KING'S PARK AND BOTANIC GARDEN

ALL COMMUNICATIONS TO BE ADDRESSED TO THE DIRECTOR
PERTH—WESTERN AUSTRALIA
TELEPHONE 21 5065

~~24th April, 1975.~~
9 May 1975
(more apologies)

Dr. J. G. Mosley
Director.
Australian Conservation Foundation
206 Clarendon Street,
EAST MELBOURNE. Victoria. 3002

Dear Dr. Mosley,

Thank you for your letter of 26 March 1975. There was a brief written report on wildflowers in 1973 and since then I have reported fragments verbally to the committee of the W.A. - A.C.F. Chapter. I drafted also an article which appeared (somewhat abridged) in Tom's Weekly, a copy of the original draft is attached.

The subject may be considered under three headings, although these interact.

1. Native flora on road verges.

This was investigated by an inter-departmental committee, whose report led to the amendment of the Main Roads Act effective in 1972. A sub-committee on road verge management research investigated the situation in certain Shires with selected vegetation types and made specific recommendations for the management of road verges under Shire control in these areas. It was also recommended that a plant ecologist be appointed to continue the research on an experimental basis and to be available full-time to advise the Shires. An advertisement for the position was drafted and an initial programme drawn up to effect a smooth transfer to the research officer from the sub-committee which has now lapsed. The Main Roads Department accepted the proposal and was prepared to vote $20,000 from its funds for the purpose. This project has been suspended ever since. The reason why has not been stated, but I believe it was due to a failure to reach agreement, whether the research officer should be appointed to the Western Australian Herbarium, which is part of the Biological Services Division of the Department of Agriculture and claims responsibility for ecological research on vegetation, or to the Forests Department which advances its claim because of long experience in control burning and its effects.

As a government officer I am in a somewhat embarrassing position because, except for the amendment of the Main Roads Act, nothing in the previous paragraph has been published, and is strictly speaking confidential. Therefore, I must ask you and the A.C.F. to refer to the matter with discretion. For instance it would be in order for the A.C.F. to express an opinion on the need fo r research into the management of road verges but not on why this specific proposal never became operational.

Ben — Please let me know what you think we should do (a) in answering the original query (b) in making further use of this good material.

2. Commercial trade in native flora

There is a demand for certain wildflowers and other parts of native plants both locally and overseas. The only attempt to discover the extent of the trade was made some years ago by the late Mr. Venning with the help of other members of the West Australian Wildflower Society (Inc). From the incomplete records of payments for road, rail, sea and air freight on consignments of these materials, it was clear that the trade was considerable, a figure of as much as two million dollars per annum for the total value of the trade has been extrapolated. That is not an impossible figure, on the other hand it cannot be sunstantiated at present. Trade statistics are not available. The forests Department has not released the number of licenses issued to pick or the quantities picked (it is unlikely that records have been kept of the latter and hence the reluctance to divulge the former). The Forests Department has authority to control only a fraction of the trade through the Protection of the Flora Act and has not had the personnel to enforce the Act. Until recently the Forests Department does not seem to have had any strong motivation to implement the Protection of the Flora Act, which will soon be removed from the authority of the Forests Department.

In brief I cannot add anything to the data on the volume of the trade and I do not think anyone could unless they had the powers of a Royal Commission or equivalent body to command information from all sources.

3. Protection of the Flora Act 1935-1938.

By proclamation under this Act all wildflowers or native plants are protected on Crown lands, State Forests, reserves and roads. Certain species are scheduled (all orchids, kangaroo paws, lambs' tails, Hovea, Kennedya, Boronia, Crowea, Diplolaena, Hibiscus, Cienfugosia, Chamaelaucium, Darwinia, Pityrodia and Leschenaultia and some other individual species) which means that they cannot be picked, sold, offered for sale or in anyone's possession unless they were obtained from private land with the written consent of the owner, lessee or licensee or from Crown land or State forest under permit or license from the Minister (in practice the Conservator of Forests).

Thus there is no protection for unscheduled wildflowers on private lane, where the owner is the final authority concerning scheduled native plants also. There are some obvious loopholes in the operation of the Act with respect to scheduled plants, licenses and the powers of honorary inspectors, apart from the laxity of the Forests Department in this regard until recently. For practical purposes the personnel of the Forests Department are located in the forested area of approximately 2 million ha situated in the South West corner of a State extending over nearly 252 million ha.

Following the representations of the Wildflower Society on commercial trade in the native flora, the Forests Department invited comment in 1972 and later announced that a new Protection of the Flora Bill was being drafted, which would take account of the comments received.

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However, when the present Court - McPharlin ministry succeeded the Tonkin government in 1974, it was announced that the administration of the Protection of Flora Act would be transferred to the Department of Fisheries and Wildlife (previously Fisheries and Fauna) in the portfolio of Mr.Stephens. Therefore, although this transfer has not yet taken place and the Act is still administered by the Forests Department, the drafting of the new Bill has been taken over by the Director of Fisheries and Wildlife, Mr. B.K. Bowen, who has put Mr. Powell in charge of collating information on the subject.

Currently I attach more importance to discussions with Mr.Powell in order - hopefully - to improve the new Bill and the schedule of species, than to going over the inadequacies of the old Act and in particular its implementation by the Forests Department. As an aside I would add that some of the difficulties experienced in the Forests Department's operation of the Act were due to circumstances beyond the control of the Conservator, who attempted to investigate and repair the situation albeit belatedly; nevertheless it was unfortunate that the Superintendent of the Extension Services of the Forests Department as spokesman on these matters often dealt with constructive criticism in a superficial and flippant manner, which has created much resentment and prejudice.

In addition to the draft article, I append further notes on each of the three topics. Together I hope that these will provide the sort of information you require, I have not attempted a comprehensive review of all aspects of conservation of the flora, such as whether there are adequate reserves, a topic dealt with by others elsewhere. Please use with discretion material in this letter, which has been indicated as confidential or which is critical of government departments, at least as far as I am associated with it, otherwise my position to obtain further information may be prejudiced.

Yours sincerely,

P.R. WYCHERLEY.
Director.

NATIVE FLORA ON ROAD VERGES

In some agricultural areas, especially in the wheatbelt, virtually the whole landscape has been cleared. Only a few salmon gums survive by roadsides and about homesteads. Some mallee reserves for firewood and fence posts remain. The loss of the roadside native flora is part of the wholesale habitat destruction. It is unrealistic to urge special attention at this stage to road verges, especially those of narrow roads under Shire control bordered on both sides by arable crops. In this region the first priority must be given to the retention of the remaining mallee reserves, which some farmers wish to absorb, because they have no use now for firewood or wooden fence posts. Next wherever possible the road reserves under Main Roads Department control should be widened so that the techniques for road verge regeneration can be applied. It may be possible later to extend from this base to other road verges.

There is no acute concern for the representation of the native flora on forest road verges. Excessive illegal picking may occur and the roads are often the channel of Phytophthora infection. Nevertheless forest roads (25,000 km) can be omitted from the present discussion.

There are thousands of kilometres of rural roads in the southwest of Western Australia within about 500 km of Perth, where the majority of the population resides and tourists visit. Excepting the extremes of wheatbelt and forest country, the majority of these rural roads run through mixed farming country (arable, grazing, orchards, vineyards), the original vegetation of sandheath and woodland survives in small patches. These are the roads, about 10% under control of the Main Roads Department and 90% under the Shires, where restoration of native vegetation along the road verges can have the greatest effect.

Sometimes it is claimed that the deterioration is apparent due to high speed travel instead of real. However, pedestrian observation shows that the deterioration is real enough. The reasons for restoration of native roadside flora are as follows:-

1. Conservation of native species per se

It must however be realised that only a fraction of the native flora can survive under even good roadside conditions. This is no substitute for adequate floral reserves, where natural communities are preserved.

More importance is attached to the role of roadside vegetation as cover for animal life, especially small birds, including migrants, reptiles and invertebrates, in what might otherwise be an inhospitable environment exposed to predators.

2. Embellishment of the landscape.

This is usually expressed in terms of tourist attraction and satisfaction, but there is now growing appreciation of the contribution a beautiful countryside can make to the quality of life and property values of the residents. The restored flora may be of direct benefit to beekeepers.

3. Road safety, economic construction and maintenance.

There is increasing evidence that impact absorbing scrub is safer than grass, although there are circumstances in which clear visibility may be more important, even so these should be considered in conjunction with other safety measures such as cautionary and mandatory roadsigns. Many motorists find the bush lined roads less strenuous to drive along.

Construction costs involved in retaining natural vegetation are comparable with traditional methods. Upkeep of bush verges is often less than those of grass.

4. Education and community participation.

If the foregoing are acceptable as adequate reasons for the regeneration of native flora on roadsides, there must be an educational programme to promote community acceptance of the objective and in turn education on the ecological basis of the methods of achieving the objective. Community participation in the implementation will be necessary. This may flow on into other community conservation projects. Education and community involvement in conservation may be regarded as ends in themselves or as desirable bonus by-products.

There is general agreement that the most common cause of degeneration in the roadside vegetation, loss of native species and variety of growth forms, is too frequent burning. These are usually protective burns, that is burning to reduce the fuel load and fire risk during the hot dry summer. In most cases these are spring burns with the wind and fairly to very hot.
When carried out every year, a variety of weed grasses especially annuals such as wild oats become established. Partly because they choke out the native species and partly because they are the only plants which can survive under such conditions anyway, these grasses and other weeds dominate the verges. This predominance of annual grasses is reinforced where 2, 4-D herbicide drifts from cereals. Grazing animals in general cut back shrub seedlings and give a further advantage to grasses, however, although some farmers graze the long paddock, others do not risk their cattle and sheep on the roadways. The effect of fertilisers drifting or leaching from agricultural land onto the verges is debatable. Superphosphate is the fertiliser most commonly applied, it is believed to have an adverse effect on native Proteaceae and perhaps on some Epacridaceae and Myrtaceae or at least when they are growing in competition with other plants, whereas superphosphate probably enhances the growth of native Leguminosae and perhaps Casuarina. Nitrogen alone or nitrogen and phosphate might be expected to favour grasses. Differential effects of potash are difficult to estimate, it is seldom applied alone, most native plants tolerate a very low potash status. Whether or not fertilisers affect the balance between native vegetation and weeds directly, there seems little doubt that annual weed grasses are able to utilise fertilisers and respond by an increased production of dry matter and hence of litter and fuel loading, which makes frequent burning by design or accident even more inevitable.

The methods of clearing for road construction using 'agricultural implements', disc ploughs, pin-wheel sidewinder rakes and rootrakes instead of dozer blades have been most successful in land where the native vegetation is still fairly well represented. These methods and the adoption of mild burning schedules prevent severe deterioration in the first place.

Very narrow road reserves and hence verges are difficult to regenerate and maintain. Where wide verges already exist or may be obtained by resumption of bordering land, which the Main Roads Department has shown a willingness to do, the adoption of milder burning schedules is often enough to start regeneration, especially in sandplain heath country. Light cultivation to bring long buried(and long viable) seed of Acacia and other legumes to the surface and to stimulate their germination is necessary on heavier soils or in areas long alienated to agriculture. In some cases deliberate planting may be necessary. After nursing these nuclei the native species may be enabled to spread.

The Main Roads Department in Western Australia has adopted a pioneering, experimental approach to the regeneration of verges under its control. It has adopted a crusading attitude also in trying to convince the Shires, dominated by farmers in many cases, to follow the examples demonstrated in practice. Of course some Shires have locally situations as bad as those in the wheatbelt and suffer disappointment if they attempt to regenerate the verges without an adequate basis in experience or experiment, Many more Shires believe that they are in that position without making an attempt to regenerate the verges or abandoning the attempt after withholding burning for one season only.

It would be misleading also to claim that cessation of frequent hot burns and the other methods mentioned are invariably successful. Success in the majority of conscientious attempts would be a fair claim. Advocates of these methods agree that increasing the proportion of successes and achieving them more cheaply and reliably must come by research.

The prognosis for improvement through research is favourable. Throughout the main area under discussion the alternation of wet and dry seasons is fairly definite and regular, much of the flora is fire-adapted in some measure and the natural vegetation in much of the area falls into reasonably well defined types.

COMMERCIAL TRADE IN NATIVE FLORA

There is commercial trade in the native flora as is evident from the sale of sweet scented Boronia (B.megastigma) and Kangaroo Paws (mainly Red and Green Anigozanthos manglesii) on the streets in spring, as well as a much larger selection including Banksia, Smokebush (Conospermum), Lachnostachys (Lambs Tails) Ptilotus (Mulla-Mulla) Qualup Bells (Pimelea physodes), Verticordia (Feather flowers) and many "Everlastings", either fresh or dried, in florists shops. There are dealers, who are engaged in an export trade, including official orders for the Australian exhibit at Expo 1967, 1970 and 1974.

Attempts have been made to assess the extent of the trade, but since those concerned have not had access to all sources of information, it can only be said that their findings give cause for anxiety among independent botanists. Some officers of the Forests Department (at present responsible for administering the Protection of the Flora Act) have argued that such anxiety is not justified, contending that the trade is self-regulatory because no one will kill the goose which lays the golden egg, that is that no one will over collect materials, either in general or in the more accessible areas, so as to endanger the future of the trade and with it the species themselves.

It is perhaps strange that those implementing the Act endeavour to allay fears by such an argument instead of publishing figures. This confirms, in our view, the need for an appropriate Commission of Enquiry.

Against the argument that no one will over-exploit a resource to extinction, this was not so historically in the case of the Passenger Pigeon in North America (Charles Darwin was one of the noted biologists who were mistaken in believing that its abundance was a protection against extinction)

There is of course grave anxiety that international over exploitation of whales will lead to their extinction. There is no compelling evidence that humanity will forego immediate profit to protect future resources.

At the parochial level some of the dealers are elderly and their children have entered other trades. There is no strong incentive for them to forego immediate profit in their business to conserve the flora. Of course if you talk to them, they pay lip-service to conservation. Indeed they may be sincere in this, but as I will try to show from the following examples, no one is actually able to define what degree of exploitation many species can stand without endangering their survival.

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Black Kangaroo Paw (Macropidia fuliginosa)

This endemic of the sandplains north of Perth is in great demand as a cut flower, especially for export. For the past twelve years the Seed Collectors of Kings Park have regularly attempted to obtain viable seed of this species growing in its natural habitat. In contrast to the other Kangaroo Paws (Anigosanthos species) most - but not all - of which set plentiful viable seed, Macropidia sets relatively few seed per plant in good seasons, and in the majority of seasons, it sets virtually no viable seed at all, there is almost zero germination in bad years, although the percentage germination is good in favourable seasons. Bad seasons are more numerous than good. The reasons why are not known, although we may guess that such factors as solar radiation, water availability and/or night temperatures during the seed maturation period are probably involved (lack of pollination-vectors does not seem to be the case in Macropidia). In good seasons it is the main flowering which sets seed. Late flowers do not set viable seed.

Macropidia plants often grow to large clumps, which can be divided artificially in cultivation and each portion grown with care to another large clump. However, such division does not occur in nature.

Recruitment of new plants in nature, including any genetic recombination which may be necessary for long term survival, is entirely dependent on the occasional and unpredictable set of viable seed. Whereas it is true that the majority of flowers cut for the trade would never set seed and cannot contribute to the survival of the species, it is also true that the almost complete harvest of the main crop of flowers from the accessible plants every year eliminates their reproduction in these areas. Leaving a few straggling blooms does not produce any seed.

It is not easy to bring Macropidia into cultivation, one must either patiently harvest seed each year until a good season occurs, or if permission is obtained, a large clump can be sacrificed in the wild, divided and transplanted. Even so care is needed.

If Kings Park had more research staff, i.e., was better funded for these purposes, we could probably find either methods of treating the plants to improve viable seed set or alternative methods of reproduction, e.g., by tissue culture. However, we are not in that happy position and in any case there are many other species needing attention.

Therefore all we can say is that, in our considered opinion and the present state of knowledge from over twelve years experience with this species in Kings Park and with private growers, the unrestricted cutting of flowers of M.fuliginosa will cut off its reproduction and survival in the more accessible areas, from which the trade will eventually move on to those inaccessible at present. Leaving a proportion of the flowers, especially late flowers, each year will not be enough. The plants must be allowed to produce their crops of viable seed in the occasional good years, which cannot be detected until after flowering and seed set, when it is too late to save flowers from cutting. This prognosis is so despite the apparent abundance of large clumps in the wild in some areas, although long lived the life of each plant is finite - and deaths are likely to be accelerated by accidents during flower harvest.

Morrisons or Feather Flowers (Verticordia)

The genus Verticordia shows the phenomenon described for Macropidia in an even more extreme form. On some occasions literally bags of apparently mature heads have been collected but only a very few plants have been raised. After cleaning and sowing, there was no germination or only one or two plants came up. Dissection showed most of the fruits to be empty of seed. Once after germination of samples in the nursery had failed, several bags of cleaned fruits (which are indehiscent) of Verticordia grandis were strewn along a bush verge, about six plants subsequently grew up. These may not have been ideal conditions for germination, but it is typical of experience with some species of Verticordia that the set of viable seed is one in many thousands of apparently good fruit or flowers.

Some Verticordia are quite easily propagated by cuttings in cultivation, but they do not sucker readily in nature and indeed do not seem to have any natural means of vegetative spread. The individual plants may branch above ground but the rootstocks do not creep or sucker or throw up new shoots distant from the original. Studies in other shrubby genera Hypocalymma (Myrtaeae) and Hibbertia (Dilleniaceae) have shown that some individual plants have persisted for about forty years, they grow a bit, then fire burns them down to the ground, the rootstock especially if of a lignotuberous nature regenerates and the shrub grows again, and the cycle is repeated. We have carbon dating evidence that some individual blackboys (Xanthorrhoea) are 500 years old, admittedly these have a different growth form, but probably many species in our flora are remarkably long lived.

Most Verticordia are sandplain plants. In some areas hectare upon hectare may be covered with the golden blooms of some species such as V.nitens in spring and summer. As far as we know every individual grew from a single seed. Yet it is impossible to harvest viable seed in practically useful or rewarding quantities, let alone commercially profitable amounts. There does not seem to be any lack of pollination-vectors, the environmental or genetic factors accounting for this exceedingly low seed set are as yet unknown. Some relatively short lived species, which are easily destroyed by fire, do set somewhat more seed, but still not in appreciable quantities.

The probable explanation of the occurrence of these extensive and fairly dense stands of species with a very low seed set is that prior to the arrival of the European settlers the sandplain habitat had been relatively stable for millenia. Periodic bush fires, occasionaly floods, constant wind erosion and accumulation of sand average out to give overall a fairly constant habitat. Individuals of the fire-resistant species of Verticordia could probably survive for one or two centuries under these conditions, so that an exceedingly low rate of reproduction by seed might suffice to maintain the population.

Agriculture has reduced the extent of the natual sandplain habitat and accordingly the population of the native plants, even if they are locally abundant in the remaining fragments. Furthermore these remaining areas are now subject to more disturbance than previously. It is very difficult to guess what factors operate or to estimate their effect. Direct injury of plants including trampling and handling in the course of flower picking may kill or at least accelerate the death of some plants. There is evidence that fertiliser drift may stimulate growth and cause heath plants to complete their life cycles more quickly. Fires started by humans whether by accident or intent are likely to be at different frequencies, intensities and seasons of the year, compared with naturally occurring fires, to which the flora has become adapted. Thus it is probable, even if not certain, that these plants will require a higher rate of reproduction and recruitment than sufficed previously in nature if they are to survive in these diminished and disturbed remnants. They might respond to these changed conditions by an increase in seed set, but there is no evidence of this from seed collection in the wild or in cultivation.

Although it is agreed that the majority of flowering stems of Verticordia gathered for the trade would never bear seed, nevertheless heavy exploitation for cut and dried flowers must inevitably reduce further the number of flowers which could set seed if left.

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These plants have a very low reproductive capacity and are already under pressure due to habitat destruction and modification. No justification can be found for a further reduction in reproductive capacity or increase in pressures on the species or their habitats. The superficial abundance of some of these plants obscures the situation.

It may be objected that we cannot substantiate our case with adequate scientific data, some steps in our argument are conjectural. However, the case for the other side, that unrestricted flower picking will not endanger species of Verticordia whose reproductive capacity is low, is entirely superficial and conjectural lacking any scientific data whatsoever. We wish we had the funds to produce the evidence and moreover solutions to the problem, such as cultivation on a commercially profitable basis. However, we do not see why the case for exploitation should be sustained for lack of evidence if the case for conservation fails for the same reason.

This phenomenon of low reproductive capacity in apparently fairly abundant plants has been found in other wildflowers in demand by the trade, for example the Smokebushes (Conospermum) and several Dicrastylidaceae Lachnostachys, Mallophora and Newcastelia.

Banksia Species

The young cones or flowering buds of Banksia laricina are collected as 'rosebuds'. The cones of about fifteen other West Australian species are taken as fresh flowers or for drying. In any case it is the reproductive part of the plant which is taken and the seed is removed from the site before it can form or fall. The majority of these species, except perhaps B.elegans, set fair amounts of seed if the cones are allowed to remain on the trees. They are not very long lived, say 20 to 30 years, before most collapse. They are rather intolerant of strong root competition, except possibly B.grandis. Many of them need fire to release seed from the cones and to clear away choking undergrowth. We have found for example that autumn burns promote the stocking of B.attenuata in the bushland of Kings Park(protective burns more frequently carried out in spring). Although at least half of the West Australian species of Banksia have been grown successfully from seed in cultivation including most of those required by the trade, commercial picking is virtually confined to wild plants.

The natural reproductive capacity of most Banksia species is good and recruitment is good where the burning regime approximates to that in their native habitats. Whether or not there are changes in the burning regime, the collection of immature, flowering or mature cones results in a proportionate reduction in reproductive capacity. In some cases this is near total. The seeds which survive to ripeness must provide the recruitment in competition with other components of the vegetation. In our opinion the Banksia species in demand cannot stand continuous exploitation and at the same time maintain their stocking. The harvest of the cones must be interrupted at intervals, seed allowed to mature and fall in conjunction with definite burning operations appropriate to the species and the conditions (fuel load, etc.) on site.

Dryandra species

Those species from which foliage only is taken may not be in too critical a condition. However, similar arguments as for Banksia apply to species such as Dryandra polycephala, from which every flower is cut in certain areas. As the popularity of other Proteaceae grows so will the problem spread to species of Grevillea, Hakea and Isopogon.

Boronia and Crowea

These are gathered mainly under license from State Forest. Independent observers are sceptical about the degree of supervision of pickers, some of whom use 'metal gloves' and other aids which are very damaging to the plants. In the absence of any data issued by the Forests Department, who keep the cards close to their chests, it is difficult to comment intelligently on the extent of the trade and on the effectiveness of the management of these areas, for the want of information critics can be made to look rather foolish.

Orchids

Few of the terrestrials native in the South West are spectacular as cut flowers and these are at risk mainly due to people digging them up to try to grow them, which is quite difficult.

Carnivorous plants

These are also under pressure from would-be growers. The Albany Pitcher Plant (Cephalotus follicularis) is also a curiosity for tourists to admire. Whole coach loads troop out to photograph easily accessible plants in reserves (tour leaders and coach drivers leave little cairns of stones and other 'secret' signs to mark the spot). Unfortunately most of the tourists have a wrong impression of the size of the pitcher plant and are unaware that it is terrestrial (perhaps confusing it with epiphytic Nepenthes from the Tropics), whatever the reason a coach load of tourists

is liable to damage more plants by trampling than they actually see and appreciate. This is perhaps a fringe aspect of the commercialisation of native plants.

Seed

Until last year Kings Park sold seed of native West Australian plants to the public, but this has now stopped. Kings Park continues to exchange seed free with other botanical institutions. These are seed surplus to our own requirements in bringing native species into cultivation. The number of packets distributed were :-

Period -	Botanic	Public
12 years 1963-74	32,529	71,716
Last year 1973-74	2,309	9,470

During the last year 1973-74 the Index Seminum listed 1278 species, at least one packet of seed of each of 1100 species were distributed. The Wildflower Society distributed seed at the same time and still does, but their list is shorter. There is also one small private company, which lists about 20 species. Most of the seed is collected from the wild, either State or private land, but a little is collected in the Botanic Garden of Kings Park or from private gardens. However, commercial seed production by cultivation is limited to relatively few species, e.g., the 'Everlastings', of which most of the seed production by cultivation is overseas, locally it is collected from the wild, except for a little in Kings Park.

There is a substantial demand for seed of native species, which if it leads to their successful cultivation is to be encouraged. Indeed commercial production of seed of the more popular species should be encouraged as a rural industry.

Nevertheless there must be reservations about the collection of seed of rare plants from the wild. Seed of Carnivorous plants, especially Cephalotus, but also Byblis and Drosera, are in great demand especially overseas particularly the U.S.A. and if any one attempted to satisfy this commercially, they could absorb the entire natural seed production of some species for years to come.

Permits to collect seed from State land stipulate that no plant is to be deprived of all its seed or that its survival is to be endangered. However, this is quite impossible to enforce and the temptation to take all the seed available in the case of rarities is obviously great and the practice can be very profitable.

Macropidia and other shy seed setting species could also be endangered by indiscriminate seed collection, whether for trade or by botanical institutions such as Kings Park, C.S.I.R.O or the Universities.

Conclusions

There is commercial trade in the native flora of Western Australia which is profitable to those engaged in it. There is no more objection to trade in and export of this product than of any other, provided that the survival of no species or community is thereby threatened. In the long run the only way that this may be ensured is to limit the trade, whether of cut flowers, dried foliage and fruit, or seed to materials which have been raised in cultivation or in bushland managed for the purpose (c.f. the management of native forests to produce timber as a renewable resource).

Although there is reluctance to cultivate native plants for the trade in (Western) Australia, Kings Park has received many enquiries from South Africa, California and Hawaii which indicate that growers there are seriously considering the commercial cultivation of our ornamental natives. Improvements in pineapple production in Hawaii have released land marginal for that purpose, which is now available for new crops. There is a precedent for Hawaii taking over the ornamentals of other countries very successfully. Hawaii has only two insignificant native species of orchids, but it has built up a multimillion dollar trade in orchid plants and flowers with Japan and the continental U.S.A on Arachnis, Cattleya, Dendrobium, Vanda and so on imported from Central America and South East Asia.

Concerning the management of privately owned bushland to produce native flora materials for the trade, this is done for Protea in South Africa. The main impediment to its implementation here is that the management of native flora does not count as improvement of a property for refund of land tax. Curiously it can be an improvement to clear an area by bulldozer and fire and then abandon it.

It may be argued that restriction of the trade to cultivation and managed areas would be premature, because insufficient is known about methods, and that it would be unenforceable, because plants taken from the wild could be used to supplement those from legitimate areas. The vascular flora of Western Australia is 6,500 species, that of the South West is 3,600 (including 2,400 endemics). About 1,200 (mainly from the South West) are grown in the Botanic Garden of Kings Park, which is situated on one very highly drained sandy soil type and obviously in one climatic region. It is evident from the work of amateurs that many more species could be grown, if there were more botanic gardens situated on lateritic

and heavy clay soils in the vicinity of Perth, let alone under the whole range of soil and climatic conditions in the State. As to the management of bushland, this is also the subject of research in Kings Park, moreover many investigations by other authorities and at the Universities can contribute to the development of appropriate methods. Indeed restriction of the trade to cultivation and managed areas would be a great stimulus to research in this direction. The growers could demand support for research to solve their operational problems.

As to enforcement, in the first place pickers and dealers in commercial quantities of the native flora will have to obtain access to legitimate areas of production, secondly they will no longer have licensed access to State land to harvest commercially and the owners of private property will be restricted to definite areas where they can give permission to take scheduled plants or material in commercial quantities. Enforcement always has some problems and people will try to evade it if the incentive is great enough. However, the proposal will be easier to enforce than the present, in which private owners can allow anything on their land and provide unlimited cover for abuse of poorly supervised, licensed collection from State land.

There will continue to be a need for licensed or permitted collection of specimens and seed for scientific purposes, but that is on a different scale to commercial exploitation. Permits can be withdrawn if abused.

If the export of native flora is as profitable as some have suggested, it could stand taxation to provide revenue to pay for the infrastructure and operation, including research as well as enforcement. A fee could be charged for the registration of approved areas of production by cultivation or from managed bushland. This fee should not be at a prohibitive level, but if appropriate amendments were enacted concerning Land Tax and the requirement to improve properties, a mutually profitable arrangement could be found for land owners managing bush in this way and to finance the service. The cost of licenses to pick from State land and the penalties for offences against the Native Flora Protection Act are at present ridiculously low. The penalties should be increased in any case and if certain areas of State Forest continue to be managed to produce Boronia for example, then the licenses to pick should also be at a realistic figure.

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Although some people believe it would be possible to introduce immediately restrictions of the trade to cultivated native plants and to collection from bushland registered for management to produce native flora (as distinct from any private land), those who insisted that so sweeping a change is impracticable will probably win the day. In which case increases in license fees, penalties and the levels of supervision and enforcement will all be necessary.

May 1975

NATIVE FLORA PROTECTION ACT

The present act 1935-8 is full of good intentions.

a) Scheduled native plants are protected on specified Crown Lands, State Forests, reserves and roads.

b) It is an offence to pick, sell or offer for sale any protected native plant, unless picked on private land with the written consent of the owner.

c) It is an offence to destroy any scheduled native plant except on private land by the owner, lessee or licensee or with his permission. That the destruction was due to an accident is a defence.

d) It is an offence to have for sale or to sell any wild flower evidently obtained by destruction of the native plant.

e) The Minister may license picking or destruction of protected native plants (with or without limitations as to time and place) for scientific or any other purposes approved by the Minister.

f) The Minister may appoint honorary inspectors, who, as well as any police officer or forest inspector, can examine any native plant in anyone's possession, inspect vehicles, detain materials, demand name and addresses, etc., to enforce the Act. Private land owners, lessees and licensees have such powers over their own land. The Commissioner of Railways may refuse to carry material evidently obtained illegally, detain same and refer to the Minister with name and address of person concerned.

g) Penalties, first offence up to $20, second offence up to $40 and third or subsequent up to $60.

Concerning b, a commercial gatherer who has written permission from one or more private land owners to collect wildflowers and native plants from their property has, if he wishes, 'cover' for the possession and sale of almost unlimited amounts of material. The private owners permit does not have to specify which native plants or what areas. Unless caught in the act of taking protected plants from Crown land, the gatherer has a defence for the possession of any native plant growing anywhere on the properties for which he has permits.

Concerning c, the Act is vague about the meaning of an 'accident'.

Concerning e, the permits issued to collect from Crown land, State forests, etc., for scientific purposes usually have no restrictions as to species or time and only a few regarding place, the main exceptions being National Parks. There is also an injunction not to destroy plants or take all their seed. The lack of expiry dates mean that permits are virtually for life.

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The licences to pick commercially are often vague about quantities and sometimes about species, locations and periods.

Concerning 'f', very few honorary inspectors have been appointed. Most police and forest officers say that they are too busy with other duties to enforce this Act, or that since there are so many loopholes and the penalties are so light, it is not worth the waste of time and money to prosecute. Private owners seldom take action leading to prosecution, they prefer to settle the matter on a personal basis. It is doubtful if the Government Railways have ever exercised their powers under the Act. In any case interstate shipments are by road or air and overseas by air.

Concerning 'g', the penalties are low compared with the commercial or 'heritage' value of the materials.

Any amendment of the Act or new Act, should ensure that permits or licences issued by private owners or State authorities to collect commercial quantities are explicit as to the species of native flora, maximum quantities which may be taken, the expiry date and the areas concerned. Furthermore the areas concerned should be registered beforehand indicating that the native flora is being grown there or retained there either by cultivation or by management of bushland. Such uses of land should be allowed as improvement for the purposes of the Land Act. An appropriate fee might be charged for registration of private land as a source of native flora. A realistic fee or royalty should be charged for licences to collect from State land managed for its native flora. The prohibition on destructive methods of gathering wildflowers and native flora should be a condition of permits and enforced.

Permits to collect specimens and seed from State land for scientific purposes as issued to officers of the West Australian Herbarium, Museum, Wildlife Service, Kings Park, the Universities, C.S.I.R.O. and amateurs should be issued on an annual basis, renewable annually. (Some professional botanists, especially those in government service, claim that they should continue to be issued with 'life' permits without expiry date. However, it does not involve much more trouble to issue permits annually, the renewal could be automatic for the privileged categories provided that they continued to observe the regulations and remained in their particular occupations. After all libraries and many other organisations issue permits, etc., on an annual basis. This enables a far more definite check to be maintained on the number of permits issued at any one time and to whom).

Under the present system not only have many permits been issued without expiry dates but some of them allow the holder to delegate his powers and duplicate the permit indefinitely).

Finally, whether by the appointment of honorary inspectors and/or by extending the powers to a much wider range of State and local government officers, there must be a definite attempt to enforce whatever legislation there is.

Where have all the wildflowers gone?

Many people, both long time residents and occasional visitors, believe that the roadside display of wildflowers has deteriorated in Western Australia. They say that when they were children, they used to drive for miles along rural roads and the verges were lined with trees and bush, but now both miles and wildflowers are a thing of the past on the roads.

It would be easy enough to dismiss it all as exaggeration and nostalgia. However, the Government of Western Australia and various authorities, in particular the Main Roads Department, have taken the matter seriously. An inter-departmental committee reported in 1971 and the Main Roads Act was amended to give the Commissioner control over the whole of the main road reserves, including the verges, instead of just the carriageway. This has enabled the Department to implement conservation measures learned by experience.

Before describing these remedial measures, the origins of the present situation should be traced. Although some rural roads run through forest and other Crown land, most are bordered by private property especially farms. Fires occur sooner or later wherever there is a build up of fuel. Farmers naturally regard the fires which may start in roadside vegetation as threats to their fences and indeed their whole property, if a wild blaze jumps the fire-break.

Thus the practice of frequent, often annual, burning of road verges has become established in many areas often with the approval of the local bushfire control boards. These areas do not remain bare and are soon invaded by grasses and other annual weeds of agriculture, such as wild oats. Their rank growth at the expanse of the native vegetation is encouraged by frequent disturbances such as the ploughing of fire-breaks outside the fence in the verge,

by ripping to control vermin, by the drift of herbicides like 2, 4-D, by the leaching of fertilisers from adjoining farmland, as well as by annual burning. Under these conditions the weeds and grasses build up a more rapid accumulation of fuel and present an even greater fire risk than the displaced native vegetation. When this stage has been reached the continuation of annual burning seems to be the only solution. However, there is evidence to suggest that badly degraded verges can be rehabilitated by careful management, particularly in the control of burning operations.

As the loss of the roadside wildflowers caused dismay, so other questions were asked, especially about road safety. Large roadside trees have claimed the lives of many victims in 'collisions of moving vehicles with stationary objects'. When a tree is right on the edge of a road for fast traffic, it must go for safety's sake. But if the tree is far back by the fence, it may only be a hazard if there is nothing to absorb the energy of a vehicle leaving the road before hitting the tree. Weight for weight (i.e. fuel load for fuel load) shrubs absorb more energy than grasses. Grasses burnt in spring offer little resistance to vehicles running off the road in summer. Varied and colourful native vegetation is easier on the eye than weeds and grasses. This makes driving less enervating and so contributes to safety as well as to the attractiveness of the countryside to tourists.

Even so, this is not the whole story. Whilst it is inevitable that the construction of new roads to meet the needs of the community will disturb the existing environment, the philosophy adopted by Main Roads engineers is to 'minimise disturbance and maximise repair'. They have 'borrowed' agricultural implements, such as disc ploughs and pin wheel sidewinder rakes. They fitted their bulldozers with root rakes instead of conventional blades. These enabled them to chop up the existing vegetation into a mulch and to move this and the topsoil aside and store it

loosely compacted for future use. The road itself became a catchment supplying water to the 'seed-bed' verges. Strong regeneration of native shrubs and wildflowers from roots and seed followed. Thereafter the verges have been burnt at less frequent intervals than hitherto and at times when the fire is less likely to be severely damaging. Light cultivation is sometimes applied. These methods have resulted in rapid stabilisation of the construction scars. Only potentially dangerous trees near the roads are removed.

The success of these methods when building roads through bushland has been striking. Even more surprising was that these methods worked, although less rapidly, when the roads were made through previously cleared land. Seed of wattles in particular retain their viability for years and germinate when the soil is disturbed. In other cases the native plants spread from small remnants. It may be necessary to plant starter-patches in bad cases. Occasional light cultivation and a reduced frequency of burning help the regenerative process. Locally there are still problems due to 2, 4-D drift, vermin control or sheep grazing the 'long paddock'.

These regenerated roadside verges do not and are not meant to preserve examples of the whole flora. They do provide safer and more pleasant driving conditions. They support a wealth of birdlife and many small animals, vertebrate and invertebrate. Surprisingly, the satisfying road with safe and enjoyable verges is not necessarily more expensive to construct, and any additional initial costs can be offset by a reduction in recurring maintenance costs. For example, the establishment of native vegetation which forms a good ground cover can effectively reduce roadside erosion. The old one-chain (20m) wide road and reserve is inadequate to carry a major highway and vegetated road verges. The reserves have been widened in many cases to meet immediate

and future needs. The Commissioner now controls all activities within Main Road reserves, including burning. In the case of very wide verges farmers may be allowed to plough a fire-break in the verge to protect the fence as well as (but not instead of) making the fire-break inside his own property required by law.

The Commissioner's new powers came into operation as recently as 1972 and the methods of road construction including regeneration of the native roadside flora are also comparatively recent. Time is needed for them to take effect. There has not been an overnight transformation, but now results are beginning to appear along substantial stretches of road.

Less than one tenth of the length of rural roads in Western Australia are Main roads, the greater part are controlled by the Shires. Therefore 'bringing back the wildflowers' to the roads of the Wildflower State will need the concern, care and co-operation of local authorities and land owners. The general public have a part to play too. Firstly by making every effort to prevent roadside fires, which are so easily caused by carelessly discarded cigarettes or matches. Fires should be lit only at proper barbecue sites. Vehicles should draw off the road in parking areas set aside for the purpose. Although litter may not interfere directly with the regeneration of the wildflowers, it definitely reduces the appreciation of them. A great start has been made with the restoration process. Everyone must keep it moving.