

Action Statement

Flora and Fauna Guarantee Act 1988

No. 84

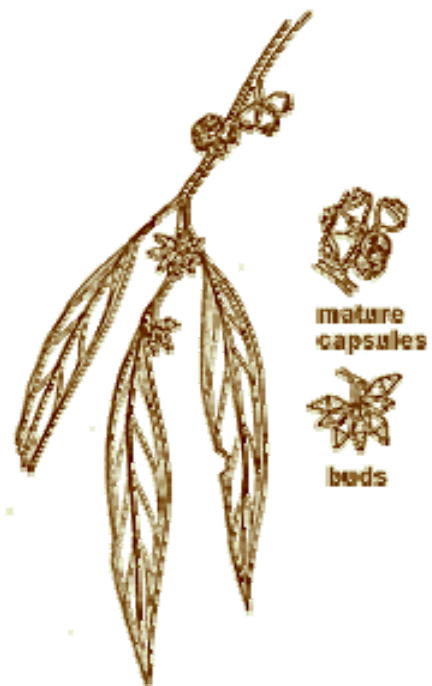
Black Gum *Eucalyptus aggregata*

Description and Distribution

Black Gum, *Eucalyptus aggregata* Deane & Maiden, is a small to medium-sized tree growing to about 25 m in height. It has dark, rough bark which usually persists to the smaller branches, a short straight trunk, and a fairly dense, well-formed crown. Its fruits are small (4-5 mm wide), hemispherical and almost stalkless (Costermans 1983, Chippendale 1988). The narrow (1-2 cm wide) glossy leaves contain leaf oils with a distinctive, clove-like odour. Trees live for well over 100 years and may live for several centuries.

The only known natural occurrence of Black Gum in Victoria is at Woodend*. All stands are within 4 km of the town, on both public and private land. The species occurs on the Five Mile Creek floodplain and several of its southern tributaries (notably the Slatey Creek floodplain), and along one tributary of the Campaspe River. It grows typically on recent alluvium associated with floodplains and narrow flats, in so-called 'frost pockets'. Occasionally it extends up adjacent lower slopes onto Ordovician sandstones and shales to about 8 m above the watercourse. Its natural habitat typically comprises riparian woodland which it may dominate or codominate with Swamp Gum *Eucalyptus ovata*.

* A specimen of uncertain identity in the National Herbarium of Victoria was collected in 1965 from 'near Tipperary Springs, Daylesford' (now in the Hepburn Regional Park). However, a recent preliminary search in the area did not reveal any Black Gums. The Slatey Creek population is situated on a narrow floodplain tributary of Slatey Creek, remarkably with no defined watercourse and no stream entrenchment; this floodplain woodland has a partially intact native understorey



(non typical of other areas). The site has the best remaining representation of natural habitat for Black Gum in Victoria and is therefore significant. The floodplain supports about 500 Black Gums, including 20 mature trees, and is bounded on both sides by intact dry eucalypt forest. The ecological boundary between the vegetation communities is preserved.

Black Gum also occurs on the south and central tablelands of New South Wales (Costermans 1983), about 500 km from Woodend. It is presumed that occurrences were connected during a cooler period in the past, and that Woodend now supports a contracted, relict population. Despite their long isolation, an analysis of the morphology (fruits, leaves, etc.) and leaf oils of the Woodend and NSW populations found they are virtually identical (Simmons 1985). Black Gum appears to have been genetically stable for a long time, although a limited amount of hybridisation with Swamp Gum *Eucalyptus ovata* has occurred. Hybrids have smooth, peeling bark and intermediate morphology, but are rare (Simmons 1985, author pers. obs.).

Conservation Status

Current Status

Gullan et al. (1990) Endangered in Victoria

SAC (1991) Threatened

Black Gum is listed as a threatened taxon on Schedule 2 of the *Flora and Fauna Guarantee Act* 1988.

Reasons for Conservation Status

Black Gum is restricted in Victoria to a small area around Woodend, where it has been subjected to extensive clearance, stock grazing and weed invasion. Its population is now much reduced and fragmented.

There is a lack of adequate reserves containing Black Gum. Two small reserves have been established on public land (part of a Council reserve on Five Mile Ck west of Calder Highway,

and part of a rail reserve at the Quarry Rd bridge), although neither is a legislated conservation reserve. The rail reserve site is a 'Native Plant Reserve' set up by V/Line and is demarcated by signs. The Council site has no signs and does not have any formal status as a Black Gum reserve.

The total population of Black Gum is estimated to be 9000 to 10 000 plants. The size of the breeding population has not been determined but is considered to be several thousand. Census results in relation to land tenure are shown in Table 1. Mature trees are defined as having diameters exceeding 50 cm, immature trees have diameters less than 50 cm but are over 2 m tall, and seedlings are less than 2 m tall. These figures are somewhat conservative since some sites were difficult to access due to woody weed invasion and individual seedlings can be overlooked where seedling numbers are large.

A comprehensive survey of Black Gum carried out in 1994 by Biosis Research indicated that the species is locally common to abundant within its restricted geographic range. Of the total population of just over 9000 plants, 64% of plants were on private land, 19% were on roadsides under the responsibility of the Macedon Ranges Shire (which are accessed and used by several other management authorities, such as Powercor), 12% were on council reserves, 2% were on Western Region Water Authority land, and 3% were on the Melbourne–Bendigo railway reserve managed by the Public Transport Corporation. The native plant reserve on rail land at Quarry Road (on both sides of the line) has about 110 plants, including 18 trees. The reserve has historical value as the site of first collection, but the site is small and disturbed, and lacks a natural watercourse.

The species is regenerating at all 27 known sites. The population size appears to be increasing, since mortality rates are low and seedlings comprise 32% of the population. This may be attributed largely to an increase in the number of 'hobby' farms in the area, which has generally led to a reduction in grazing pressure, from intensive

Table 1. Number of Black Gum Trees and Seedlings within Various Land Categories, 1994

Land tenure	Mature Trees	Immature Trees	Seedlings	Total Trees	Total Plants	% of Total
Council reserves	103	438	535	541	1076	12%
Road reserves	115	1027	535	1142	1677	19%
Rail reserve	39	206	61	245	306	3%
Water authority	74	68	7	142	149	2%
Private land	659	3416	1745	4075	5820	64%
Total	990	5155	2883	6145	9028	100%

sheep and cattle grazing to light horse grazing. Council land and roadsides have been protected from grazing for many years, and Black Gum is also regenerating on those lands.

However, Black Gum regenerates poorly in residential gardens and roadside nature strips because of the intensive management of these areas. Because much of its restricted geographic range is likely to be converted to residential areas over the next 20 years, the presently favourable situation with regeneration may not last. The current 'pulse' of regeneration may be the last major recruitment event for some time. Black Gum is also subject to several threatening processes, including grazing, weed invasion, road construction and residential development. The prognosis for the species is therefore not entirely favourable. A reduction in population size is expected in the long term, and must be planned for.

In its final recommendations on the nomination for listing, the Scientific Advisory Committee (SAC 1993) determined that Black Gum is:

- significantly prone to future threats which are likely to result in extinction; and
- very rare in terms of abundance or distribution.

Major Conservation Objectives

The major conservation objectives over the next 10 years are to:

- facilitate the natural regeneration of Black Gum;
- double the number of Black Gums on public land, to 3000;
- restore or improve the condition of Black Gum habitat particularly in council reserves on Five Mile Creek; and
- ensure that at least 50% of current Black Gum populations are protected within a reserve system.

Management Issues

Ecological Issues Specific to the Taxon

Characteristics of the Species

There is little published on the biology and ecology of Black Gum apart from a valuable comparison of Victorian and New South Wales populations (Simmons 1985). The effects of fire on Black Gum are unknown, but fire is not thought to be a significant pressure.

Reproduction

Black Gum reproduces by seed and is likely to be pollinated by a range of insects, birds and mammals. Larger trees appear to flower and set fertile seed reliably. Maximum seed fall is thought to be in late summer - early autumn (R. Baker pers.

comm.). Seedlings are usually common where grazing pressure is low or absent and where the ground cover is not too dense. It reproduces readily given the opportunity and does not have complicated management requirements for reproduction. Existing stands may require fencing to enable natural regeneration, but the fencing can be removed when the saplings are large enough.

Threatening Processes

Grazing

Grazing by sheep and cattle eliminates seedlings. Large, intensively grazed commercial farms on the town fringes have no regeneration below existing mature trees. Light grazing by horses appears to be compatible with seedling regeneration, as horses might avoid the seedlings; however, this has not been firmly established. Horses might also reduce competitive herbaceous weed cover. While horses can facilitate weed dispersal, the areas containing Black Gum where grazing occurs generally have an introduced understorey already present. Horses do not appear to eat bark from existing Black Gum trees or otherwise damage them to any significant extent.

Stream-bank erosion

Native vegetation clearance has been widespread and extensive in the Five Mile Creek catchment, and almost every stream is entrenched and liable to lateral erosion. Remnant Black Gums and other woody plants are vulnerable to undermining.

Weed invasion

The entire habitat of Black Gum has been altered by extensive weed invasion. Almost all understorey vegetation below Black Gum is introduced, due to a management history of prolonged grazing and other disturbances. In some sites Black Gum is the only survivor of the original vegetation community.

A wide range of woody and herbaceous weeds compete with Black Gum seedlings for space, light and water. The overall effect is usually to restrict rather than prevent regeneration. Woody weeds include Blackberry (*Rubus discolor*), Gorse (*Ulex europaeus*), willows (*Salix* species), Hawthorn (*Crataegus monogyna*) and English Broom (*Cytisus scoparius*). Black Gum seedlings are occasionally protected from stock when growing in low Gorse thickets. Shrubs would have originally been rare or localised in the riparian woodland habitat of Black Gum, the only indigenous shrub being Prickly Tea-tree (*Leptospermum continentale*), which is now rare in the area.

Herbaceous vegetation may also inhibit regeneration. Native grasses originally dominated the ground layer in riparian woodland, particularly Common Tussock-grass (*Poa labillardieri*), but this

species has been almost eliminated by prolonged grazing. Rank growth of introduced pasture grasses such as Canary-grass (*Phalaris aquatica*) and Cocksfoot (*Dactylis glomerata*) supports few or no seedlings. The most widespread and abundant weed in the district, in both remnant native vegetation and pasture, is Bent-grass (*Agrostis capillaris*), but Black Gum regenerates readily through this low-growing grass. Successive periods of intensive grazing by stock are likely to reduce competition from introduced grasses and promote seedling establishment and recruitment.

Residential development

Black Gum populations on private land are directly threatened by residential development. The species regenerates poorly in residential gardens and on nature strips because of intensive management, and much of its restricted geographic range is likely to be converted to residential area over the next 20 years.

The local shire can require that trees are retained during planned residential development. Many stands will fall within (as yet) undesignated public open space, usually along drainage lines. It is not clear how Black Gum will respond to the altered stream hydrology associated with increased catchment runoff.

Trees (mature and immature) may remain locally common within house blocks and on nature strips throughout their life. During this period they will remain part of the breeding population, but mainly as pollen sources only. Ultimately they will die out unless spontaneous seedlings are tolerated (and perhaps encouraged) by residents. An alternative is to plant new trees, but planted stands would gradually become gardens rather than natural, self-sown occurrences.

Road construction and maintenance

Road maintenance regularly eliminates seedlings on road edges or reduces seedlings to coppice through slashing. This is unavoidable and is not considered a problem given that Black Gum is, in general, regenerating satisfactorily away from the verges on road reserves. The planned Calder Highway Woodend Bypass and its associated minor road upgrades will have a long-term impact on Black Gum, as habitat will be removed. The selection of a bypass alignment (known as E4A) east of the town was announced by the State Government in 1994.

Tree planting

There is considerable scope for planting Black Gum on sites where it has been completely removed, but planting is generally unnecessary given the regeneration capability of the species. Plantings might also undermine the integrity of Black Gum

stands as natural, self-sown occurrences, as they gradually become managed plantations through human intervention. Self-sown populations undergoing natural selection have more ecological integrity than plantations of tube stock raised in benign nursery environments, and are also cheaper to achieve. Eventually, however, planted trees are themselves likely to produce seedlings, thus lessening the distinction between natural and planted populations.

Inappropriate species have also been planted in some cases, such as Manna Gum (*Eucalyptus viminalis*) (which is rare or absent in Black Gum habitat) adjacent to and among natural Black Gum regeneration on Five Mile Creek. In order to maintain ecological and evolutionary processes as far as possible, tree planting should only occur on sites where Black Gum has been eliminated. An exception to this is on sites where regeneration near existing trees is prevented by heavy weed cover that is impractical to manage. Tree planting also requires considerable research and planning, as the composition of the original vegetation should be reproduced as nearly as possible.

Planting Black Gum outside its restricted geographic range (4 km from Woodend) or outside its natural habitat (flood plains) may have horticultural value but would be of little value for the conservation of the species.

Wider Conservation Issues

Protecting Black Gum will help improve the condition and water quality of the Five Mile Creek catchment, primarily through the fencing of creek frontages. Herbicide use must be in accordance with health and safety regulations, especially near housing and waterways.

Black Gum provides habitat for a range of native fauna that will benefit from conservation actions. For example, the Mountain Galaxias (*Galaxias olidus*), which is listed under the *Flora and Fauna Guarantee Act 1988* would receive direct benefit from conservation of Black Gum streamside habitat, and riparian vegetation (including Prickly Tea-tree) would be indirectly protected.

Because of the proximity of remaining Black Gum stands to local urban areas and the past active involvement of local groups and the local municipality in its management, this species provides a ready example of species management in the urban environment.

Social and Economic Issues

Public Authorities

The planned Calder Highway Woodend Bypass E4A will affect an estimated 110 trees, including 8

mature trees (Yugovic and Meredith 1992a, 1992b; Yugovic et al. 1993). These figures refer to trees within defined development zones and represent maximum values. Not all trees would require removal in every situation. The Environment Effects Statement indicates that bypass construction would make extensive use of Black Gum in the landscaping of floodplain crossings.

Where Black Gum occurs on road reserves, several agencies (Macedon Ranges Shire, Powercor, and telecommunications and water supply agencies) will have to take responsibility if the effective management for Black Gum retention and regeneration is to be achieved. Coordinating management and ensuring that all relevant staff (from planners to work crews) and contractors understand what is required of them presents major logistic problems. Issues will need to be dealt with through periodic meetings and other forms of liaison, and through appropriate training and guidelines for staff and contractors.

Private land

Initial fencing and weed management costs for landowners must be considered, but these conservation measures are voluntary and will benefit the community in the long term through improved stream and wildlife habitat quality. Also, fencing is only required until seedlings are established, so materials could be recycled and areas will not be permanently removed from grazing. Fencing streams susceptible to erosion is considered to be sound land management (see LCC 1991). Financial assistance may be obtained through the Department of Natural Resources and Environment under the Land Protection Incentives Scheme.

Community involvement

Promoting the Black Gum reserves as recreational and educational venues has social and economic value. With ecological management, these reserves can contribute to a sense of local identity for Woodend, contribute to its tourist economy, and foster community awareness and participation.

The conservation of Black Gum and waterway environments around Woodend depends on interest and support from the community, and requires a collaborative approach to the identification and resolution of issues. Community participation in protecting Black Gum on public land would extend and complement actions taken by the Shire and other agencies.

Residential development

Restraints placed upon the future development of residential areas because of Black Gum conservation may prevent potential economic gain. The existence of Black Gum on land with potential

for residential development does not necessarily preclude development, but suitable planning controls should be considered to protect Black Gum populations.

Previous Management Action

Black Gum was first recorded in Victoria in 1964, from the rail reserve 1.8 km south-east of Woodend railway station (Carolan 1964). For some time this site, next to the Quarry Road bridge (pictured in Costermans 1983), was the best known location of the species. In the late 1970s, La Trobe University documented several more sites. In 1985 the former Department of Conservation, Forests and Lands undertook further survey as part of a general conservation study of the Macedon Ranges Shire, and recorded more sites (Allan 1985). A survey by Biosis Research in June 1994 (Yugovic 1994) is the most detailed yet undertaken.

Two small reserves have been established on public land (a section of the Council reserve on Five Mile Creek west of Calder Highway, and a section of the rail reserve at the Quarry Rd bridge), although neither is a legislated conservation reserve. The rail reserve site is listed under the Public Transport Corporation's register of rare plant reserves and is signposted. The Council site has no sign and is not a formal Black Gum reserve.

Active management for conservation of the species has been confined to woody weed control, rubbish removal and tree planting on the Council reserve on Five Mile Creek west of the Calder Highway, undertaken by the Woodend Beautification Committee in a largely voluntary capacity between 1985 and 1990 (R. Baker, *pers. comm.*). An additional 320 trees have been planted and habitat restoration works have commenced in this area. There have been no attempts to facilitate natural regeneration, although such regeneration has occurred in the Council reserve.

Intended Management Action

Conservation actions on private land will be necessary, but an increasing emphasis will need to be placed on public land management to ensure the survival of reasonably large and self-maintaining populations. NRE's Port Phillip Region (PP) and the Flora and Fauna Program (FF) will facilitate the following actions:

Private Land

1. Facilitate the natural regeneration of Black Gum by encouraging landowners and managers to:
 - control woody weeds and protect seedlings where possible,
 - encourage the temporary fencing of stands and individuals of Black Gum, including creek frontages, and

- use schemes such as Landcare, Land Protection Incentive Scheme and Land for Wildlife. (PP, FF)
2. Promote the use of conservation covenants on title to protect Black Gum stands. (PP)
 3. Ensure that the Black Gum stand north of Island Farm Rd (the Slatey Creek population) and fringing buffer zones are managed sensitively preferably in public ownership or under covenant. Investigate acquisition of the central crown allotment as this contains most of the site and buffer zones of dry forest. (PP)

Roadsides

4. Facilitate natural regeneration of Black Gum by controlling woody weeds and avoiding seedlings during slashing (except on road verges) as resources allow. (PP, with Macedon Ranges Shire)
5. Include Black Gum management in road construction and maintenance programs. Prepare work specifications to protect trees and regeneration.
6. Liaise with relevant government service agencies (Powercor, NRE, Western Region Water Authority, Telecom) to ensure protection of Black Gum regeneration where possible. (PP, FF)

Council Reserves

7. Support Macedon Ranges Shire in establishing Black Gum reserves on Shire land at Five Mile Creek east of the Calder Highway (i.e. Ruby McKenzie Park and council land to south) and west of the Highway. These support 10.7% and 1% of the wild population respectively. (PP)
8. Establish a Public Authority Management Agreement or other management regime for these reserves that ensures natural regeneration by:
 - controlling woody weeds,
 - erecting appropriate fencing,
 - removing exotic trees, and
 - promoting recreational, tourist and educational potential compatible with conservation. (PP, FF)
9. This should include intensive management of areas of Kangaroo Grass (*Themeda triandra*) and Spear Grass (*Stipa rudis*) near the creek, which are of botanical and geomorphological interest.

Railway Line

10. Ensure that all rail reserves containing Black Gum are listed on the PTC schedule of rare plant reserves, including:

- extending the reserve at the Quarry Road bridge across Quarry Road to include further large specimens of Black Gum, and
 - establishing a second native plant reserve on the railway reservoir site, a triangular shaped parcel of rail reserve west of the highway. (PP)
11. Undertake cooperative management of these reserves to:
 - ensure natural regeneration of Black Gum on the rail reserve,
 - control woody weeds and avoid seedlings during slashing where possible, and
 ensure that conservation values are considered in proposed construction and maintenance works (use work specifications to protect Black Gums where appropriate). (PP, with PTC)

Western Region Water Authority

12. Facilitate the natural regeneration of Black Gum through a Public Authority Management Agreement between NRE and MRWA, by fencing trees and creek frontages from stock, controlling woody weeds and protecting seedlings where possible. (PP, FF)

Statutory Planning

13. Investigate the possibility of amending the Macedon Ranges Shire Planning Scheme to take into account conservation measures for Black Gum, including:
 - introducing overlay controls to maintain and extend habitat, and to limit intrusion of buildings and works,
 - reviewing subdivision controls to limit the fragmentation of land in areas of significant habitat,
 - considering the introduction of density controls which allow existing subdivision rights to be preserved by allowing equivalent exclusions or transfer of rights to suitable locations, and limiting the extension of rural or residential development except adjacent to existing towns, and supplying a maximum of 10 years vacant land margin. (PP)

Community Involvement

14. Prepare an information sheet on Black Gum for distribution to schools and residents. (PP, FF)
15. Encourage local teachers and students to become involved in searching, monitoring and protective works. (PP, FF)
16. Support the Friends of Five Mile Creek and local field naturalist groups through schemes such as Botanic Guardians. (FF, PP)

Tree Planting

17. Promote the planting of Black Gum on former Black Gum sites. (PP)
18. Encourage the extensive use of Black Gum in the landscaping of flood plain crossings on the planned Woodend Bypass. (PP)
19. Discontinue tree planting on public land within 100 m of existing Black Gum trees and within proposed Black Gum Reserves, except in carefully designated plantation areas or where regeneration is prevented by heavy weed cover which is considered impractical to manage. (PP, with land managers)
20. Promote the protection of natural regeneration as an alternative to tree planting. Locate and protect spontaneous seedlings, for example by spot-weeding or marking with stakes or tree guards. (PP)

Survey

21. Organise further searches for Black Gum in suitable habitat near Tipperary Springs, Daylesford. (PP)
22. Search the Campaspe River, particularly south of the Five Mile Ck confluence, for Black Gum (PP)

Monitoring

23. Monitor the size structures of populations and habitat conditions at selected locations, collecting data compatible with that obtained in 1994. (PP)
24. Monitor the effects of fire. (PP)
25. Establish a database of reserves, properties and allotments with Black Gum. Include data on tree numbers in allotments as it becomes available in addition to data on trees planted. Encourage community participation in providing information. (PP)

Other Desirable Management Action

26. Investigate the possibility of combining the reserves across the Calder Highway by removing all exotic trees at the Five Mile Creek crossing and replanting to native vegetation, using Black Gum and Swamp Gum in particular. (PP)
27. Prepare a large-scale photomosaic of Woodend showing the detailed distribution of Black Gum for viewing in a public place such as the Shire offices. (PP)
28. Investigate the of impact of various levels of livestock grazing and determine the palatability of seedlings. (PP)

29. Investigate restoration of the original vegetation community at Black Gum sites, using the Slaty Creek population as a guide. (PP)

Legislative Powers Operating

Legislation

Flora and Fauna Guarantee Act 1988 — Provides for protected flora controls, the listing of species, communities or threatening processes, and the preparation of an action statement. Black Gum is listed as 'protected flora' and as 'threatened' under the Act.

Planning and Environment Act 1987 — Provides for agreements on land use controls, as covenants on title, between landholder and the responsible authority, with input from the referral authority such as NRE. Provides also for the application of planning scheme controls by the Macedon Ranges Shire.

Victorian Conservation Trust Act 1972 — Provides for the inclusion of conservation covenants on land titles.

Licence/Permit Conditions

The Black Gum population on public land is sufficiently large to support some commercial seed collection. Permits for collecting seeds of protected flora from public land must be obtained from NRE. These controls prevent over-collection of seed from significant populations and damage to habitats.

Consultation and Community Participation

Statutory authorities such as the Public Transport Corporation, VicRoads and the Western Region Water Authority have been consulted in the preparation of this action statement. These authorities will also need to be involved with ongoing management.

Officers of the Macedon Ranges Shire helped with the 1994 census and the preparation of this action statement. As most of the actions to conserve this species affect private or council land, the Shire will need to be involved in management.

Local naturalists from groups such as Friends of Five Mile Creek and other members of the community have provided information and participated in surveys. The Port Phillip Catchment and Land Protection Board will be kept informed of management actions affecting its responsibilities.

Implementation, Evaluation and Review

The Regional Manager of NRE's Port Phillip Region is responsible for implementing this action statement. NRE does not directly manage any public land with Black Gum. The Macedon Ranges Shire is the major agency with powers and

responsibility to achieve the stated conservation objectives. NRE's Port Phillip Region and the Shire will coordinate actions and share resources to achieve these objectives over the next five years. NRE's Flora and Fauna Branch will monitor the implementation of the action statement and review progress near the end of this period.

This action statement will be reviewed in 2002.

Contacts

Management

Flora and Fauna Planner, Port Phillip Region, DSE

Shire of Macedon Ranges

Friends of Five Mile Creek

Biology

J. Yugovic, Biosis Research

D. Simmons, Deakin University

R. Baker, field naturalist/tree propagator, Woodend

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Further information can be obtained from
Department of Sustainability and Environment
Customer Service Centre on 136 186.

Flora and Fauna Guarantee Action Statements are
available from the Department of Sustainability and
Environment website: <http://www.dse.vic.gov.au>

This Action Statement was first published in 1997
and remains current. This version has been
prepared for web publication. It retains the original
text of the action statement, although contact
information, the distribution map and the illustration
may have been updated.

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