was maintained providing regular updates to ambient air quality data from all air quality monitoring stations operated by DEC. An air quality index has been developed and is accessible through DER's website. The index is updated regularly as data are retrieved from each monitoring station.

Annual reports summarising the previous year's data are provided to the National Environment Protection Council as part of WA's obligation to this group. The report also details WA's compliance with the National Environment Protection Measure (NEPM) and provides historical context to the year's data.

Air quality data continues to be provided to members of the public as and when requested. Data are provided free of charge to *bona fide* researchers, students and interested stakeholders. Consultants are also provided data; however, this is charged on a fee-for-service basis.

More information, about air quality, specific programs, monitoring and access to the air quality index, is available on the DER website: www.der.wa.gov.au

Noise regulation

DEC provided technical noise advice to the Office of the EPA and to planning and local government authorities, as well as policy, technical, enforcement and training support for DEC, WA Police and local government officers.

During 2012–13, DEC provided 83 reports on 59 projects in response to requests for environmental impact assessment.

Two noise regulation 17 approvals, allowing the emission of noise that exceeds or varies from the standard, were gazetted. One was the amendment to the existing approval for Western Power substations and one was the renewal of the approval for Wespine's Dardanup Sawmill. The regulation 17 approval gazetted in June 2012 for Alcoa's Wagerup alumina refinery has been under appeal. Significant progress was made in the assessment of two regulation 17 applications, for Rio Tinto Dampier Port and Western Power distribution transformers. Assessment started on two renewal regulation 17 applications received, for the Talison Lithium Greenbushes operation and Kalgoorlie Consolidated Gold Mines Fimiston Open Pit.

DEC had input into the activity of the Port Hedland Dust and Noise Taskforce, and work on the cumulative noise modelling started. Draft 15 of the Environmental Protection (Noise) Amendment Regulations 2013 was presented to Cabinet for approval.

More information about noise regulation is available on the DER website: www.der.wa.gov.au

Industry Regulation

Approvals processing

DEC continued to receive a high number of works approval and licence applications and a large number of open applications were carried over at the end of 2011–12. The number of new major resource project works approval applications received in 2012–13 (156) showed a continued high number compared with 2009–10 (84), following the trend set in 2010–11 (175). Despite this increase, DEC processed 88 per cent of major resource project works approvals within the 60-working day target timeframe, achieving an average of 47 working days for the 140 applications approved. DEC also processed 84 per cent of major resource project licence applications within the 60-working day target timeframe, achieving an average of 48 working days for the 38 applications. During the year, approximately 20 documents (including bulletins, policies and guidance documents) were updated or a new version published for internal use.

Regulation of prescribed premises

During 2012–13, 938 premises held licences under Part V of the EP Act. A total of 235 works approvals were issued in 2012–13, two more than the number issued in 2011–12. Seventy nine new licences were issued in 2012–13 compared with 72 in 2011–12. The sustained high number of works approvals is primarily related to increased activity in the resources sector in the Pilbara region. The number of new works approvals issued for the Pilbara region accounted for 35 per cent of the total works approvals issued by DEC in 2012–13.

Table 26: Prescribed premises

Region	New works approvals issued 2012–13	New licences issued 2012–13	Active licences 2012–13
Goldfields	34	11	94
Kimberley	13	3	34
Midwest	30	5	91
Pilbara	82	27	166
South Coast	8	6	58
South West	18	7	123
Swan	42	16	292
Wheatbelt	8	4	80
Total	235	79	938

DEC made significant progress on industry regulation licensing reform under the REFIRE program. This program is ensuring that the industry regulation function is effective, risk based and sector focussed. The re-engineered licensing system has greatly improved consistency, efficiency, quality and effectiveness. All new works approvals and licences are being issued using the REFIRE approach and a strategic licensing team is converting all existing licences into the REFIRE format. This will provide a platform for ongoing sector based improvement programs to further improve the regulation of prescribed premises. The reform process is continuing in accordance with the Industry Regulation Licensing Branch Strategic Plan. A copy of the REFIRE Fact Sheet and related REFIRE material is available from DER's website at www.der.wa.gov.au

Successes to date include the production and implementation of a much-improved consistent licensing system that includes templates for a generic licence, daughter (sector specific) licences, works approvals and decision documents. This system is supported by a series of newly developed products including a premises risk appraisal tool, policies, officer guides and industry guides. The development of improved application packages, further industry guides and consistent emission assessment frameworks is ongoing.

DEC also made significant improvements to its Industry Licensing System application. Major additional improvements to this system included a new workflow system for annual fees and specialised reporting that delivers a more consistent approvals process, improved business controls, capacity for auditing and reporting functions.

National Pollutant Inventory

DEC implemented the National Pollutant Inventory (NPI) program in WA on behalf of the federal government. In 2012–13, reports of substance emissions and transfers of substances in waste from 785 industrial facilities were submitted to the federal government for publication on the NPI website (www.npi.gov.au). Ninety three per cent of facilities in WA now use the online reporting system to submit their reports.

In 2012–13, DEC conducted 10 audits on companies submitting NPI reports. Facilities audited included brickworks, gold mines, landfills, quarries and oil and gas processing plants. Audits enable onsite assessment of emission values reported to the NPI and assist in developing an understanding of facility operations and possible issues associated with reporting.

Controlled waste

The review of the EP (Controlled Waste) Regulations 2004 made progress and work started on drafting the proposed amendments with Parliamentary Counsel's Office. Stakeholders were kept informed of the progress and associated operational reforms through the circulation of an information sheet.

Controlled waste licensing activity continued to increase in 2012–13 (Table 27). Elements of this growth can be associated with the effectiveness of the industry regulation controlled waste compliance program in identifying industry sectors that required licensing.

Table 27: Number of controlled waste licences issued

Licence type	2010–11	2011–12	2012–13
Carrier	338	337	381
Vehicle	503	547	607
Driver	927	1,009	1,142

The volume of controlled waste and number of movements increased in 2012–13 with electronic forms increasingly being used for the tracking of controlled waste instead of paper forms (Table 28).

Table 28: Number of controlled waste tracking forms

	2010–11	2011–12	2012–13
Paper	8,672	10,799	7,423
Electronic	70,039	81,332	86,858
Total	78,711	92,131	94,281

The total volume of controlled waste tracked during 2012–13 was 932,221 kilolitres (compared to 770,264 kilolitres in 2011–12), an increase of 21 per cent. The controlled waste transported comprised:

- 58 per cent biological waste
- 8.7 per cent alkalis
- 0.5 per cent acids
- 16.2 per cent waste oils
- 6.9 per cent low-strength waste waters
- 9.7 per cent other.

DEC released a new electronic driver training package targeting bulk controlled waste driver licence applications and renewals. This compact disc education and assessment tool replaced traditional paper training manuals and exams.

The Controlled Waste Tracking System's computer software continues to be upgraded with substantial work underway on a suite of usability enhancements to be rolled out in 2013–14.

More information on controlled waste is available on the DER website: www.der.wa.gov.au


Industry regulation compliance strategy

Proactive compliance management continued to be a significant part of the department's industry regulation business. Through a set of annual industry regulation compliance programs, compliance across a wide range of industries was targeted to promote best practice environmental management and consistent implementation and enforcement of environmental regulations across the state.

These compliance programs are risk based and target departmental resources at industries that present the most significant risk to the environment. During 2012–13, more than 700 proactive compliance inspections were undertaken across the state; targeting prescribed premises, controlled waste transportation, specific industrial activities. DEC worked with the Department of Fire and Emergency Services (DFES) and DMP through the Special Risk Inspection Program which is designed to reduce the risk of major environmental and hazardous materials accidents, fires and discharges to the environment.



A DEC environmental officer conducts an on-site inspection.



Under the 2012–13 programs DEC targeted compliance with statutory reporting submissions to ensure the timely submission of accurate information from industry in relation to their operations.

More information about industry regulation is available on the DER website: www.der.wa.gov.au

Environmental hazards management

Pollution emergency management

DEC's Pollution Response Unit (PRU) continued to provide statewide emergency response capabilities for pollution incidents and hazardous material incidents under the State Emergency Plan for hazardous materials. The PRU responded to more than 108 pollution incidents during the year and provided support to DEC regional offices as well as other agencies such as DFES, WA Police, local governments, WorkSafe and the Department of Health.

Significant achievements for 2012–13 included:

- providing emergency response air monitoring, environmental risk assessment and advice to DFES to protect public health and the environment at incidents including:
 - two major fires at scrap metal yards where evacuations had to be ordered to protect nearby residents from potentially hazardous smoke emissions
 - a hazardous materials fire at a Canning Vale resins factory where air monitoring detected emissions resulting in a major highway being closed and DFES issuing warning messages to residents to shelter in place. PRU worked with DFES to prevent approximately one million litres of contaminated fire-fighting waste water from entering an environmentally sensitive creek system. PRU tested the water on site and, in collaboration with the ChemCentre and the Water Corporation, was able to determine that it would be safe and environmentally acceptable for the waste water to be discharged into the sewerage system
- emergency response to chlorine leaks at two public swimming pool facilities that included monitoring the air and water to determine when it was safe to re-open the facilities and surrounding streets
- attending numerous incidents where DFES was concerned about potentially toxic emissions affecting the community, these included fuel, oil and chemical spills, gas leaks, boat fires, illegal dumping of chemicals, fuel tanker road crashes, clandestine drug laboratory contamination and several large industrial fires
- responding to a fuel tanker rollover near Katanning where thousands of litres of spilt fuel was threatening a nearby creek
- carrying out 69 risk-based inspections targeting suspected environmental hazards (for more details see page 119)
- reviewing and updating all of the PRU's incident response procedures to improve objectivity in decision-making during environmental emergencies.

DEC coordinated a task group under the State Evacuation Working Group that developed a draft Hazardous Materials Emergency Evacuation Guideline that is being considered by state emergency committees.

More information on pollution incidents and pollution response is available on the DER website: www.der.wa.gov.au



A DEC environmental officer uses a thermal imaging camera to assess chemical drums. Photo – DEC.

Proactive inspections identify environmental risks

A dangerous collection of accumulated chemical waste with incompatible chemicals being stored together; waste drums on unsealed ground, chemical leaks and spills, and blocked fire doors.

These were just some of the things DEC's inspection team found during one of the 69 hazardous materials risk-based inspections undertaken in 2012–13 as part of the annual proactive compliance management program

Under its Industry Regulation Compliance Strategy the department aims to work with industry and the community to protect the environment, by encouraging operation beyond compliance in industry regulation.

A core function of industry regulation is to determine levels of compliance with current standards and legislative requirements.

Industry regulation compliance activities are planned annually and include proactive engagement as well as enforcement to achieve appropriate environmental outcomes in industry regulation.

During 2012–13, more than 700 proactive compliance inspections were undertaken across the state; targeting prescribed premises, controlled waste transportation, specific industrial activities and premises that pose risks of pollution incidents.

The *Environmental Risk Program* targets known, or suspected, pollution-risk industry sectors, such as hazardous waste, scrap yards, plastics recyclers, laboratories, and pesticide storage, or industrial areas such as Kwinana and Maddington.

The *Special Risk Premises Program* is a joint program carried out in collaboration with DFES and DMP and focuses on premises that manufacture, use, transport or store large volumes of hazardous materials.

The inspections targeted suspected environmental hazards, including the storage of large numbers of used tyres or chemical drums. In each case where serious environmental risks were identified, joint action was initiated with other relevant agencies to reduce risk and prevent environmental harm.

Examples of risk-based inspections were:

- Fire Assay Laboratory inspections – environmental officers inspected four fire assay laboratories and identified significant lead contamination risks to stormwater drains on some sites. The companies were directed to improve their operations to prevent discharges of lead waste into the environment, and to clean up and dispose of lead that had entered on-site drains.
- Welshpool haulage company – environmental officers investigated a complaint and discovered more than 500 drums containing waste oil and chemical residues, many of which were leaking and in poor condition. The drums were located in close proximity to a wetland. The company was directed to seal the drums to prevent further leakage, clean up the premises and prevent pollutants entering the wetland. PRU also notified DFES and local authority. The company subsequently removed all of the drums.
- Perth pesticide factory – environmental officers identified serious pollution risks and potential health impacts for people living nearby in the event of the premises catching fire. DEC coordinated a joint inspection of the premises with DFES, DMP and WorkSafe to address environmental, dangerous goods, fire and occupational health and safety risks. The company is now taking measures to reduce the identified risks. The company's progress is being monitored.



Regulation of contaminated sites

During 2012–13, 171 new reports of known or suspected contaminated sites were received under the *Contaminated Sites Act 2003*. DEC classified 476 sites during the year, bringing the total number of sites classified under the Act to 2,517. Soil and groundwater investigations confirmed the presence of contamination at 604 sites, which are listed on the contaminated sites database accessed through DER's website. DEC continued systematic follow-up of sites requiring remediation or identified as a high priority for further investigation.

Specialist technical advice was provided to external parties such as community groups, land developers, industry and state and local government. DEC reviewed and provided advice on 907 technical reports relating to contaminated sites and 109 technical reports relating to acid sulfate soils and water.

The Minister for Environment had previously approved \$1.4 million from the Contaminated Sites Management Account for the investigation and/or remediation of state-managed sites. In some cases agencies had to comply with conditions of funding, resulting in \$500,000 from the account being transferred this year for sites in Dwellingup, Grey, Kenwick, Wedge Island and Wittenoom.

DEC chaired the technical working group responsible for preparing an amendment to the national Assessment of Site Contamination NEPM. The amendment was registered on the federal Register of Legislative Instruments on 15 May 2013 and DEC was involved in a national workshop series on the changes in technical guidance that was presented to regulators, site assessors, consultants, environmental auditors, landowners, developers and industry practitioners throughout Australia.

The *Contaminated Sites Act 2003* and Contaminated Sites Regulations 2006, implemented in December 2006, are undergoing a statutory five-year review. DEC received 61 submissions in response to the first stage of public consultation on the operation and effectiveness of the Act. A summary of these responses is available on DER's website and a discussion paper, focusing on identified issues and proposing potential solutions, is being prepared for release in early 2013–14. Further public comment will be sought.

DEC continued to monitor compliance with its first Investigation Notice served on a Mirrabooka landfill owner last year. The company has completed the required groundwater sampling and a final report and associated Contaminated Sites Auditor's report are due by December 2013.

DEC released the updated guideline *Identification and investigation of acid sulfate soils and acidic landscapes* and continued to use acid sulfate soil investigations (soil bore logs and laboratory results) to further develop the state's acid sulfate soil risk maps.

More information on acid sulfate soils and contaminated sites are available on the DER website: www.der.wa.gov.au

Training

Training was provided for environmental compliance officers through courses as well as e-learning and web conferencing, a cost-effective method of delivering training to staff and other agencies.

Local government support and training

DEC continued to provide technical support and training courses and for local government regulatory officers in the areas of environmental health, compliance and ranger services. Accredited courses in hazardous materials, complaint handling and unauthorised discharges were developed and provided to local governments in metropolitan and country areas.

During 2012–13, authorisation training in legislation covering the illegal dumping of waste was conducted in Perth, Port Hedland, Albany and Broome. A total of 79 new local government officer authorisations were

processed during the 2012–13 financial year, comprising 11 authorisations for noise legislation, 27 for pollution and 41 for illegal dumping of waste.

In conjunction with the Department of Health, DEC developed a response system to facilitate the remediation of sites contaminated as a result of clandestine drug manufacturing. This project is a finalist in the 2013 Resilient Australia Awards. A key component of this system was the development of an e-learning package that would assist local governments in the awareness of clandestine drug laboratories and to provide links to the state and national guidelines. Eighty seven Department of Housing staff were also trained in hazardous materials awareness, including asbestos and clandestine drug laboratories, to assist in working with local and state government agencies to remediate these premises. Three training sessions were conducted in Perth, one in Kalgoorlie and one in Geraldton.

Technology enabled training and development

Improving access to technical training opportunities to staff across WA continued to be a priority and progress was made through the use of e-learning and other-web based learning resources. During 2012–13, the department further developed technology based training methods, which now include webinars, internet based seminars. The webinars complement the e-learning modules and provide a cost-effective and sustainable mechanism for providing training, particularly in the regions.

Regulatory training program

The Authorised Officer Training Course is a specialist training program for officers who conduct investigations and enforce legislation and regulations.

The formal component of this course comprises two weeks of training at the Western Australia Police Academy. The training and assessment activities are mapped to the nationally recognised qualification, Certificate IV in Government (Investigation). Since its inception in 2005, the program has significantly built capacity within the department's workforce and enabled staff to carry out their regulatory roles in a cost-effective, efficient and transparent way. The program is being reviewed to ensure the training continues to meet national best practice and supports the national objective of harmonising regulatory training across jurisdictions.

Industry Regulation Officer Development Program (IRODP)

The IRODP is a series of formal learning and development activities undertaken during the first 12 weeks of employment. These activities have been built around the core competencies required by industry regulation officers. The modular program can be configured by different business areas to meet their specific requirements.

External funding for regulatory training—Enterprise Based Productivity Places program

In 2010, DEC secured \$200,000 through the federal government's *Enterprise Based Productivity Places* program to enable 40 DEC officers to undertake the Certificate IV in Government (Statutory Compliance) and Certificate IV in Government (Investigation). The program is a partnership including state government agencies, Government Skills Australia and the federal government. At 30 June 2013, 105 qualifications had been issued to DEC staff. The program concludes in February 2014.



Indian Ocean Territories

DEC continued to provide environmental regulatory services for Christmas Island and Cocos (Keeling) Islands as part of a formal arrangement with the federal government. This included issuing licences, works approvals, clearing permits and ensuring compliance with them. A Compliance Management Strategy for the Indian Ocean Territories is being developed in liaison with licensees on the islands to ensure consistent, effective and accountable regulation of industries operating on the islands. A clearing permit covering 41 separate sites and about 102 hectares was assessed and authorised for Christmas Island phosphate mine during 2012–13. DEC also took part in island clean-ups and endeavoured to promote environmental awareness and best environmental management practices.

Significant Issues

Southern Metropolitan Regional Council's Canning Vale waste composting facility

The Southern Metropolitan Regional Council (SMRC) operates the Regional Resource Recovery Centre in Bannister Road, Canning Vale. The facility composts putrescible waste, mainly from residential kerbside collections, in rotating digesters and then in windrows on an enclosed aeration floor. For many years the facility was the subject of ongoing odour complaints from the community.

In May 2012, DEC issued an amended licence to the SMRC requiring the installation of new humidifiers for the biofilters by 15 December 2012. The installation of the humidifiers was not completed by the deadline and the facility closed from 15 December 2012. The facility reopened on 4 March 2013 and since it restarted accepting waste there have been significantly fewer complaints about odour. The effectiveness of the upgrades to the facility will be monitored over the 2013–14 summer. The current licence expires on 30 March 2014.

Cockburn Cement Ltd lime and cement plant, Munster

Cockburn Cement Ltd's (CCL) operations at Munster have been the subject of ongoing community concerns and complaints. In December 2010 and on 14 December 2012, DEC amended CCL's licence to include conditions that baghouse filters were to be installed on kilns six (by February 2012) and five (by June 2013) respectively. The installations were completed as per licence conditions and both were in operation from May 2013. Since then, reported particulate emissions from these kilns have averaged well below the licence limit. As part of the licence amendment, CCL was required to undertake a community odour assessment. A year-long community odour survey is being conducted by an independent consulting company. In addition, the department is working with CCL to examine additional ways of reducing odour emissions and dust deposition to achieve further improvements in air quality in the local area.

More information on the SMRC and Cockburn Cement licences (and all other industry licences) is available on DER's website: www.der.wa.gov.au



Biosystems Engineering's Richard Sulman with the Mallee harvester prototype and chipped biomass.

Environmental Sustainability and Climate Change



Environmental Sustainability and Climate Change

DEC had responsibility for the development and implementation of policies and strategies that promote environmentally sustainable practices in industry, government and the community, and reduce the impact of climate change for WA.

Strategic Policy

The Strategic Policy Branch leads and coordinates high level strategic policy and promotes good environmental sustainability policy outcomes.

The branch has key roles in leading the department's input to the government's approval reform; providing high-level advice to state agencies, local government and the non-government sector on sustainability policy, programs and reporting; ensuring that the department leads by example through incorporating sustainability principles into its diverse range of activities, operations and decision-making processes across WA; leading and coordinating major legislative and regulation reviews and amendments.

The branch also coordinates the department's involvement with the Regulatory Gatekeeping process administered by the Department of Treasury (now Department of Finance).

Strategic assessment of the impacts of development in the Perth and Peel regions on matters of national environmental significance

The WA and federal governments have entered into an agreement to undertake a strategic assessment of development for the protection of matters of national environmental significance within the Perth and Peel regions under the federal EPBC Act. The strategic assessment provides for a coordinated and integrated assessment that will deliver improved biodiversity conservation outcomes for a growing Perth.

The strategic assessment addresses the incremental loss of biodiversity values that can result from a case by case approach to environmental assessment, and is also intended to reduce the regulatory burden and streamline approvals. The department has responsibility leading the preparation of the plan for the protection of matters of national environmental significance.

Offsets

DEC contributed to the WA Environmental Offsets Policy that was published in September 2011, which provides guidance to agencies on the application of offsets. The policy commits to the development of a public register to provide a consolidated record of the state's environmental offsets approved under WA legislation.

During 2012–13, DEC led the development of the public register, which was scheduled to be launched by the Minister for Environment in August 2013. DEC was supported by an interagency advisory group overseen by the Directors General Working Group. The advisory group included representatives from the Office of the EPA, the Department of the Premier and Cabinet, DMP, the Department of Planning, the Department of State Development and Landgate.

The register has been designed to meet government, community and industry expectations for transparency and accountability, and its development was strongly guided and influenced by stakeholder groups including the Chamber of Minerals and Energy, Association of Mining and Exploration Companies, Australian Petroleum Production & Exploration Association, Western Australian Farmers Federation, Pastoralists and Graziers Association of Western Australia, World Wide Fund for Nature (WWF), Conservation Council, Urban Development Industry Association, Property Council, and the Housing Industry Association.

Legislative review and reform

The Litter Amendment Act 2012 amended the *Litter Act 1979* to increase the maximum fine for littering from \$1,000 to \$5,000. The amendments also made vehicle owners responsible for littering offences from vehicles where the litterer or driver cannot be identified, and transferred the responsibility for authorising officers to enforce the legislation from the Minister to the Chief Executive Officer of DEC.

The Litter Regulations 1981 were also amended to give effect to the amendments to the *Litter Act 1979* and increase the fines for cigarette butt littering from \$75 to \$200. The amendments also increased the maximum fines for other offences within the regulations and introduced new categories of litter creating a public risk, with fines of \$500 for individuals and \$2,000 for corporations.

Support for participation in Standing Council on Water and Environment and other Council of Australian Governments forums

Policy advice is provided to the Minister for Environment on Standing Council on Environment and Water and other Council of Australian Governments forums.

WA participates in inter-jurisdictional working groups to implement national projects and it is also represented on the Standing Council on Environment and Water's Thematic Oversight Groups for Seamless Environmental Regulation, National Waste Policy, Clean Air, and Landscape and Ecosystem Scale Biodiversity, and their working groups.

WA is also represented on the Australian Packaging Covenant Council and, as part of the implementation of the Australian Packaging Covenant, the department administers a funding program.

During 2012–13, DEC continued to participate in inter-jurisdictional working groups to develop national climate change policy. It provided policy advice to the Minister for Environment on Select Council on Climate Change matters and was represented on the Complementary Measures and Adaptation working groups. Further adaptation work is being undertaken through a nationally agreed Coastal Adaptation work plan and National Climate Projections Program work plan.

The Select Council ceased in 2012–13 and its work was transferred to other Standing Councils (primarily the Standing Council on Environment and Water).

Addressing climate change

Through the Climate Change Unit, leadership is provided across government, industry and the community in the development and implementation of climate change policies and adaptation initiatives to reduce the impact of climate change for WA. Advice is also provided on strategies to reduce greenhouse gas emissions and the impact of national mitigation policies.

State climate change strategy

During 2012–13, DEC completed the development of the government's climate change strategy, *Adapting to Our Changing Climate*, which was released in October 2012. The strategy aims to secure the future prosperity of WA and to minimise the effects of climate change on WA's environment, economy and community. It acknowledges the government's role in adapting to climate change, both through its own decision making, asset management and service delivery, and also through the support it provides to others. The strategy establishes a high level strategic framework for agencies to develop their own responses to climate change adaptation. See story on page 127.

More information about the strategy is available on the DER website: www.der.wa.gov.au



Policy support and leadership

DEC continued to provide advice to represent WA's interests (including analysis of costs, benefits and implementation issues) on the design of national climate change policies and programs.

DEC also continued to provide policy advice to state agencies on climate change considerations during the development, or review, of their relevant policies and programs, and on integrating adaptation considerations into existing policies and decision-making.

Enabling state and local government adaptation

In addition to policy advice, DEC provided practical support to state agencies, local governments and other stakeholders on measures to identify their climate change risks and vulnerabilities by supporting climate change risk and vulnerability assessments. DEC also provided assistance in building adaptive capacity for organisations, and advice on adaptation project and program design and implementation.

Further information about climate change adaptation and mitigation can be accessed through the DER website: www.der.wa.gov.au

Indian Ocean Climate Initiative Stage 3

Stage 3 of the Indian Ocean Climate Initiative (IOCI) concluded in June 2012. The program researched the nature and impacts of climate change on WA and the final reports, including the technical synthesis reports, were released in October 2012. These are available on DER's website at www.der.wa.gov.au/your-environment/climate-change.

IOCI Stage 3 was a \$4 million investment by the state government in basic climate research, building on previous IOCI studies. The program, a partnership with CSIRO and the Bureau of Meteorology, provided better understanding of the factors influencing WA's climate and the impact of future climate change, particularly in north-west WA. The program also supported development of improved regional weather projections to allow people and businesses and state government to plan and adapt to a changing climate.

More information on the Indian Ocean Climate Initiative is available on the project website: www.ioci.org.au

Electric vehicles trial

DEC incorporated an electric vehicle into its regular fleet as part of an Australian-first large scale trial of converted electric vehicles. Managed by CO2 Smart and monitored by UWA, the trial contributed valuable information regarding vehicle performance, recharge infrastructure, maintenance, environmental performance and usability.

Strategy sets out priorities for climate change adaptation

In October 2012, the state government released its climate change strategy, *Adapting to our changing climate*, which outlines the key climate change challenges the state will face and the strategic approach it will need to take to address them.

In his foreword to the strategy, Environment Minister Bill Marmion said the Western Australian Government was committed to ensuring the future prosperity of WA, and minimising the effects that climate change will have on WA's environment, economy and community.

"Climate change is happening now and will continue to occur and affect WA's communities, industries and ecosystems as well as present challenges to managing our state's resources," he said.

"Whether at the national or international level, policy approaches to mitigate climate change will clearly impact on WA. The state government supports action to reduce Australia's greenhouse gas emissions; however, we need to ensure that we do not competitively disadvantage our export industries.

"In order to protect our unique environment and our thriving economy, a number of policies and measures are needed to prepare WA for the challenges of climate change now and into the future."

Mr Marmion said the strategy focused on climate change responses appropriate for WA and outlined key policies the state government would adopt to tackle the issue.

The climate change strategy identifies seven areas where climate change adaptation (adjustments in natural and human systems to avoid or minimise the impacts of climate change) will be needed:

- Water supplies – continuing adjustment and management will be required to respond to reductions in rainfall in some regions and increased temperatures.
- The agricultural sector – which will face less water availability and potentially longer, warmer and drier conditions, including the possibility of more frequent and more intense droughts.
- Buildings, transport infrastructure, such as roads and rail, and critical infrastructure that supply energy and water; health and communication services – these will be required to adapt to impacts such as higher temperatures, reduced rainfall, larger storm surges and more frequent extreme weather events.
- Health, social and emergency management service systems – which will face additional demand from extreme weather events such as storms, floods, heatwaves and bushfires, as well as the likely increased incidence of food, water and vector-borne diseases.
- Industries – which will need to adjust to a range of predicted changes; for example, oil, gas and mining operations in the north-west will need to adapt to more intense tropical cyclones.
- Communities – will need to adapt to the changes in lifestyle that climate change will cause.
- Management of our natural environment – this area will need to incorporate consideration of climate change risks and adapt in ways that will reduce impacts and maximise the resilience of ecosystems.

The strategy notes that due to their key responsibilities in providing public infrastructure, health and safety services, land-use planning and natural resource management, state and local governments have a large role to play in adaptation.

However, it points out that effective and efficient adaptation will require cooperation between all levels of government, businesses and industry, individuals and communities.

WA's climate change strategy is available on DER's website at www.der.wa.gov.au.



Low Emissions Energy Development Fund

During 2012–13, many of projects supported by the Low Emissions Energy Development Fund (LEED) won awards and further funding. This reflected well on the fund's rigorous selection process and the value of state support for innovation.

The following were highlights from a successful year for funded projects:

In October 2012, UWA's Winthrop Professor Eric May, who leads a project investigating methane scrubbing from natural gas facility nitrogen vents, won the Prime Minister's Physical Scientist of the Year award, the Malcolm McIntosh Prize.

John Curtin Distinguished Professor Chun-Zhu Li, of Curtin University, who leads a project on biomass grinding pyrolysis for co-firing with coal, was appointed as the Australian director of the Australia-China Joint Research Centre for Energy.

Future Farm CRC's development of a mallee harvester has been crucial to the effort to establish a sustainable biofuels industry, with the CRC now partnering the aviation industry to develop aviation fuel sourced from sustainable farm-grown tree crops. The mallee harvester project won the 2013 CRCA Excellence in Innovation award.

Aurora Algae completed its final milestone in August 2012, and has plans to develop a commercial scale facility. Aurora's technology proved remarkably efficient, capable of producing 10 times more oil and 40 times more protein per unit area than soy, with minimal fresh water requirements. For two consecutive years, Aurora has been honoured by the international AlwaysOn competition as one of the top 200 private green technology companies.

In January 2013, the Environment Minister switched on the banks of solar thermal heating at the City of Kalgoorlie-Boulder's Goldfields Oasis Leisure Centre marking the successful conclusion of the first phase of the pool heating project, which will be completed once photovoltaic panels and ground-source heat pumps have been installed. This was the first LEED project to achieve commercial-scale greenhouse gas abatement. In addition, the city won funding for the project from the federal government's Community Energy Efficiency Program.

During 2012–13, Carnegie Wave Energy was awarded \$9.9 million of federal funding to support the Perth Wave Energy Project. The project has secured all environmental and planning approvals. Carnegie also signed a power purchase and grid connection agreement with the Department of Defence in July 2012. This announcement was made by the Prime Minister and the Member for Brand at Carnegie's Fremantle premises. Carnegie also briefed United States and Australian defence leadership regarding the potential of wave energy to provide power and water to defence operations.



Environment Minister Bill Marmion switches on the solar thermal heating for the City of Kalgoorlie-Boulder's Goldfields Oasis Leisure Centre.

On 30 October 2012, WA's Minister for Agriculture and the Speaker of the House visited the proposed site for Carbon Reduction Ventures' North Midlands Solar Thermal Power Project, a grid-connected concentrated thermal power station incorporating heat storage technology to be built near Morowa.

Richgro and Biogas Renewables' anaerobic digestion bioenergy project was awarded federal funding to complement its LEED funding. The plant was scheduled to be commissioned in December 2013. Morton Seed and Grain's oat husk boiler biomass project also received federal funding.

More information about the LEED fund is available on the DER website: www.der.wa.gov.au

Waste management

Legislation and regulations

DEC had responsibility for administering the *Waste Avoidance and Resource Recovery Act 2007 (WARR Act)*, *Waste Avoidance and Resource Recovery Levy Act 2007*, WARR Regulations 2008, and the WARR Levy Regulations 2008 to minimise waste production and manage its storage and recycling.

Under this legislation, all landfills throughout the state that receive waste from the Perth metropolitan area must pay a landfill levy on the waste disposed to landfill. The levy is determined by the type of landfill and quantity of waste.

DEC also had responsibility for approving local laws made under the WARR Act.

Office of the Waste Authority

The Office of the Waste Authority provides secretariat services to the Waste Authority and manages key activities including policy, strategic partnerships and communications.

Delivery of programs on behalf of the Waste Authority

The department's Waste Management Branch provides program delivery support to the Waste Authority, in accordance with a service level agreement established in 2009. The Waste Management Branch manages the administration of various funding programs, such as the *Strategic Waste Initiatives Scheme*, *Community Grants Scheme*, *Regional Funding Program*, *Household Hazardous Waste Program* and *WA Transitional E-waste Program*. It also provides policy advice to government and other stakeholders on waste and recycling issues.

DEC provided support to the Waste Authority in the creation of the first Business Plan to be developed under the *Western Australian Waste Strategy: Creating the Right Environment*, which was approved by the Minister for Environment in August 2012.

Also in 2012–13, DEC provided significant support for the work of the Strategic Waste Infrastructure Planning Working Group that has been charged with developing a Waste and Recycling Infrastructure Plan for the Perth and Peel regions to cater for a population of 3.5 million.



DEC Fire Management Services workshop supervisor Barry Flett gets familiar with personal protective equipment during a fire training course.
Photo – Leanne O'Rourke/DEC.

Fire Management Services

Fire Management Services

Bushfire season 2012–13

The 2012–13 bushfire season was marked by the events of 12 October 2012 that led to the tragic death of DEC firefighter Wendy Bearfoot. During a bushfire in the South Coast Region, Wendy and several other DEC, FPC and brigade firefighters involved in the fire suppression effort were caught in a burn-over. In November 2012, Wendy died as a result of the injuries she sustained. Three other DEC firefighters suffered burns during the burn-over. One of these firefighters was severely injured and remained in hospital for several weeks and required ongoing treatment.

Other significant fires of the season occurred near Greenbushes in the South West Region, Kin Kin near Manjimup in the Warren Region and Bremer Bay in the South Coast Region. All these fires were started by lightning.

Significant assistance was provided to local government authorities and DFES at fires in Bullsbrook and Lennard Brook. Other fires of significance occurred at Osmand Range, which threatened the World Heritage values of the Bungle Bungle Range in Purnululu National Park. Large fires also occurred in the South Coast Region near Norseman and Salmon Gums in the Dundas Nature Reserve and in Cape Arid National Park.

DEC staff attended and monitored 676 bushfires throughout the state in 2012–13, which burnt about 5,477,394 hectares. For regional details about the number of fires attended and area burnt see Table 28 below.

About 28 per cent of all bushfires attended by DEC were caused by lightning, above the 10-year average of about 24 per cent. About 37 per cent of DEC-attended fires were deliberately lit or arson-caused fires, below the 10 year average of about 43 per cent. Two bushfires were the result of escapes from DEC prescribed burns. For more details about the causes of fires attended by DEC see Table 29 below.

DEC pre-formed incident management teams were deployed, either in full or in part, to two fires during the 2012–13 fire season.

Table 29: Bushfires in all regions 2010–11 to 2012–13

Category	Number **			Area burnt (ha) *		
	2010–11	2011–12	2012–13	2010–11	2011–12	2012–13
State forest						
native hardwood	99	138	120	1,954	11,775	1,457
softwood plantation	114	73	90	192	511	510
National parks	111	109	136	226,625	496,789	238,467
Nature reserves	68	44	52	143,322	551,135	1,004,689
Other DEC-managed reserves	62	64	69	78,695	225,046	672,768
Other Crown lands	38	53	37	63,120	1,181,168	992,114
Private property	100	114	138	7,162	150,469	531,870
Unallocated Crown Land	37	30	34	124,436	2,374,609	2,035,519
Total	629	625	676	645,505	4,991,503	5,477,394

Cause	Number **			Per cent		
	2010–11	2011–12	2012–13	2010–11	2011–12	2012–13
Deliberately/illegally lit	321	228	248	51	36	37
Escapes – DEC burns	11	10	2	2	2	0
Escapes – non DEC burning	36	34	24	6	5	4
Accidental – timber industry	7	10	6	1	2	1
Accidental – other industries	30	26	44	5	4	6
Accidental – recreationists	54	39	58	9	6	9
Lightning	72	193	193	11	31	28
Unknown	63	55	77	10	9	11
Other causes	35	30	24	5	5	4
Total	629	625	676	100	100	100

* Area (ha) burnt by bushfires in the tenure type

** Number of bushfires that started in each tenure type and fire cause

Table 30: Area and number of bushfires attended and monitored by DEC for all regions 2012–13

Region	State forest native hardwood	State forest softwood plantation	National parks	Nature reserves	Other DEC reserves	Other Crown lands	Private property	Unallocated Crown land	Total
South-west forest regions									
Swan	Area (ha) *	203	1,168	84	10	173	3,925	253	6,104
	Number **	44	30	12	14	14	62	5	256
South West	Area (ha) *	364	25	255	1,495	91	2,691	170	5,313
	Number **	60	31	4	33	5	41	4	193
Warren	Area (ha) *	866	92	4	82	405	728	39	2,216
	Number **	16	21	3	4	1	8	0	53
Other regions									
Kimberley	Area (ha) *	0	38,845	22,452	625,311	55,292	497,043	70,070	1,309,013
	Number **	0	6	3	6	3	1	11	30
Pilbara	Area (ha) *	0	190,560	125,782	45,792	115,120	0	112,850	590,104
	Number **	0	31	5	8	3	0	9	56
Midwest	Area (ha) *	0	1,362	205	78	27,057	347	0	29,049
	Number **	0	10	6	4	8	9	1	38
Goldfields	Area (ha) *	0	410	848,154	0	793,766	0	1,808,000	3,450,330
	Number **	0	1	11	0	1	0	2	15
Wheatbelt	Area (ha) *	5	0	724	0	0	188	0	917
	Number **	0	0	1	0	0	4	0	5
South Coast	Area (ha) *	19	6,005	7,029	0	210	26,948	44,137	84,348
	Number **	0	6	7	0	2	13	2	30
Grand total (all regions)	Area (ha) *	1,457	238,467	1,004,689	672,768	992,114	531,870	2,035,519	5,477,394
	Number **	120	136	52	69	37	138	34	676



Prescribed burning

The department has legislative responsibility for fire preparedness on DEC-managed lands (generally parks, reserves and State forest) and unallocated Crown land and unmanaged reserves outside metropolitan and town site areas. Fire preparedness activities include the preparation and implementation of an annual prescribed burning program by DEC on these lands.

Prescribed burning on DEC-managed lands throughout the state is undertaken for three primary purposes: to reduce the occurrence and impacts of large, intense bushfires; to protect and conserve community assets and biodiversity values; and to regenerate and protect forest ecosystems following harvesting operations or other disturbances. In many cases these outcomes are achieved together within a prescribed burn.

The indicative burn target for 2012–13 in the south-west forest regions was 200,000 hectares. To meet this objective, the department's burn planning process identified areas in excess of 200,000 hectares as available for prescribed burning in the south-west forest regions for the 2012–13 burning seasons. The surplus burn area provides the flexibility to take advantage of favourable burning conditions as, and if, they occur in different parts of the south-west.

In 2012–13, DEC achieved 23,468 hectares in the south-west forest regions, including about 6,410 hectares that were burnt for pine plantation protection. Fifty two per cent of all burns were undertaken in the spring–early summer period (September to December 2012), 15 per cent in autumn (April to June 2013), 33 per cent in winter (July and August 2012) and 0 per cent in summer (January to March 2013). See appendix for details.

The department also completed about six million hectares of prescribed burning in the Kimberley, Pilbara, Goldfields, Wheatbelt and South Coast regions. Many of these burns were open-edged and wind-driven with aerial ignition. These burns provide the habitat diversity necessary to conserve biodiversity and establish protective buffers to limit the spread of bushfires. The burns were carried out on DEC-managed lands as well as on unallocated Crown lands and unmanaged reserves in these regions.

Prescribed burn planning and implementation underwent an unprecedented level of change in 2012–13 with the international standard for risk management (ISO 31000) a central principle of a new corporate policy on prescribed burning and the inclusion of a risk management context statement and map in all prescribed fire plans. More details about these changes can be found in DEC's 2012–13 Annual Report, which is available on DPaW's website at www.dpaw.wa.gov.au/about-us/annual-report-and-yearbook.

Figure 3 shows the achievement of prescribed burning in the south-west forest regions from 2001–02 to 2012–13. The relatively low level of burning for a number of years during this period reflects the impacts of reduced rainfall and unfavourable burning conditions that prevailed in those years. The combination of unfavourable weather conditions, dry fuels over an extended summer into autumn and the implementation of enhanced requirements in prescribed burn planning and risk management as a result of the 2011 Margaret River bushfire contributed to a significant reduction of the area able to be prescribed burnt in 2012–13.

The average area of burning achieved over the past 10 years has been about 163,019 hectares per annum.

Figure 3: Prescribed burning in the south-west forest regions, 2001-02 to 2012-13

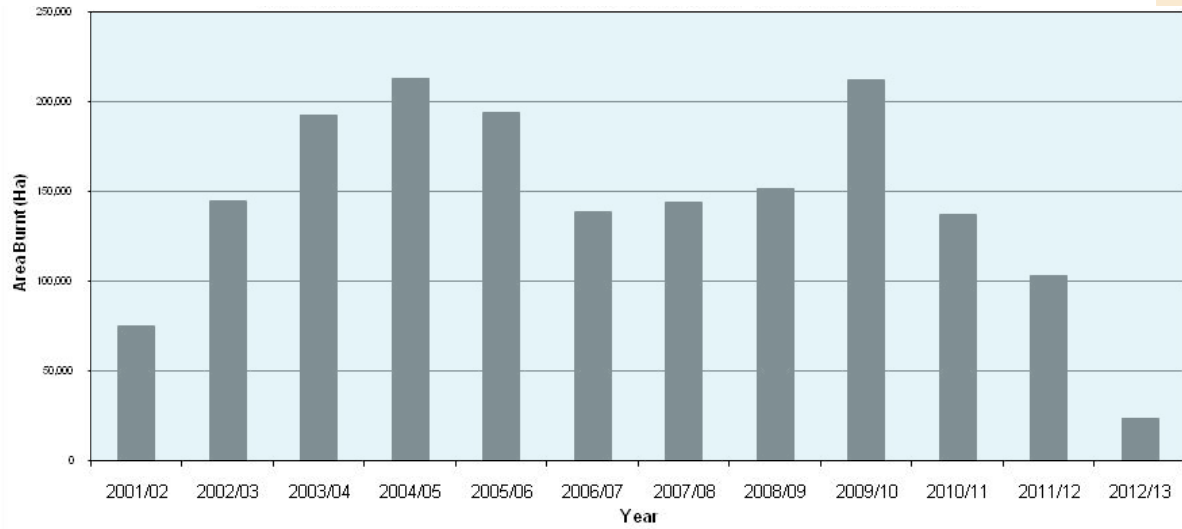
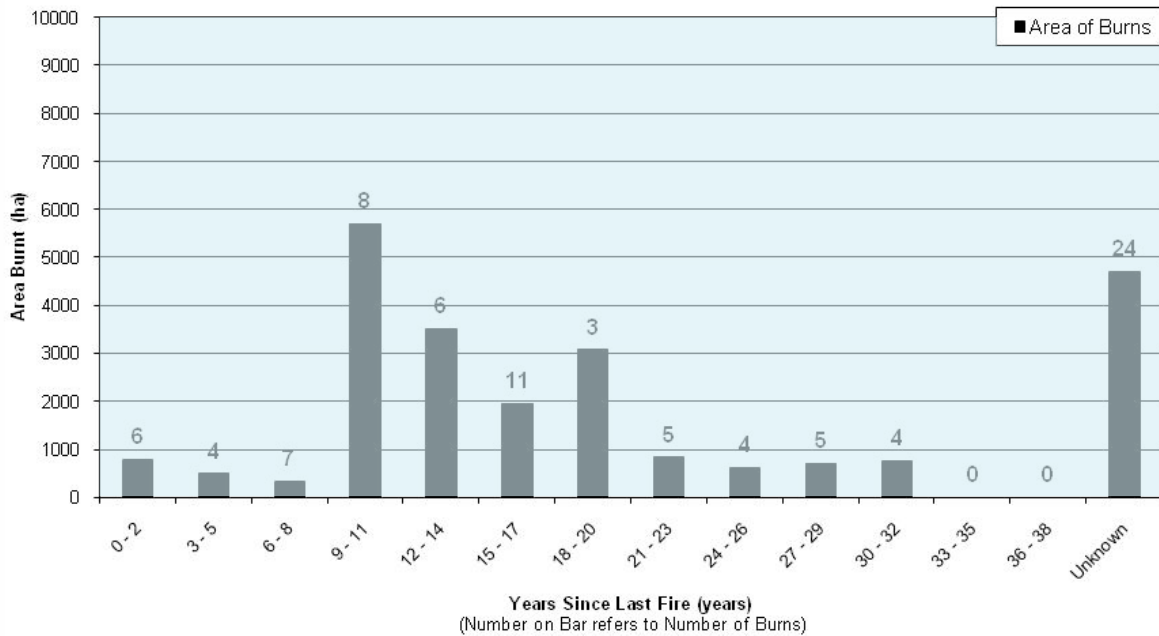


Figure 4 shows the number of years since fire last occurred in the vegetation/fuel in all of the prescribed burns conducted in the south-west forest regions in 2012-13. Approximately 93 per cent of the burns contained fuels that had not been burnt for at least 10 years.

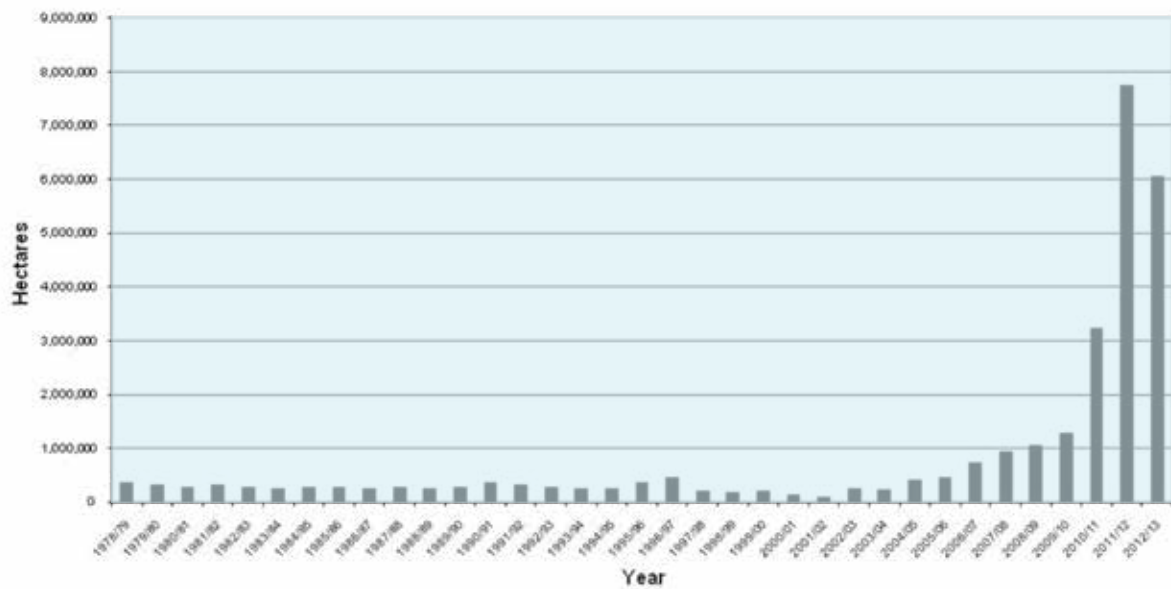
Figure 4 Years since last fire distribution for 2012-13 prescribed burns in the south-west forest regions



In 2012–13, the combined total area of prescribed burning undertaken throughout the state was 6,047,352 hectares.

The application of prescribed fire by DEC has increased markedly since July 2003 when the department became responsible for fire risk prevention and fire preparedness over large areas of unallocated Crown lands. Significant progress has been made in the Pilbara, Kimberley and Goldfields regions in applying prescribed fire across the landscape to achieve biodiversity conservation outcomes and to minimise the potential extent of damaging bushfires. Figure 5 shows the area prescribed burnt in all DEC regions since 1978.

Figure 5 Prescribed burning in all regions from 1978–79 to 2012–13





Tom Robinson checks the curtains installed in a fire truck. The curtains cover the windows to help protect crew from radiant heat in the event of them being caught in a burn-over. Photo – Peter Nicholas/DEC.

New safety features to help protect forest firefighters

During 2012–13, the DEC implemented enhanced safety procedures to help protect the more than 700 of its employees who are involved in fire-related duties.

DEC Fire Management Services Branch Manager Murray Carter said that when dealing with bushfires and prescribed burning, the safety and wellbeing of staff was the number one priority.

“Staff involved in fire management activities often work under difficult conditions and can be faced with challenging circumstances that carry inherent risks,” he said.

“Last year, our staff attended nearly 700 bushfires and carried out 124 prescribed burns. The changes to our safety procedures and the additional safety equipment are designed to further protect our staff in these situations.

“As part of the new procedures, we’re currently retrofitting our fire trucks with new safety features to assist in the event of a burn-over. We anticipate that this work will be completed in the south of WA by the end of the year and early next year in the north.”

Mr Carter said the new features included curtains inside trucks to cover windows and protect against radiant heat; special heat shielding to reduce the risk of damage to critical electrical and mechanical components and maintain truck mobility; easy-access storage for fire blankets and aluminum panels to replace plastic ones.

“Engineering and field based trialing of water and gel spray systems has started with the intention to have a selected system installed on trucks by the end of September 2014,” he said.

Mr Carter said the department was also rolling out mandatory pre-season training in mapping, radio operations, road closures, interpreting weather information and an improved procedure to respond to burn-over events.

“DEC has introduced compulsory annual training and biannual drills for all staff involved in fire to ensure that individuals are familiar with what they can do should a burn-over occur,” he said.

“We have also developed a comprehensive training video that illustrates the drills so staff can revisit the training and improve information retention.

“New personal protective equipment (PPE) that surpasses the current Australian standards will also replace existing DPaW fire uniforms, which still meet the standards, over the next 12 months. The PPE includes new boots, helmets, goggles, gloves, shirts, jackets and trousers.”

Details on the prescribed burn areas achieved are provided in tables 30 and 31, and in the Appendix (pages 142-143).

Table 31: Type of prescribed burns for all DEC regions 2009–10 to 2012–13

	2010–11	2011–12	2012–13
Indigenous vegetation—hand burning (ha)			
State forest	3,804	6,818	1,107
National parks	15,913	20,096	6,897
Nature reserves	7,516	957	404
Other Crown land and private property *	40,210	136,894	3,172
Total	67,443	164,765	11,580
Indigenous vegetation—aerial burning (ha)			
State forest	29,689	11,870	5,785
National parks	1,146,992	1,986,205	4,321,682
Nature reserves	1,103,496	704,597	108,811
Other Crown land and private property *	864,849	4,868,145	1,590,005
Total	3,145,026	7,570,817	6,026,283
Indigenous Vegetation - Silviculture Burning (ha)			
- Jarrah dominant forests	5,386	2,893	2,626
- Karri, kami/marni, marni forests	464	355	440
- Other forest	0	0	13
Total	5,850	3,248	3,079
Softwood plantation—burning (ha)			
- Strategic protection	4,036	4,754	3,607
- Clearing burns	640	0	1,997
- Logging debris removal, silviculture, regeneration	5,925	2,915	806
Total	10,601	7,669	6,410
Grand total	3,228,920	7,746,499	6,047,352

Table 32: Area of prescribed burns for all DEC regions 2009–10 to 2012–13

South-west forest regions		2010–11	2011–12	2012–13
Swan	Area (ha)	13,007	26,358	9,978
	Number	48	54	46
South West	Area (ha)	48,651	23,211	5,918
	Number	56	45	22
Warren	Area (ha)	75,088	53,596	7,572
	Number	54	24	19
Subtotal	Area (ha)	136,746	103,165	23,468
	Number	158	123	87
Other regions		2010–11	2011–12	2012–13
Kimberley	Area (ha)	2,946,570	7,099,829	5,030,846
	Number	24	23	7
Pilbara	Area (ha)	106,346	95,148	8,017
	Number	11	14	8
Midwest	Area (ha)	3,102	199	
	Number	12	3	
Goldfields	Area (ha)	25,103	414,050	968,206
	Number	6	7	3
Wheatbelt	Area (ha)	2,334	2,510	10,568
	Number	16	17	9
South Coast	Area (ha)	8,719	31,598	6,247
	Number	31	27	10
Subtotal	Area (ha)	3,092,174	7,643,334	6,023,884
	Number	100	91	37
Grand total (all regions)	Area (ha)	3,228,920	7,746,499	6,047,352
	Number	258	214	124

Operations, planning and interagency cooperation

Aerial bushfire suppression operations

DEC contracted nine fixed-wing water bombers from late November 2012 to late April 2013. The aircraft provided rapid aerial suppression capability in the South Coast, Midwest, Wheatbelt and south-west forest regions, including the Perth outer-metropolitan area, giving significant assistance to ground crews in the initial attack on bushfires. The fixed-wing water bombers were used successfully on numerous bushfires that threatened residential areas across the south-west. These aircraft attended 188 bushfires, and dropped 1,396 loads. More details can be found in DEC's 2012–13 Annual Report, which is available on DPaW's website at www.dpaw.wa.gov.au/about-us/annual-report-and-yearbook.



Bushfire detection

DEC provided an effective fire-detection system in the high bushfire risk zones of the south-west forest regions using fleet of 10 'spotter' aircraft and 11 fixed-lookout towers. The 'spotter' aircraft flew 3,977 hours for aerial surveillance and about 314 hours in support of aerial suppression operations during 2012–13. More details can be found in DEC's 2012–13 Annual Report, which is available on DPaW's website at www.dpaw.wa.gov.au/about-us/annual-report-and-yearbook.

Logistics support for bushfire response

Major works were completed on the department's logistics warehouse in Bunbury with the warehouse expected to be ready for use prior to the 2013–14 bushfire season.

Bushfire training and development

Fire Management Services Branch development and education section conducted 39 formal fire training courses involving 495 participants. In addition, district and regional staff delivered five formal fire-training programs to 56 participants. Course participants were predominantly from DEC, including campground host volunteers, but also included personnel from the FPC, DFES and local governments.

The tragic burn-over incident that resulted in the death of DEC firefighter Wendy Bearfoot led to DEC being issued with 10 improvement notices by WorkSafe. The 10 improvement notices were categorised into two main streams: crew protection and vehicle modifications; and training and information.

Seven of the 10 improvement notices related to matters being addressed by the training and information working group with which the Fire Management Services Branch development and education staff had significant involvement. By 30 June 2013, the working group had trained more than 800 DEC staff in bushfire readiness, LACES (staying safe at fires) and awareness of the 'dead man zone'. In addition, 656 DEC and FPC staff were trained in burn-over drills and 783 staff in the use of the Western Australian Emergency Radio Network and communicating via radio systems on a fire ground.

Operations section (aviation) personnel provided training to 118 DEC aerial operations personnel and 367 participants across 35 operational bases, with the majority of these participants from volunteer bushfire brigades and local State Emergency Service units.

More details can be found in DEC's 2012–13 Annual Report, which is available on DPaW's website at www.dpaw.wa.gov.au/about-us/annual-report-and-yearbook.

Prescribed fire planning and risk management

The report of the Special Inquiry into the November 2011 Margaret River bushfire by Mr Mick Keilty AO contained 10 recommendations, of which DEC has carriage of eight. Of DEC's eight recommendations, two are completed; five are well advanced and progressing steadily towards completion and the final recommendation (four) will now gather momentum with the appointment of a research scientist. During 2012–13, particular attention was given to recommendation two, which advocated a review of risk management practices associated with prescribed burning. The State Emergency Management Committee continues to provide independent oversight of DEC's implementation of the Margaret River bushfire Special Inquiry recommendations.

Through the Bushfire CRC two consultants were engaged to review DEC's prescribed burning processes and practices against the international standard for risk management (ISO 31000). Implementation of the findings of this review and the process of aligning DEC's prescribed burning activities with the standard are ongoing. Key reforms to date include a new corporate policy on prescribed burning with ISO 31000 risk management a

central principle, a new Prescribed Fire Manual 2013 has been developed with training provided to more than 200 staff, and all prescribed fire plans now include a risk management context statement and map. For more details see DEC's 2012–13 Annual Report, which is available on DPaW's website at www.dpaw.wa.gov.au/about-us/annual-report-and-yearbook.

Bushfire preparedness on unallocated Crown land

Since 1 July 2003, the department has had responsibility for the coordination and on-ground management of bushfire risk prevention and bushfire preparedness works on 89 million hectares of unallocated Crown land and unmanaged reserves outside the Perth metropolitan area and town sites.

Work undertaken by DEC in 2012–13 included the construction and maintenance of firebreaks, modification of vegetation in strategic buffers, open-edge prescribed burning and large-scale aerial ignition.

In the Kimberley, Pilbara and Goldfields regions, DEC continued to make good progress in engaging and building partnerships with other stakeholders, including Aboriginal communities and neighbouring pastoralists. The use of planned fire for developing landscape-scale mosaics continued to yield benefits for mitigating large bushfires, protecting biodiversity and cultural values, and achieving designated nature conservation outcomes.

Interagency bushfire management

During 2012–13, significant DEC fire management resources were dedicated to improving interagency bushfire management arrangements through the Interagency Bushfire Management Committee (IBMC) and associated sub-committees. Details about the sub-committees servicing the IBMC are included in DEC's 2012–13 Annual Report, which is available on DPaW's website at www.dpaw.wa.gov.au/about-us/annual-report-and-yearbook.

Outside the IBMC, DEC initiated and participated in substantial inter-agency liaison with DFES, local government and other departments on fire management related matters.

Key efficiency indicators

Table 33: Prescribed burning in south-west forest regions

Region	10-year rolling average (ha)	Actual 2012–13	Difference (ha)	%
Swan	44,356	9,978	-34,378	-78
South West	50,220	5,918	-44,302	-88
Warren	68,443	7,572	-60,871	-89
Total	163,019	23,468	-139,551	-86

The fire suppression efficiency indicator is represented by the percentage of all forest bushfires, burning under 95 percentile weather conditions, which are effectively attacked and contained by DEC suppression forces. To be considered efficient, these fires must not exceed five hectares in size for Priority 1 and Priority 2 areas. These priority areas include high values (community values, biodiversity conservation, recreation and landscape, and primary production) that may be vulnerable to bushfires or inappropriate fire regimes. DEC aims to exceed the percentage standard of successful attacks on 95 per cent of all forest fires. The 95 percentile weather conditions are days when the forest fire danger is below 'Very high' as calculated using the department's Forest Fire Behaviour Tables (1998).

Table 34: Fire suppression efficiency in the south-west forest regions

Region	Priority 1 and 2 (%)			
	Standard	2010–11	2011–12	2012–13
Swan	95	95	97	92
South West	95	94	92	96
Warren	95	86	98	97
		DEC Average (one year)		95
		DEC Average (five years)		93

Only includes records where DEC was first attack agency

Appendix: Prescribed burning summary data

Area prescribed-burnt within south-west forest regions for 2012–13

Objective	Region	Area (hectares)				Year of last fire *
		Winter	Spring	Summer	Autumn	
Community/strategic protection	Swan	-	44	-	73	1941–1961
	South West	-	3,369	-	500	1983–2006
	Warren	-	5,185	-	1	1990–2004
Biodiversity conservation	Swan	3,590	-	-	262	1998–1999
	South West	-	-	-	-	-
	Warren	-	-	-	-	-
Hardwood silviculture	Swan	-	-	-	414	1987
	South West	-	265	-	56	1988–2005
	Warren	-	1,916	-	440	1985–2011
Plantation silviculture/protection	Swan	3,607	708	-	326	1991
	South West	589	-	-	1,139	1953–2012
	Warren	-	-	-	29	1984
Tourism and recreation protection	Swan	30	599	-	325	1961–2003
	South West	-	-	-	-	-
	Warren	-	-	-	1	1983
Grand total by season (ha)		7,816	12,086	-	3,566	
Seasonal %		33	52	-	15	
Grand total (ha)			23,468			

Data from 1 July 2012 to 30 June 2013

* Range of vegetation/fuelages of July 2012

Number of prescribed burns conducted in south-west forest regions in each season for various purposes in 2012–13

Dominant purpose	Region	Winter		Spring		Summer		Autumn		Total number of burns	Number of escapes
		Aerial ignition	Hand ignition	Aerial ignition	Hand ignition	Aerial ignition	Hand ignition	Aerial ignition	Hand ignition		
Community/ strategic protection	Swan	-	-	4	-	-	-	-	3	7	1
	South West	-	-	4	-	-	-	-	1	6	-
	Warren	-	-	1	2	-	-	-	1	4	-
Biodiversity conservation	Swan	2	-	-	-	-	-	-	5	7	-
	South West	-	-	-	-	-	-	-	-	-	-
	Warren	-	-	-	-	-	-	-	-	-	-
Hardwood silviculture	Swan	-	-	-	-	-	-	1	2	3	-
	South West	-	-	2	-	-	-	-	2	4	-
	Warren	-	-	2	1	-	-	-	10	13	-
Plantation silviculture/ protection	Swan	-	6	5	-	-	-	-	5	16	-
	South West	-	2	-	-	-	-	-	10	12	-
	Warren	-	-	-	-	-	-	-	1	1	-
Tourism and recreation protection	Swan	-	1	1	2	-	-	-	9	13	-
	South West	-	-	-	-	-	-	-	-	-	-
	Warren	-	-	-	-	-	-	-	1	1	-
Total	2	9	5	20	-	-	-	1	50	87	1

