

# THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

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The Minister's delegate approved this Conservation Advice on 16/12/2016.

## Conservation Advice

### *Pterostylis* sp. Botany Bay (A.Bishop J221/1-13)

Botany Bay bearded greenhood

#### Conservation Status

*Pterostylis* sp. Botany Bay (A. Bishop J221/1-13) (Botany Bay bearded greenhood) is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) effective from 16 July 2000. The species was eligible for listing under the EPBC Act as on 16 July 2000 it was listed as Endangered under Schedule 1 of the preceding Act, the *Endangered Species Protection Act 1992* (Cwlth).

Species can also be listed as threatened under state and territory legislation. For information on the current listing status of this species under relevant state or territory legislation, see <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

The main factors that make the species eligible for listing in the Endangered category are its low population size, very restricted distribution and continuing decline due to the impact of ongoing threats such as fire, habitat loss and degradation.

#### Description

The Botany Bay bearded greenhood is a terrestrial orchid with a slender flowering stem to 20 cm. The leaves are narrow oval, 37 mm long, and 12 mm wide. Up to 12 leaves form a basal rosette that ascends the stem. The flowers are solitary and a translucent green with dark green veins. The species is very similar to *Pterostylis plumosa* (plumed greenhood), however the plumed greenhood is only found on the western slopes and tablelands of NSW and has almost erect flowers which are larger and more robust than those of this species (OEH 2016).

#### Distribution

The Botany Bay bearded greenhood is restricted to the Sydney region of New South Wales where it is known from one location in the Kamay Botany Bay National Park on the Kurnell Peninsula. The species was first collected at Maroubra in 1908, however it has not been recorded in Maroubra since that time (OEH 2016). Current population numbers are not known, however in 1998 surveys indicated that there were approximately 65 mature individuals of the species and 84 juveniles (NPWS 2001).

#### Relevant Biology/Ecology

The Botany Bay bearded greenhood is found on moist flat sites on sandy soils derived from sandstone. It is found in association with vegetation communities such as coastal heath dominated by *Melaleuca nodosa* (pricklyleaf paperbark) and *Baeckea imbricata* (a shrub). The species occurs in small localised populations, often within the heath where the canopy allows filtered light to reach the ground. All species of *Pterostylis* are deciduous and die back to a fleshy rounded tuber in dry or hot conditions. The orchid produces a basal rosette of leaves from mid-autumn, followed by a flowering stem. This genus of orchids is usually pollinated by small winged insects such as gnats and in some cases by mosquitoes (Jones 1993). Flowering usually occurs from August to September. If the flowers are pollinated, the above ground parts of the plant wither and dry following flowering or seed dispersal and the plant persists as an underground tuberoid through summer. The timing of emergence, flowering and withering is dependent on the prevailing weather conditions (OEH 2016).

## Threats

The Botany Bay bearded greenhood is threatened by habitat loss, degradation and fragmentation, invasive species and altered fire regimes. These threats and their effects on the Botany Bay bearded greenhood are described in the table below. The threats outlined below have corresponding conservation management priorities.

Table 1 – Threats impacting on the Botany Bay bearded greenhood in approximate order of severity of risk, based on available evidence.

Threat factor	Threat type and status	Evidence base
Fire		
Too frequent burning	potential current	Fires between July and September will destroy the above ground parts of the plant. A single fire at this time of year is unlikely to kill individuals but repeated fires are likely to eliminate populations, as there is no opportunity for plants to replenish their tuber reserves or to flower and set seed (NPWS 2001). As Botany Bay National Park is adjacent to urban development there is an increased risk of frequent fires caused by arson, accidental fires from discarded cigarettes and hazard reduction activities (NPWS 2001). Frequent fires may also change the drainage patterns in the soil and alter the microhabitat to the disadvantage of the Botany Bay bearded greenhood (NPWS 2001).
Long fire intervals	potential current	As well as urban development occurring adjacent to the Botany Bay National Park, an oil refinery is located adjacent to the national park and pipelines from the oil refinery occur close to the habitat of this species. Consequently, fire suppression activities are given a high priority in the park to protect life and property. The absence of fire or infrequent fires may be a threat to the species as it may alter the habitat of the species at known sites by altering the species composition and the age structure of the vegetation (NPWS 2001). Many perennial plants may have a competitive advantage under these circumstances. A denser understory or a build-up of leaf litter may also limit available light and space for the species. In the long term, the light levels under a dense canopy of plants may be too low for understory species such as this orchid to survive (NPWS 2002).
Habitat loss and degradation		
Habitat degradation related to unrestricted access	potential current	Uncontrolled site access by bikes and walkers could lead to the degradation of the species habitat. The habitat of the Botany Bay bearded greenhood is coastal heath on shallow sandy soils of the Bundeena soil landscape. The erosion hazard for these soils is high to very high (Hazelton et al. 1990). On Malabar headland at Maroubra, which is potential habitat for the species, rubbish dumping and numerous tracks have led to habitat degradation (Godden Mackay 1997).
Urban development	potential current	Potential habitat for the Botany Bay bearded greenhood at Malabar Headland at Maroubra may be threatened by residential development as the site is zoned as residential land (NPWS 2001).

Other threats		
Illegal collection	potential current	As a threatened orchid the Botany Bay bearded greenhood is a potential target for collectors. Given the estimated very low numbers of mature individuals of this species, the population could not sustain any collection. Collection of native species is illegal in NSW without a permit (NPWS 2001).

## **Conservation Actions**

### **Conservation and Management priorities**

#### Fire

- Ensure that prescribed fires occur only within the habitat during the dormant phase of the Botany Bay bearded greenhood's life cycle.
- Fires must be managed to ensure that prevailing fire regimes do not disrupt the life cycle of the Botany Bay bearded greenhood; that they support rather than degrade the habitat necessary for the Botany Bay bearded greenhood; that they do not promote the invasion of exotic species; and that they do not increase the impacts of grazing.
- Physical damage to the habitat and individuals of the Botany Bay bearded greenhood must be avoided during and after fire operations. Ensure the retention of the surface soil organic material and leaf litter as it is important for many terrestrial orchids that rely on these materials for regeneration from seed, particularly *Pterostylis* species.
- Fire management authorities and land management agencies should use suitable maps and install field markers to avoid damage to the Botany Bay bearded greenhood.
- Avoid any use of fire research and other activities that impact upon the persistence of the population unless there is evidence to show the impact would have a positive and enduring effect on the Botany Bay bearded greenhood's persistence. Anecdotal evidence suggests that fire may be an important factor in flowering and seed production (NPWS 2001).

#### Habitat loss and degradation

- Prevent habitat disturbance to mitigate known trampling and soil erosion by mountain bikes and walkers. Control access routes by installing fencing, barriers or gates to suitably constrain public access to known sites on public land and manage access on private land and other land tenure, to prevent rubbish dumping, accidental trampling and damage to the Botany Bay bearded greenhood and its habitat.
- Ensure land managers are aware of the Botany Bay bearded greenhood's occurrence and provide protection measures against key and potential threats.
- Ensure that Randwick Council considers the potential habitat of the Botany Bay bearded greenhood in consideration of any residential development that may occur at Malabar Headland in Maroubra.
- If any new populations are identified on private land or other land tenures, negotiate with the relevant land owners/managers to put in place protection measures for the population through a habitat management strategy; joint management agreement; a property management plan; or a voluntary conservation agreement.

### Illegal collection

- Ensure confidentiality of the known locations of the Botany Bay bearded greenhood is maintained to reduce the potential threat from illegal collection.
- Provide signage in publically accessible areas to encourage the public to not collect plants or damage plants in any way.

### Seed collection, propagation and other ex-situ recovery action

- Establish plants in cultivation in appropriate institutions such as the Royal Botanic Gardens Sydney.
- To manage the risk of losing genetic diversity, undertake appropriate seed collection and storage in appropriate institutions, such as the NSW Plantbank, Royal Botanic Gardens Sydney, and determine viability of stored seed. Best practice seed storage guidelines and procedures should be adhered to, to maximise seed viability and germinability.

### Stakeholder Engagement

- Identify who the relevant stakeholders are e.g. traditional owners, local members of the public, private landowners, public land managers, industry, non-government organisations or developers.
- In undertaking surveys for new Botany Bay bearded greenhood populations, seek to involve volunteers and community groups in the survey effort.

### Survey and Monitoring priorities

- More precisely assess population size, distribution, ecological requirements and the relative impacts of threatening processes.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Design and implement a monitoring program or, if appropriate, support and enhance existing programs. Monitoring should occur during the peak flowering and fruiting period from August to September (OEH 2016).
- Implement an annual census to monitor emergence and resprouting success.
- Undertake surveys of known populations as well as potential habitat to locate any additional populations to more precisely assess population size and distribution.
- Monitor the size and structure and reproductive status of populations at different stages in the fire cycle, taking opportunities to monitor after planned and unplanned fires (where they occur) and improve the understanding of the fire response of the Botany Bay bearded greenhood.

### Information and research priorities

- Investigate options for establishing in situ and/or ex situ populations of the Botany Bay bearded greenhood.
- If new populations are identified, establish representative populations in cultivation in appropriate institutions such as botanic gardens and investigate the reproductive status, longevity, fecundity and recruitment levels for the species in order to form a view on the

resilience of this species to known and potential threats and adjust conservation actions as required.

- Undertake seed germination and/or vegetative propagation trials to determine the requirements for successful establishment, including disturbance and mycorrhizal fungi requirements that may include future translocation to reinforce existing populations or establish new populations in secure locations.
- Undertake research into pollinator activity and the ecological requirements to support pollinator communities of the Botany Bay bearded greenhood.
- Investigate options for linking, enhancing or establishing additional populations.
- Improve understanding of the mechanisms of response to different fire regimes and identify appropriate fire regimes for the conservation of the Botany Bay bearded greenhood by undertaking appropriately designed experiments in the field and/or laboratory.
- Where appropriate, use available information and research on the fire responses among related (e.g. congeneric) or functionally similar species to develop fire management strategies for conservation.
- Precise fire history records must be kept for the habitat and extant populations (confirmed and suspected) of the Botany Bay bearded greenhood.
- Identify optimal fire regimes for regeneration (vegetative regrowth and/or seed germination) of the species, and the species' response to other prevailing fire regimes.
- Research the effects of public access on the species where this is likely and the effects are unknown.

### **References cited in the advice**

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### **Other sources cited in the advice**

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