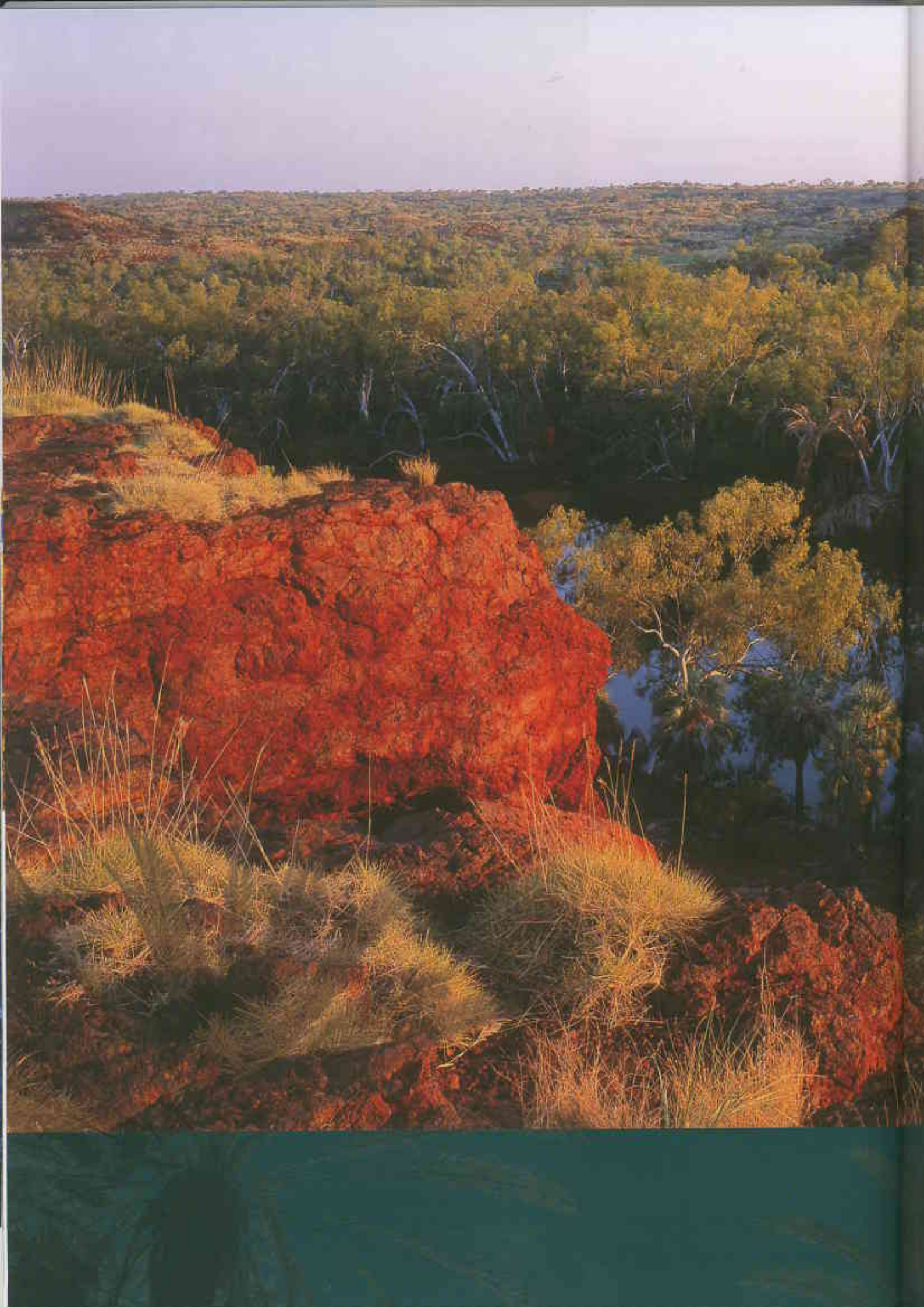
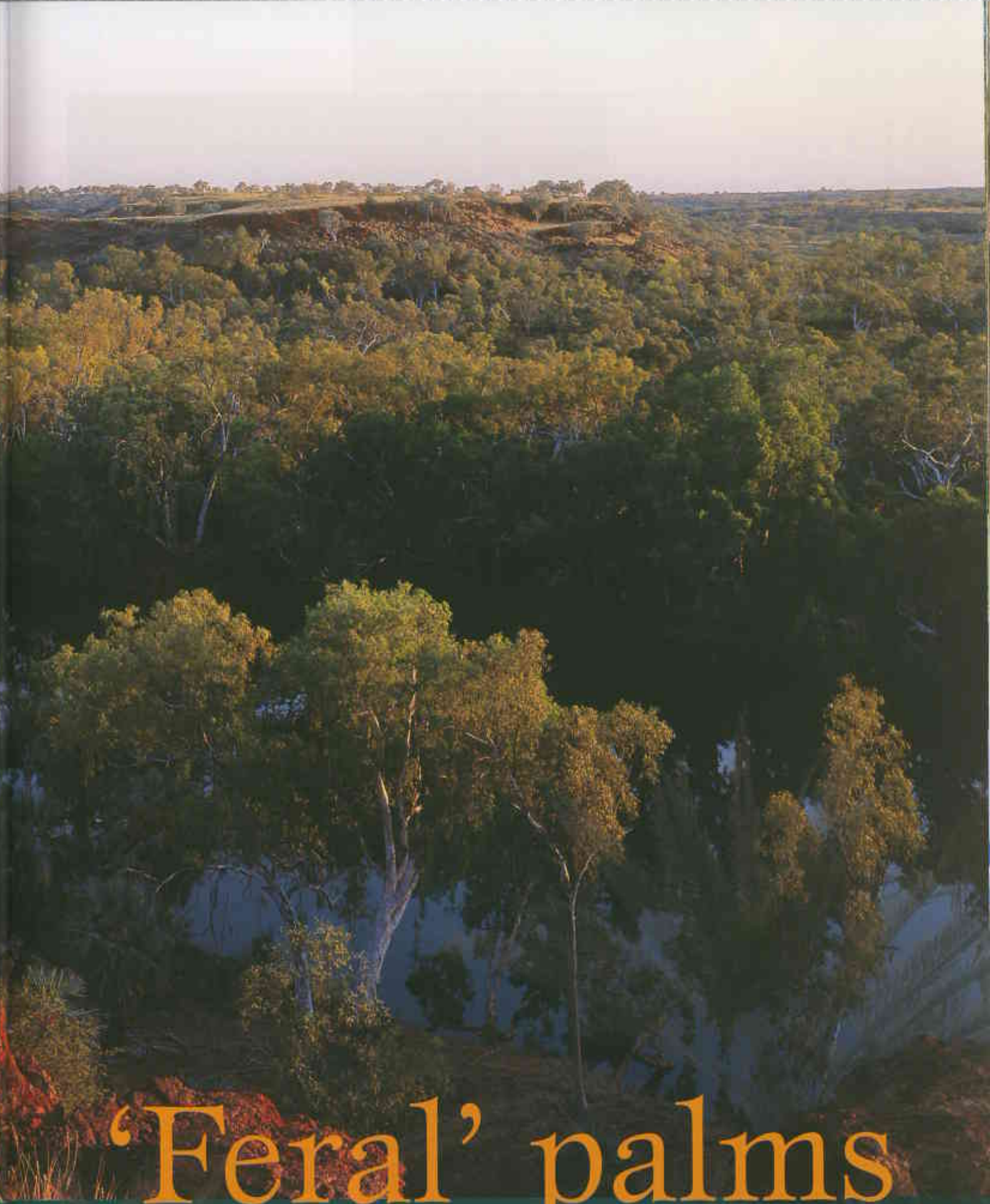




'Feral' palms

by Peter Kendrick

In the remote Millstream-Chichester National Park, conservation managers have declared war on 'ferals' of a different kind. These are not predatory animals, but highly invasive date palms that have had a severe impact on the area's unique natural vegetation and wildlife.

Like so many of the exotic plants that have arrived in Australia since European settlement two centuries ago, date palms (*Phoenix dactylifera*) are both handsome and useful. In cultivation they are popular for both shade and fruit, and thrive in the hot arid conditions of the north. Indeed, in the early days of the colony, government agencies provided parties of explorers, prospectors and pastoralists with packets of date palm seeds, with instructions to plant them in suitable locations. These were invariably springs, soaks and other wetlands—the legacy of this well-intentioned policy can still be seen today.

Millstream—the heart of the west Pilbara

The Millstream wetlands, in the Millstream-Chichester National Park, form one of the jewels of the Pilbara. Lying about 100 kilometres south of Karratha, the permanent pools and springs of Millstream are fed from spring outflows from a large calcrete aquifer, the remnants of an ancient lake system lying in the Fortescue River valley. These springs flow through permanent pools (some more than two kilometres long and 15 metres deep) and streams for more than 30 kilometres along the Fortescue River. The Millstream 'delta', close to the homestead, is an area of approximately 250-hectares of streams and swamps, fed by springs within Chinderwarriner Pool. The canopy of river gums (*Eucalyptus camaldulensis*) and cadjeputs (*Melaleuca leucadendra*), and the dense stands of Millstream fan palms (*Livistona alfredii*), sedges, reeds and dragon trees (*Sesbania formosa*) along the pools and streams are a striking contrast with the spinifex and snappy gum (*Eucalyptus leucophloia*) grasslands of the surrounding hills and plains.

For many thousands of years, this huge wetland has been the heart of the tribal lands and lore of the Yindjibarndi people. The river provided more than just the resources they needed—many places along the river and streams remain sacred to the traditional custodians of the country.

The permanent streams and pools of Millstream are of great biological interest because they are so large, and for the unique plants and wildlife they support. The native Millstream fan palm grows in large numbers around the springs and in the Fortescue River bed near Millstream. The streams and pools are also home to *Nosoticta pilbara*, a tiny beautiful black-and-gold damselfly known only from the Millstream area. It is one of 33 species of dragonfly and damselfly found at Millstream (see 'Dragonflies - Desert Jewels', *LANDSCOPE*, Summer 1986–87). The groundwater of the Millstream aquifer and the springs that flow from it support a wide variety of stygofauna—aquatic animals that live below the ground surface. These secretive creatures are currently being investigated by Department of Conservation and Land Management (CALM) scientists as part of a massive biological survey of the Pilbara.

In the early 1860s, an exploration party led by Francis T Gregory passed by the springs at Millstream, describing the stream as 'running strong enough to power a large mill'. His reports of

Previous page
Main Millstream-Chichester National Park. *Photo – David Bettini*
Background Date palms.

Above Black-and-gold damselfly (*Nosoticta pilbara*).

Left A proliferation of date palms chocking Millstream in 1989. *Photos – Jiri Lochman*

pastoral lands in the interior of the Pilbara led to rapid settlement of the area by Europeans, mainly for pastoralism.

During the early 1890s, the settlement at Millstream Station resembled a small town. Station staff, workers and their dependents were fed from stores imported from the coast via wagon from Cossack, and from produce grown locally. Many pastoral stations supported as many as 200 people or more, and the springs and wetlands near the Millstream homestead irrigated large kitchen gardens and grazing.

Mixed up mess

Inevitably, weeds became established in the rich, damp soils near the homestead. By 1990, after part of the Millstream pastoral lease had been acquired for conversion to a national park, at least ten major weed species had become naturalised in the delta area (date palms, cotton palms, parkinsonia, giant bamboo, oleander, Indian water fern, water lily morning glory, khaki weed and Galland's curse).

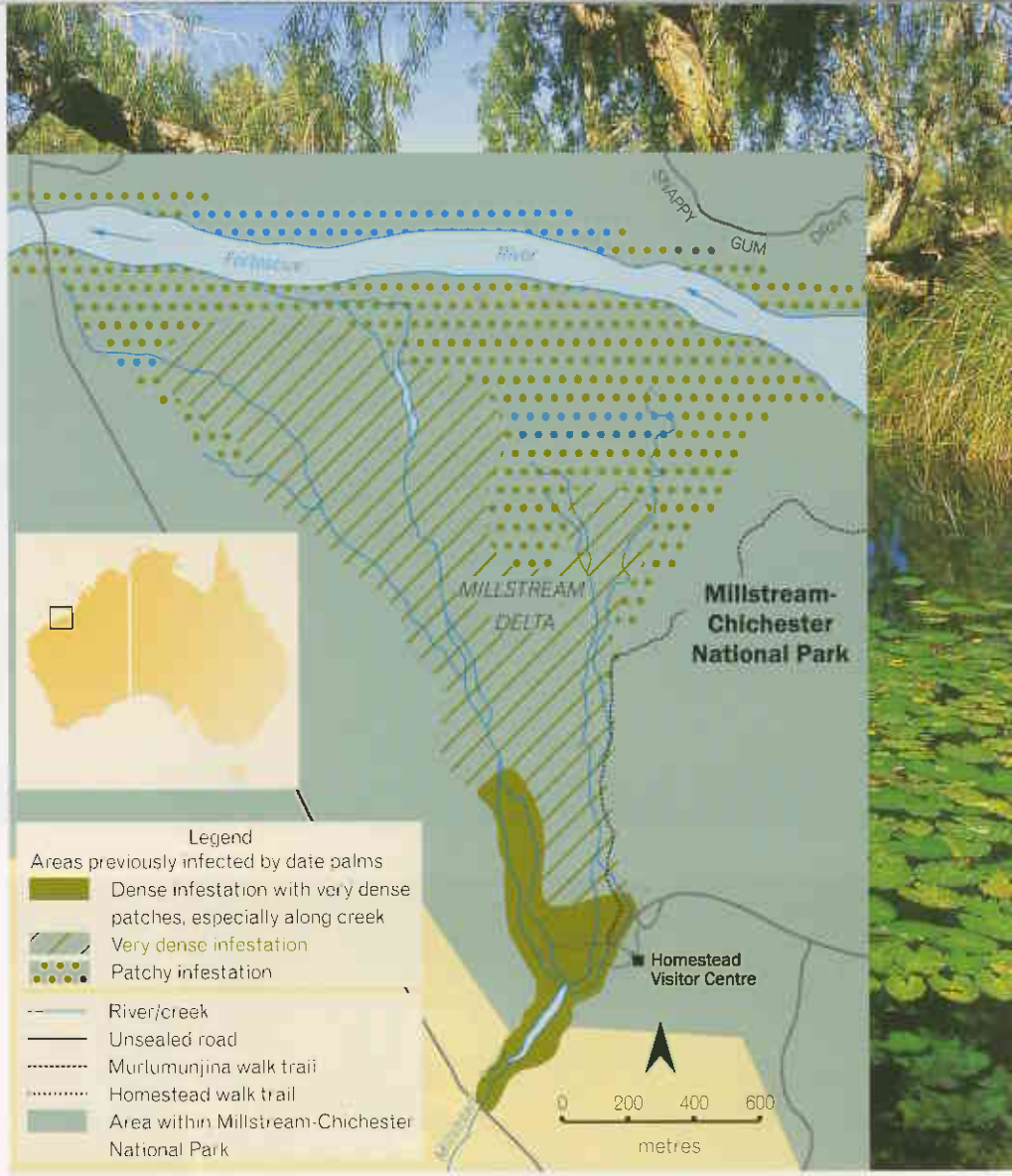
Date palms were estimated to have totally destroyed about 30 hectares of native vegetation, mostly within the Millstream delta. Another 250 hectares were heavily infested, particularly along watercourses, but the palms had not yet destroyed the natural canopy of river gums and paperbarks. A further 1000 hectares were more lightly infested. In all, many millions of date palms were thriving in the Fortescue River valley and in nearby springs. The other weed species were mixed up in this as well.

Alien invaders

Date palms are one of the most serious environmental weeds affecting wetland areas in the Pilbara. While they do not invade large areas of the Pilbara landscape, they very efficiently overrun wetlands, totally destroying the native species.

Individual date palms are either male or female. Mature female date palms can produce many thousands of large, heavy seeds each year. Seed production can thus be controlled by removing females. The seeds usually fall near the parent tree and germinate in dense stands, sometimes resulting in thousands of seedlings per square metre. Seeds are spread by floods and animals such as emus, dingoes and possibly flying-foxes.

The seedlings rapidly grow into dense, impenetrable thickets, which overwhelm other plants. The understorey plants cannot persist within these thickets as the date palms grow taller and denser. The palms grow so thick that they cut off most of the light. Because they use large quantities of water, the soil becomes strongly saline over time. The final phase of the invasion occurs when the date palms gradually kill off the mature trees—the river gums and cadjeputs—which once formed the natural canopy of the wetland.



Above Chinderwarriner Pool.
Photo – Jiri Lochman

Right Millstream homestead.
Photo – David Bettini

Date palms thrive on fire, and in a relatively short time can create vast quantities of fuel from fallen fronds. Even the green fronds are highly flammable, being well aerated, light and covered in a waxy coating. Repeated high-intensity fires, blazing from ground level right up into the canopy, eventually kill even the largest of the native trees, leaving the dates in sole possession.

The palms have also affected the

hydrology of Millstream. The stiff, dense root mats of the palm trees rapidly invaded streams in the delta, blocking them up and altering water flow patterns. The date palm root mats are very different to the softer and less invasive roots of the native cadjeputs and river gums, and may affect aquatic invertebrates. The palms also cut off all light for long distances of stream channel, suppressing or killing off all the aquatic plants as well.

This complete cycle, from initial invasion of a few palms to total replacement of native species can occur quite rapidly. Photographs of Chinderwarriner Pool taken in 1957 clearly show that the date palms were just beginning to invade the area. In less than 30 years, massive damage had been done. The same view, taken in the late 1980s, shows almost total domination of date palms in this area.

This is also seen in aerial photographs. In 1964 aerial photos, the distribution of date palms was relatively small, with the main infestation occurring close to the homestead (a small number are apparent in the Fortescue River at that time). In 1964, there were still a large number of natural canopy trees surrounding Chinderwarriner Pool. By the mid-1970s, although the overall distribution of the palms had not greatly increased, they were clearly dominant in upper parts of the delta and around Chinderwarriner Pool. By the late 1980s, dates were dominant throughout the delta and had spread into the river en masse.

War on palms

In 1986, a small number of mature palms were removed from Chinderwarriner Pool for landscaping projects in Karratha. When Perth-based horticultural operators became interested in sourcing date palms for major projects in Perth during the early 1990s, hundreds of mature and mid-sized palms were removed from Millstream and transported alive to Perth (some of them can be seen in North Fremantle). Ironically for the date palms, the revenue raised from selling these palms was used to fund larger-scale control operations.

In 1990, staff from CALM's Pilbara regional office decided to try to remove date palms from the Millstream area. The discovery of an effective herbicide treatment, applied to the crown of the palm, turned the tide. Following a devastating fire in 1991, which burnt the entire Millstream

Left Chinderwarriner Pool in 1989 with dense date palms overgrowing the top of the pool.

Below left Chinderwarriner Pool in 2004 with all date palms removed and rehabilitation plantings established.

Below Chinderwarriner Pool after a fire in 1991.
Photos – Peter Kendrick

wetland area, momentum for the program accelerated. An intensive campaign, which resulted in some 7000 mature palms being felled in a four-week period, was followed by mechanical removal of dense thickets. Stragglers and juvenile palms were poisoned wherever they occurred.

The date palm removal program involved CALM staff and trainees, contractors and volunteer groups, as well as several groups of Green Corps trainees. In 2001, the WA Department of Justice established a work camp at Millstream. Work camp personnel have been major contributors to the control program.

Because seeds are produced only on female date palms, it has been possible to retain a stand of male palms in the Homestead walktrail area for their historic interest—without jeopardising the natural vegetation. Several hundred male palms have been kept as a reminder of their link to the pastoral days.

Above Chinderwarriner Pool.
Photo – Jiri Lochman

Below The native Millstream fan palm.
Photo – Dennis Sarson/Lochman Transparencies

Taking back control

Removing the palms was just the first step in bringing the Millstream wetlands back to health. Early on in the program, a nursery was developed at Millstream, growing plants from local seed for use in areas where the palms had destroyed all native vegetation. Michael Hughes, a Karratha-based CALM horticulturalist, and national park rangers based at Millstream took on this project, and produced many thousands of seedlings. These were planted into the most damaged areas, and established using drip irrigation. Compacted, salinised soils often made this very difficult. Where canopy species had not yet been totally destroyed by palms, there was no need to undertake plantings—those areas quickly rehabilitated using natural seed fall. Many thousands of seeds were also directly sown into areas after palms had been removed.

Once established, most plantings thrived. Areas that were once nothing but date palms, and then bare ground following their removal, now support healthy riverine vegetation.

The future

Date palms are not the only weeds at Millstream. Significant effort is also being put into controlling parkinsonia (*Parkinsonia aculeata*) and Indian water fern (*Ceratopteris thalictroides*), as well as several other weed species. Weed control remains a major part of the daily works program in the national park. CALM staff, volunteers and work camp personnel are continually sweeping through areas where date palms have been removed, poisoning small date palms as they emerge. This task will go on for at least another five years. However, those areas once lost to a voracious environmental weed are now well on the way to recovery.

Peter Kendrick is the Pilbara regional ecologist, based in Karratha. He joined CALM in 1987, initially based at the Wildlife Research Centre at Woodvale, then at CALM's Pilbara regional office from 1989. He can be contacted on (08) 9143 1488 or by email (peterke@calm.wa.gov.au).

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contents

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