FITZGERALD REBORN

by Steve Hopper

It is more than a year since wildfire, started by lightning strikes, raced through the Fitzgerald River National Park on Western Australia's south coast, burning some 157 000 hectares. Twelve months later the park was already showing positive signs of new life. Steve Hopper, who led the post-fire research surveys, reports on plant regeneration in the park and the spectacular wildflower season that followed the 1989 wildfire.

Photo - Michael Morcombe

LATE in December 1989, some of the largest wildfires recorded in the Fitzgerald River National Park occurred during severe weather conditions. The fires burnt some 48 per cent of the park, most of which was consumed in the first 10 hours.

The fires' severity provoked widespread public concern. Many people asked whether the vegetation would ever recover from what must have seemed total devastation, seen just after the fires. Fortunately, previous biological surveys and the presence of permanent study plots provided an unusual opportunity to record the recovery of the plants and animals by comparing them with their pre-fire status. The strong public interest in the park led to a valuable survey by volunteers and Department of Conservation and Land Management (CALM) staff of plants such as orchids and kangaroo paws, many species of which are only abundant during the first spring after fire.

With more than 1 750 plant species (75 found nowhere else), Fitzgerald River National Park contains 20 per cent of the total known flora in WA. It is one of the State's most important flora conservation reserves, particularly as our current knowledge suggests unusually low levels of dieback fungus.

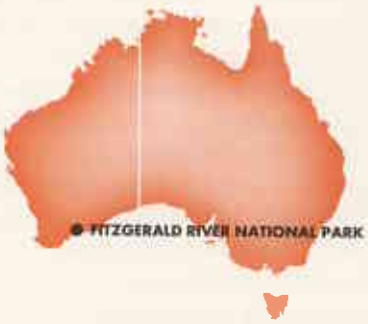
Before the 1989 fire, a significant start had been made in documenting the distribution and abundance of Fitzgerald's flora. The late Ken Newbey, a botanist who participated in a biological survey in 1985-87, judged that about 250 species had special conservation significance. Two hundred and four plant species had known populations of less than 1 000 plants in conservation reserves. Of these, only 16 have been searched for in sufficient detail to be listed on the State's Schedule of Declared Rare Flora. Many others may warrant such special legal protection when their conservation status has been similarly established.

THE PLIGHT OF RARE PLANTS

The plight of rare plants after a major wildfire is a concern, particularly for those killed and dependent for regeneration on seed stored in their canopies or on the soil. Fitzgerald River National Park has many such rare species, including East Barren's wattle (*Acacia argutifolia*), Fitzgerald woollybush (*Adenanthos dobagii*), and oval-leaf adenanthos (*Adenanthos ellipticus*). Recurring fires could exhaust the seed supply of such species if they occurred more frequently than the time required for seedlings to mature, flower and set seed.

Seedlings of the rare Burdett gum. The larger seedling germinated after summer rains in 1990, the smaller the following winter.
Photo - S.D. Hopper ▲

Burnt nut of *Banksia lemanniana*. Shortly after the fire, each open-mouthed follicle sheds its two seeds.
Photo - Tony Tapper ▶



Following the 1989 fire, a careful search was made for seedlings of a sample of rare plants. To our delight, we found excellent seed germination among the seed-regenerators; East Barren's wattle germinated so prolifically that it may no longer need to be declared as rare flora. However, only a small number of the rare species have been inspected in the time available, so more study is needed.

A GARDEN OF ORCHIDS

Ken Newbey recorded 84 orchid species and one hybrid in Fitzgerald River National Park. Many orchids flower best during the first spring after a summer fire, and a few flower only in such circumstances, so the 1989 fire provided a unique opportunity for orchid enthusiasts.

During one week in October 1990, members of the WA Native Orchid Study and Conservation Group helped CALM researchers survey the burnt country. They located 58 of the 84 previously recorded orchids, and found another 20 species and eight hybrids. A few of the additional species may prove to be orchids already known for the park, but whose identification was uncertain when Ken Newbey compiled his list. However, most appear to be new records as they usually flower only after summer fire.

About 100 species of orchid and nine hybrids are now known in Fitzgerald River National Park. None is confined to

Diminutive pink bunny orchids (*Eriochilus scaber*), which flowered prolifically in winter following the fire.
Photo - Babs & Bert Wells ◄

Red beaks (*Lyperanthus nigricans*), a common orchid normally seen as a fleshy heart-shaped leaf until fire stimulates flowering.
Photo - Babs & Bert Wells ▼

Burdett gum (*Eucalyptus burdettiana*) is known only from the vicinity of East Mount Barren in the park. Volunteers and CALM staff found many more plants of this rare species following the fire.
Photo - S.D. Hopper ▼▼

the park, since most species range across the south coast from Albany to Esperance and beyond. However, the Fitzgerald populations are important regional representatives. Some orchids, like the warty hammer orchid (*Drakaea livida*), grow at the limit of their known range in the park.

The survey found that orchids are abundant only in certain seasonally wet habitats in Fitzgerald. The margins of yate swamps and drainage lines were richly endowed. A swamp near West Mount Barren had 38 species and six hybrids around it. Some spider orchids were so abundant that it was difficult to walk without treading on them! CALM colleague Andrew Brown and I had surveyed part of that swamp in October 1984, when the vegetation was long unburnt, and had searched in vain for orchids. This area became an orchid garden following the 1989 fire.

Granite outcrops along the northern sector of the park were also dotted with orchids. Bald Rock Creek on the Old Ongerup Road had 24 species and one hybrid. The coastal East Mount Barren, with its jagged quartzite ridges and narrow intervening seeps, had 22. Throughout the extensive mallee and heath vegetation of much of Fitzgerald, however, few orchids were seen.

We found an undescribed species of flying duck orchid growing alongside the common flying duck (*Paracaleana nigrita*) at two sites. The new species flowers later (October-November rather than August-September), is shorter, has a narrower linear leaf and a less warty flower than the common flying duck. It appears to range eastwards beyond Esperance, and possibly westwards to the Nannup area. It was found in bud in 1984 by Andrew Brown and me, and subsequently by Ken Newbey, but good flowering had not been recorded there until the 1990 survey.

BRANCHED CATSPAWS

Perhaps the most remarkable find of the post-fire surveys was the appearance of the branched catspaw (*Anigozanthos onycis*), which dominated nearly a quarter of the park's westernmost regenerating vegetation. Despite thorough searches on several occasions by Ken Newbey and kangaroo paw enthusiasts during the 1970s and 1980s, this species had never previously been recorded within the park.

The branched catspaw is the most enigmatic of the kangaroo paws. It was first seen by WA Herbarium botanist Alex George in 1962. Seven years later, new specimens were collected from a farm north-east of Albany, and brought to the Herbarium by Mrs Honor Venning, a member of the Wildflower Society. Another collection from the same area in 1972 by Bob Dixon was used by Alex George as type specimens to name the species formally in 1974. He chose the name *onycis* from the Greek *onyx*, a claw or talon, because of the claw-like appearance of the open flower. While the branched catspaw is a distinct species, it has a similar size, colour and habitat to the common catspaw (*Anigozanthos humilis* subspecies *humilis*). This may explain why it had been overlooked by botanists for such a long time.

The branched catspaw is a common but elusive fire-opportunist that persists as seed stored in the soil for many years

The branched catspaw (*Anigozanthos onycis*), recorded for the first time in the Park after the 1989 wildfires.
Photo - S.D. Hopper ◄

Tawny-crowned honeyeater (*Phylidonyris melanops*) feeding on graceful honeymyrtle. This bird is a major pollinator of branched catspaws.
Photo - Babs & Bert Wells ▲

between fires. The abundance of the branched catspaws in October 1990 west from the Fitzgerald Inlet Road was breathtaking. A sea of pale red extended across undulating sandplain wherever the fire had burnt mallee-heath communities.

Branched catspaws were the only vertebrate-pollinated species flowering at this early stage of post-fire regeneration, yet their abundance and reliable nectar production were sufficient to allow populations of honeyeaters to occupy the heart of the burnt country and breed successfully just 10 months after the fire.

In the midst of hectares of branched catspaws, the orchid survey party flushed a tawny-crowned honeyeater from its nest - containing two eggs - which was hidden just 20 cm off the ground in some slightly taller coppice of sweat bush (*Adenanthos cuneatus*). For the first time I was able to record the pollination of this ephemeral kangaroo paw. Perched on dead sticks, the honeyeaters dropped to the ground and fed on one to three flowers per plant, before hopping as far as eight metres between plants to feed again. They would then fly 20-40 m before dropping down to feed again.

Tawny-crowned honeyeaters are birds of heath or kwongan communities in south-western Australia. They appear to play an important role in the pollination of the branched catspaw, and possibly of other kangaroo paws that are similar fire opportunists in mallee-heath communities. Time did not allow us to investigate whether honey possums were pollinating the catspaws. Perhaps these abundant animals are also helped in rapidly colonising burnt country by the reliable flowering of branched catspaws in the first spring following a fire.

MALLEES

Mallees have two means of regenerating: from seedlings or from rootstock. Unexpectedly, CALM researchers and volunteers found very poor seedling germination of most of the park's mallee eucalypts, including two declared as rare - Burdett gum (*Eucalyptus burdettiana*), and crowned mallee (*Eucalyptus coronata*). Only eucalypts such as swamp yate (*Eucalyptus occidentalis*) - copious-seeding plants growing along creek lines and near lakes - had germinated in any number.

It is not known whether poor seedling regeneration is usual for Fitzgerald mallees, or if something exceptional occurred during or after the wildfire. Most eucalypts retain their seed in capsules in the canopy until fire. Any that fall to the ground prematurely are rapidly consumed by seed harvesters such as ants. In many cases, the Fitzgerald fire was so intense that even the robust woody seed capsules of species such as bushy yate (*Eucalyptus lehmanii*) were entirely consumed, indicating that a significant proportion of the mallees' seed store may have been depleted this way.

Also, up to 150 mm of rain fell in one day in January, causing extensive runoff and flooding. This was followed by a long, dry spell. Seeds on the ground may have been moved around and clumped by sheet runoff, then germinated in the middle of summer - only to die before the onset of autumn rains. Evidence of at least two flushes of germination (summer and winter) were seen on moist sites in stands of three species of eucalypts.

However, all mallee species that were inspected were regenerating strongly from rootstock. Barely two months after the fire, coppice averaged more than 10 cm for most species, and for swamp yate on alluvial flats it was 53 cm, with the tallest shoot standing 79 cm above the rootstock. By October, some swamp yate coppice was 2 m tall, and most mallee coppice was more than 20 cm.

RECOVERY IN PERMANENT TRANSECTS

During the 1985-87 biological survey, Ken Newbey and zoologist Andrew Chapman established 65 transects 10 m long and a metre wide. The location of the canopy of each perennial plant within each transect was mapped and a list of species prepared.

Two months after the fire, it was discovered that vegetation in 18 of the 65 transects had been burnt. In October-November 1990, with the help of consultant botanist Colin Yates and volunteers, the presence and maximum height of all species within each square metre of 17 of the 18 transects were recorded (one transect was not found).

More species were found in the regenerating transects than were recorded in the same unburnt transects a few years earlier. On average, Ken had recorded 23 species for 15 of the burnt transects when they had been unburnt. In 1990 45 were found. One transect through mallee-heath on the Point Ann Road had 89 species in it, a remarkable number for such a small area.

Annual species were also recorded

It will take several years before the flowers of the bushy yate *(Eucalyptus lehmanii)* are seen again in the park.
Photo - Michael Morecombe ◄

New shoots emerge from the burnt trunk of the WA Christmas Trëe (*Nuytsia floribunda*).
Photo - Tony Tapper ▲

after the fire. The opening of the canopy and the enhanced nutrients available in the ashbed provided good conditions for the growth, flowering and fruiting of far more annuals than are seen in most unburnt communities. For example, a yate woodland on Fungus Creek, north-west of East Mount Barren, had nine species of perennial plant in September 1986, compared with 21 species of perennials and 26 annuals in October 1990. Most of the new perennials were bulbous or rhizomatous herbs whose flowering is pronounced after fire; e.g., three orchids, three lilies and the fern-like austral adder's tongue (*Ophioglossum lusitanicum*). Others were short-lived perennial fire-opportunists, such as the native hibiscus (*Alyogyne huegelii*), and coojong (*Acacia saligna*).

It was valuable to have some transects in plant communities dominated by seed regenerators, since these are the most vulnerable to frequent fires. A *Banksia baxteri* thicket on Hamersley Drive was one such community. Despite all adult plants being killed by the fire, *Banksia baxteri* seedlings were found in all 10 square metres of the transect.

Another seed regenerator, *Eucalyptus platypus* var. *heterophylla*, formed a low forest on consolidated dunes traversed by a transect north of Edwards Point. Seedlings of this tree occurred in seven of the 10 square metres, and were not as abundant as usually seen in populations of similar eucalypts.

Perhaps the poorest regeneration found for a seed regenerator was in a coastal moonah (*Melaleuca lanceolata*) clump at Mylie's Beach. Seedlings at very low densities were found in only four of the 10 square metres of this transect.

FROM THE ASHES

It will take several years of study to assess the recovery of native plants within Fitzgerald River National Park adequately. Far more seeds germinate than space allows for adult plants, so there will be intense competition among seedlings as they grow.

With some exceptions, it seems there is less cause for alarm about the impact of the 1989 wildfires than their apparently devastating aftermath first suggested. All of the plants inspected during the 1990 surveys have regenerated either from rootstock and/or as seedlings. This includes some of the rare and endangered species considered most vulnerable to frequent fire. In addition, some superb displays of flowering fire-opportunists were seen, including species of orchids and kangaroo paws not previously recorded. It will be many years before such vast areas of transient splendour will be seen again.

However, some species such as mallee eucalypts and the coastal moonah have produced lower densities of seedlings than expected. And only about a quarter of the park's 1750-plus plant species were seen in the survey time available.

While individual fires may appear devastating, it is the fire regime that should be of real concern for the conservation of the park's flora and fauna. The frequency, season and intensity of fires need to be managed carefully so that plants have time to grow, flower and establish a seed bank. These factors are being taken into account in the park's management plan, currently nearing completion.

Preliminary work by Ken Newbey following a fire in 1985 in the Mid Mount Barren area, together with the data acquired in 1990, provides a foundation for future regeneration studies. Long-term monitoring is sorely needed for the development of appropriate fire regimes, and the Fitzgerald River National Park provides an outstanding opportunity to pursue this essential research. ◘

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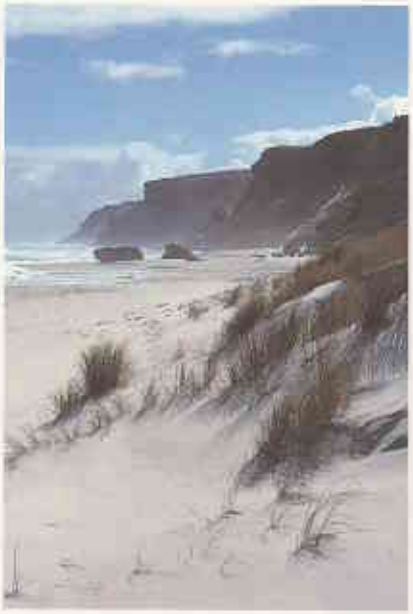


*Visitors from around Australia are discovering what those who live nearby already know - D'Entrecasteaux...*C'est Magnifique. *Turn to page 10.*

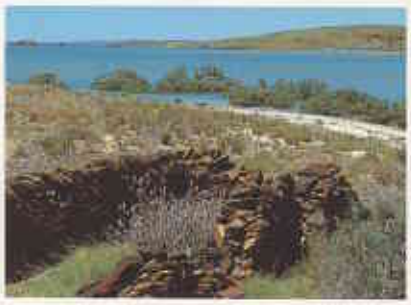
LANDSCOPE

VOLUME SIX NO. 3 - AUTUMN EDITION 1991

There's more to invertebrates than slugs, maggots and spiders. Turn to page 28 to find out just why invertebrates are so important.

What has happened to Fitzgerald River National Park since the 1989 wildfire? See page 34.

Seabirds nest on Pelsaert Island in the Houtman Abrolhos by the million. See page 17.



Explore the Dampier Archipelago, a group of rocky islands with a violent past and a wealth of wildlife. Turn to page 48.

FEATURES

REGULARS

COVER

Invertebrates play an important role in the ecosystem of WA's jarrah forest. Earthworms, termites and ants fragment leaf litter and mix organic matter. Some soil and litter invertebrates stimulate plant growth. Soil insects such as larval beetles feed on roots, stimulating the plants' growth rate. Our cover illustration is Philippa Nikulinsky's impression of this process at work in the jarrah forest.

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