Persoonia mollis subspecies maxima

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The following information is provided to assist authors of Species Impact Statements, development and activity proponents, and determining and consent authorities, who are required to prepare or review assessments of likely impacts on threatened species pursuant to the provisions of the *Environmental Planning and Assessment Act* 1979. These guidelines should be read in conjunction with the NPWS *Information Circular No. 2: Threatened Species Assessment under the EP&A Act: The '8 Part Test' of Significance* (November 1996) and with the accompanying "Threatened Species Information" sheet.

Survey

Persoonia mollis subspecies *maxima* is easily identifiable during both flowering and non-flowering periods of the plant's lifecycle. Therefore, there are no seasonal survey constraints for this plant. Seedlings may not be easily identifiable until they are approximately 0.5-1m high, particularly 2–4 years following fire.

Survey for *P. mollis* ssp. *maxima* should not be limited to areas within the existing distributional limits, and there should have two objectives:

1. to determine presence/absence; and, where the plant is present,
2. to determine the spatial distribution and age classes (seedlings, juvenile, adults) of individuals at a site.

If a gully or side slope is being searched, each escarpment bench should be traversed. Creeklines up to the first escarpment bench, and intermittent drainage lines should be intensively searched.

Where *P. mollis* ssp. *maxima* is present, plant heights and approximate age of individuals should be recorded (see NSW NPWS 2000 for method of estimating plant ages).

Viable but dormant *P. mollis* ssp. *maxima* seeds may be present in the soil seedbank, particularly where there are mature individuals within 1km. If *P. mollis* ssp. *maxima* individuals are identified, an investigation into the disturbance history (particularly fire history[1]) of the site should be conducted to determine whether the apparent (that is, visible) population size is an accurate indication of the potential population size (that is, including the seedbank).

Life cycle of the species

The biology of *P. mollis* ssp. *maxima* is described in the draft Recovery Plan and summarised in the attached profile. The lifecycle of *P. mollis* ssp. *maxima* is likely to be disrupted should any of the following occur:

Habitat loss - *P. mollis* ssp. *maxima* does not reproduce vegetatively, therefore the plant's persistence depends on the production and germination of viable seed. Seeds are stored in the seedbank until germination, however, *Persoonia* seeds possess a dormancy mechanism which is poorly understood (see Wasley 1997). If suitable habitat is present, *P. mollis* ssp. *maxima* seeds may germinate as a consequence of disturbance, however, the triggers which break dormancy and encourage germination are unknown. This plant has not been successfully grown from cuttings or seed,. therefore, propagation and replanting is not a suitable ameliorative strategy.

The significance of a particular action which physically destroys individual plants will require (i) an examination of the number of plants to be destroyed in

[1] Fire history data for the Hornsby Heights area is available from Hornsby Shire Council

relation to the proportion of the relevant subpopulation/population sizes[2]; and (ii) a discussion of whether and how the potential seedbank will be affected. That is, whether the seedbank will also be destroyed permanently or whether seeds are likely to germinate following disturbance.

Fire - disrupts the lifecycle of *P. mollis* ssp. *maxima* as a result of halting the process of seed production and seedbank replenishment. *P. mollis* is fire sensitive, which means that adult plants are killed by fire and a minimum fire-free interval is required for individuals to mature and produce sufficient viable seed to replace the seedbank. Current estimates are that reproductive maturity is not reached until approximately eight years following germination, however, peak maturity is not likely to be reached until 12-15 years (NSW NPWS 2000). Repeated disturbance of populations, particularly at intervals of less than 12–15 years, is likely to result in population declines. Fire intervals of less than 8 years are likely to result in *P. mollis* ssp. *maxima* extinction.

In relation to fire management, Wasley (1997) further notes the importance of maintaining for long periods of time unburnt "refuge" areas in Persoonia habitat which act as seed sources and facilitate re-invasion of seed.

Seedbank disturbance as a result of removal of leaf litter layer of the soil profile, may disrupt the lifecycle of *P. mollis* ssp. *maxima* as *Persoonia* seeds are predominantly stored in the upper layers of the soil profile (Wasley 1997). An example of this kind of disturbance may include fuel reduction activities such as turbo-mowing and the removal of understorey vegetation. Impacts of this type of disturbance on the *P. mollis* ssp. *maxima* seedbank may be minimised by retaining a proportion of the leaf litter occurring at a site.

Habitat modification - affects the lifecycle of *P. mollis* ssp. *maxima* by altering the ecological processes within suitable habitat. Habitat modification may include: weed invasion, reduced water quality/urban runoff, and increased sedimentation of creek/drainage lines. Since *Persoonia* species are pollinated by relatively few genera of native bees, an activity which resulted in the loss or inhibited movement of native bees within *P. mollis* ssp. *maxima* habitat has the potential to significantly affect the lifecycle of this plant.

Threatening processes

"*High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition*" is listed in the NSW *Threatened Species Conservation Act* 1995 as a key threatening process in the which may affect *P. mollis* ssp. *maxima*. *P. mollis* ssp. *maxima* is fire sensitive and is thus vulnerable to high frequency fires. Other identified threats to the *P. mollis* ssp. *maxima* populations include: inappropriate hazard reduction burning & associated activities (eg trail construction, turbo-mowing), habitat degradation (eg weed invasion & reduced water quality), and rubbish dumping.

Viable local population

Research on the mating system in *P. mollis* indicates that this plant is partially self-compatible (that is, not requiring pollen from other plants) owever, self-pollination rarely results in successful seedset (Krauss 1994). The nature of reproduction in *P. mollis* indicates that:

this plant requires pollen from other proximate *P. mollis* ssp. *maxima* individuals to produce viable seed (that is, the breeding system promotes outcrossing);

- pollen dispersal is restricted and genetic neighborhood sizes from pollen are small; and
- seed dispersal (primarily by birds and wallabies), and the germination requirements probably combine to promote a randomly mating population which facilitates gene flow (Krauss 1994a).

The minimum size of a viable local population of *P. mollis* ssp. *maxima* is unknown. However in the absence of

[2] A description of populations, including population numbers, age structure and disturbance history is provided in the draft Recovery Plan.

external recruitment, isolated individual plants which experience little or no interaction with other *P. mollis* ssp. *maxima* individuals are unlikely to be viable in the long term.

Significant area of habitat

Due to the restricted natural distribution of this species, all areas of habitat for the three major populations are considered significant.

Isolation/fragmentation

Three populations of *P. mollis* ssp. *maxima* have been described in the Recovery Plan (NSW NPWS 2000). These populations are isolated from each other as a consequence of ridgetop urban development. These populations have been further described as management subpopulations (NSW NPWS 2000). Within each subpopulation *P. mollis* ssp. *maxima* generally has a continuous distribution, of varying densities. Management of *P. mollis* ssp. *maxima* habitat should aim to maintain the continuity of habitat between individuals within subpopulations, and avoid artificially creating new subpopulations/ populations.

Precise estimates for pollen/seed dispersal distances are unknown for *P. mollis* ssp. *Maxima,* however, Krauss (1994a) has suggested that gene flow is facilitated by seed dispersal over greater distances than pollen dispersal (that is, pollen pool sizes are low). Fragmentation /isolation of *P. mollis* ssp. *maxima* individuals/ subpopulations is likely to result in disruption to the plant's lifecycle as a consequence of reduced reproductive success by producing fewer opportunities for outbreeding. This will ultimately cause inbreeding depression in small populations as a consequence of consanguineous mating, that is, mating among close relatives[3].

[3] Preliminary data (Krauss 1994a) suggests the possibility of an increase in mating between close relatives in *P. mollis* ssp. *maxima* compared to other populations of *P. mollis.*

Regional distribution of the habitat.

P. mollis ssp. *maxima* habitat occurs in the Sydney Basin Bioregion in vegetation communities that are restricted to the steep dissected gullies on the Hornsby plateau and Hawkesbury Sandstone. This vegetation has been described by Benson and Howell (1994) as the Sydney Sandstone Complex (Map Units 10ag & 10ar) on the Sydney 1:100,000 map sheet. These communities are generally associated with sheltered hillsides and moist gullies (10ag) and dry plateaus and ridges (10ar), and often intergrade with each other. *P. mollis* ssp. *maxima* appears to be restricted to sheltered aspects, which limits the availability of suitable habitat across the region.

Limit of known distribution

The distributional limits of *P. mollis* ssp. *maxima* are described in the draft recovery plan (NSW NPWS 2000). The northern limit occurs at Lyrebird Gully (Berowra Valley Regional Park) and the southern limit occurs at Cockle Creek (Ku-ring-gai Chase National Park). Further survey may identify additional occurrences of *P. mollis* ssp. *maxima* resulting in range extensions.

The restricted distribution of *P. mollis* ssp. *maxima* may be explained through natural evolutionary development, lack of targeted survey or alternatively restricted habitat requirements which are currently unknown[4].

There is some evidence that the *P. mollis* ssp. *maxima* populations have been reduced as a consequence of past inappropriate fire management, however, the extent of this impact is unclear.

The loss of individuals from the limits of the plant's distribution may result in a range contraction, further isolation, and potentially the loss of genetic diversityAdequacy of representation in conservation reserves

Individuals within each population of *P. mollis* ssp. *maxima* are represented in conservation reserves across their range. The populations occurring in the Calna

[4] see (NPWS 1999)

Creek and Cockle Creek catchments are considered to be adequately conserved. The Berowra Creek population of *P. mollis* ssp. *maxima* is not considered to be adequately conserved across its range.

Critical habitat

Critical habitat has not been declared for *P. mollis* ssp. *maxima.*

For further information contact

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