Fairy lanterns

Thismia rodwayi

TASMANIAN THREATENED FLORA LISTING STATEMENT

Image by Oberon Carter.

Scientific name: *Thismia rodwayi* F.Muell., *Vict. Nat.* 7: 115 (1890).

Family: Burmanniaceae

Status: *Threatened Species Protection Act 1995*: **rare**

Environment Protection and Biodiversity Conservation Act 1999: **Not listed**

Tasmanian NRM Regions: **North, South**

Regional Forest Agreement: **Priority species**

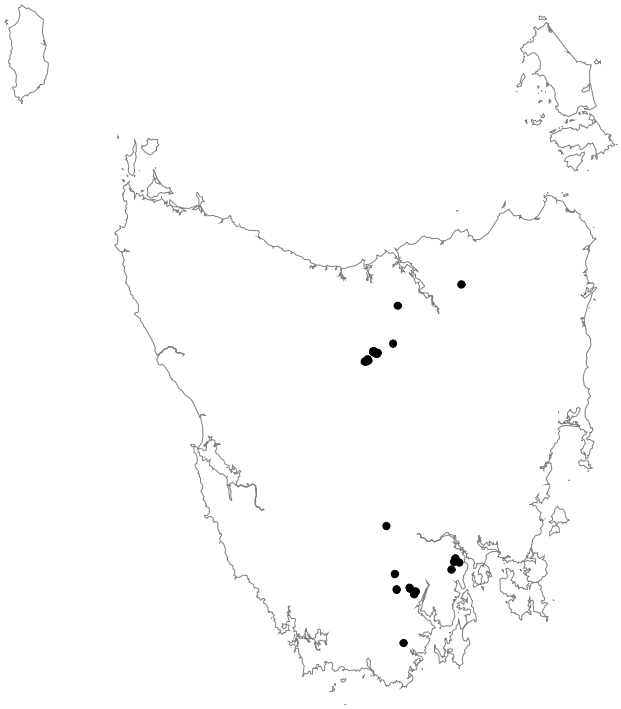

Figure 1. Distribution of *Thismia rodwayi* in Tasmania.

Figure 2. *Thismia rodwayi*. flower. Image by Oberon Carter.

DESCRIPTION AND ECOLOGY

Thismia rodwayi is a very small herb of the Burmanniaceae. The common name 'fairy lanterns' refers to the appearance of bright orange flowers resembling lanterns on the forest floor. The species flowers from October to December.

Thismia rodwayi lacks chlorophyll and is therefore incapable of photosynthesis. Plants derive their energy from a saprophytic fungus.

Identification

The species can be identified when flowering or earlier from buds that appear as small red-orange globules just above the soil surface. The following description is adapted from Conn (1994).

Flowers: Plants produce brightly coloured flowers that are 10 to 18 mm tall and have an obovate longitudinally striped floral tube (the 'lantern'), surmounted by six perianth lobes. The three perianth lobes arch inwards and cohere at the top, and outer lobes spread (Figure 2).

Leaves: The vegetative part of the plant is entirely subterranean and colourless.

Roots: The roots are about 1 to 1.5 mm thick and 4 to 15 cm long. They give rise to erect flower stems (0.5 to 3 cm) – these bear about six colourless leaf-like bracts, which increase in size toward the terminal flower (Figure 3).

Figure 3. *Thismia rodwayi* plant showing flower (occurs above–ground) and roots (occurs below-ground). Image by Justine Shaw.

Thismia rodwayi has historically been found only during targeted surveys or else incidentally, for example during fungi or snail searches. Roberts *et al.* (2003) and Wapstra *et al.* (2004) describe appropriate methods to search for *Thismia rodwayi*.

Confusing Species

There are no confusing vascular plants in Tasmania, and no vascular plants share the same soil/litter interface. Species of *Thismia* are occasionally confused for fungi.

DISTRIBUTION AND HABITAT

Thismia rodwayi occurs in Tasmania, Victoria, New South Wales and New Zealand, with possible occurrences in southern Queensland (Curtis & Morris 1994). In Tasmania, the species is known from several disjunct localities: Mt Arthur, Mt Wellington, Mt Field, Little Denison River, Meander, Cluan Tier, Black Sugarloaf, Hastings Caves, and Franklin-Glen Huon (Figure 1 and Table 1).

The species has a linear extent of c. 237 km and extent of occurrence of c. 10,390 km^2 (with an area of occupancy of < 20 ha).

Thismia rodwayi occurs in wet eucalypt forests, dominated by various species including *Eucalyptus delegatensis*, *E. globulus*, *E. regnans*, *E. obliqua*, *E. ovata* and *E. viminalis*. Understorey characteristics vary, and may include *Nothofagus cunninghamii* (myrtle beech) and *Atherosperma moschatum* (sassafras) and/or a range of broad- or narrow-leaved shrubs.

Site suitability for *Thismia rodwayi* appears to depend on a combination of characteristics of the understorey and soil/leaf litter composition. Potential habitat includes wet eucalypt forest with an understorey dominated by any of the following: *Pomaderris apetala* (dogwood) *Olearia argophylla*, (musk), *Coprosma quadrifida* (native currant), *Bedfordia salicina* (blanketleaf) or *Acacia melanoxylon* (blackwood). The species has been found to occur on well-developed litter layers (often 1 to 3 cm thick) over moist friable loamy soils (usually with very low rock/pebble content) (see figure4). Decaying logs are often a feature of *Thismia rodwayi* sites.

Geology of *Thismia rodwayi* sites is variable and includes dolerite, dolomite and sedimentary sequences such as mudstone. The altitudinal range of the species is 300 to 650 m above sea level. Plants generally occur on gentle to moderately steep slopes, independent of aspects. The site above Hastings Caves is somewhat unusual in that it occurs on very steep slopes with small to large dolomite outcrops, with *Thismia rodwayi* growing in rock crevices.

The widespread distribution of *Thismia rodwayi* appears to correspond with the distribution of suitable forest types. Additional surveys might locate the species in other areas of potential habitat. Since the work of Roberts *et al.* (2003), three new sites have been located within only a few kilometres of previously recorded locations. A recent record from Cluan Tiers extended the range in the central north of Tasmania by 12 kilometres to the northeast of the previously recorded sites in the Meander area. The recent record from the Black Sugarloaf area north of Westbury extended the range by 34 kilometres to the north-northeast of the Meander sites, whilst the record from Hastings Caves extended the range south by 33 kilometres. These new sites, whilst in large patches of native forest, are separated from nearest known sites by relatively large areas of cleared land.

Figure 4. *Thismia rodwayi* in flower *in situ* (arrowed). Image courtesy of the Forest Practices Authority.

Table 1. Populations of *Thismia rodwayi* in Tasmania.

Popn.	Location	Tenure	NRM region	1:25 000 mapsheet	Year (last) and first seen	Area of occupancy (ha)	Number of mature plants#
1	**Black Sugarloaf (Birralee)** 1 site	Private property (PFRP conservation covenant)	North	Bridgenorth 4841	(2005) 2004	1-2	c. 20
2	**Cluan Tiers** 1 site	State forest	North	Cluan 4839	(2004) 2004	0.0001	2
3	**Jackeys Creek/Warners Sugarloaf** 5 sites	Jackeys Creek Forest Reserve/State forest	North	Quamby Bluff 4638	(2004) 2002	c. 1	c. 21
4	**Archers Sugarloaf, Meander** 11 sites	State forest (MDC protection forest)	North	Quamby Bluff 4638	(2004) 2002	c. 2	c. 51
5	**Meander River/Meander Falls Road area** 5 sites	State forest/Meander Forest Reserve	North	Quamby Bluff 4638	(2004) 2002	c. 1	c. 50
6	**Mt Field** 1 site	Mt Field National Park	South	Dobson 4627	(1923) 1923	unknown	unknown
7	**Mt Wellington area** 4 sites	Private property/Wellington Park	South	Longley, Hobart 5024, 5225	(2005) 1890	c. 1	1
8	**Glen Huon/Franklin/ Denison Rivulet area** 8 sites	State forest/private property	South	Geeveston, Glen Huon, Lonnavale 4822, 4823, 4824	(2004) 1980s	c. 1	12
9	**Hastings Caves** 1 site	Hastings Caves State Reserve	South	Hastings 4819	(2004) 2004	c. 1	14
10	**Mt Arthur Road near Lilydale** 1 site	State forest	North	Lisle 5243	(1960s or 70s) 1960s or 70s	0.0001	2

NRM region = Natural Resource Management region. #Maximum number of plants recorded in any one year.

Several recent searches in potentially suitable habitat close to known sites did not locate the species (e.g. the species was not recorded from 80 1 m^2 plots over about 10 ha in the Jackeys Creek area about 1 km from several "reliable" sites) (M. Wapstra pers. comm.).

RESERVATION STATUS

Four known records occur on public land in gazetted reserves (Jackeys Creek Forest Reserve, Wellington Park, Mount Field National Park). The precise location of Rodway's 1890 site (von Mueller 1890a,b) is unknown but is likely to be on public land within Wellington Park.

One recently discovered population in the State's central north (near Birralee) is on private property subject to a conservation covenant under the *Nature Conservation Act 2002*, established under the Private Forest Reserves Program (DPIWE 1998).

POPULATION ESTIMATE

Thismia rodwayi is known from approximately 26 sites from 7 disjunct areas of Tasmania. It is difficult to estimate total abundance of this species because of its mostly subterranean habit. Less than 200 *Thismia rodwayi* have been reported but with further surveys the total known population in Tasmania may increase. This is based on the widespread distribution of records and the presence of tens of thousands

of hectares of potentially suitable wet sclerophyll forest (Wapstra *et al.* 2005). Plants emerge during most years at known sites, however abundance varies from year to year (Wapstra *et al.* 2004). Surveys at a site in the Meander area located 3 flowers in 2002, no flowers in 2003, and 25 flowers in 2004.

It is likely that the detection of additional populations will only alter total population estimates by a small amount because all known subpopulations tend to be of low abundance.

CONSERVATION ASSESSMENT

Thismia rodwayi meets the criteria for listing as rare on schedules of the Tasmanian *Threatened Species Protection Act 1995* under criterion B (species subject to stochastic risk of endangerment because of naturally small population sizes) because:

- Extent of occurrence is less than 2000 km^2;
- Area of occupancy is less than 50 ha;
- Less than 10,000 mature individuals;
- No populations greater than 1000 individuals;
- Most mature individuals in less than 10 populations.

Thismia rodwayi is listed as a priority species requiring consideration in the development of the private land component of the Tasmanian reserve system (DPIWE 1998).

THREATS

Known or potential threats to populations of *Thismia rodwayi* are described below:

Forestry-related activities: A major threat to *Thismia rodwayi* is conversion of native forest to monoculture plantation or forest clearing for intensive agricultural uses (Roberts *et al.* 2003). *Thismia rodwayi* is adversely affected by conversion of habitat to plantation because of the dramatic, and often permanent, changes in site characteristics. Such conversion has occurred extensively in areas with the potential to support the species (including the base of the Western Tiers, upper Derwent Valley and Franklin area). A dense broad-leaved shrub understorey and suitable litter layer may not develop during a typical rotation period or under typical plantation management practices (M. Wapstra pers. comm.).

Thismia rodwayi may persist in some native wet eucalypt forests used for silviculture in Tasmania (Roberts *et al.* 2003). Retention of large forest remnants is considered important for maintenance of a moist microclimate necessary for *Thismia rodwayi*. Most known sites in the Meander area were selectively logged in the 1950s, 1960s or 1980s, or were subject to clearfelling and burning. Further monitoring of a range of sites subject to various tree-harvesting practices in native forest will assist in guiding future conservation-based management of *Thismia rodwayi*.

Lyrebirds: Lyrebirds (*Menura novaehollandiae*) occur within the range of *Thismia rodwayi* (Glen Huon, Franklin, Mt Field and Denison Rivulet areas, and at Hastings Caves). When foraging, Lyrebirds scratch and dig at the soil surface and leaf litter. At Hastings Caves, diggings are extensive, and have even been observed on steep rocky slopes. At that site, *Thismia rodwayi* appears restricted to crevices in dolomite outcrops and amongst complex root systems unreachable by lyrebirds. However, the severity of threat by lyrebirds is unknown because of lack of baseline population estimates.

Recreational activities: A population of *Thismia rodwayi* was discovered recently (2005) by track construction workers on Mt Wellington, highlighting the potential, albeit minor, impact of these construction activities, which would also occur periodically in reserves such as Mt Field National Park.

Inappropriate fire regime: It is not known whether *Thismia rodwayi* survives wildfires, whether plants recolonise disturbed ground from outside the burnt area, or both. As such, the effect of post-harvest high intensity regeneration burning (generally after clearfelling) on the species is largely unknown. Low intensity fuel reduction burning or post-harvest low intensity top-disposal burning (generally after non-clearfell harvesting) is unlikely to be detrimental to *Thismia rodwayi*.

Most known sites supporting *Thismia rodwayi* have been subject to intense wildfires (e.g. sites

on the lower slopes of Mt Wellington and in the Glen Huon/Franklin area were subject to the intensive 1967 bushfire).

MANAGEMENT STRATEGY

The main objective for recovery of *Thismia rodwayi* is to prevent inadvertent destruction of populations, maintain viability of standing populations, and promote conditions for successful recruitment.

What has been done?

Most known populations of *Thismia rodwayi* occur in gazetted reserves or in State forest. Proposed activities within reserves are subject to the *Tasmanian Reserve Management Code of Practice* (PWS, FT & DPIWE 2003). Proposed activities in forests known to support or likely to support *Thismia rodwayi*, on both public and private land, are subject to the provisions of the *Forest Practices Code 2000* (Forest Practices Board 2000), which requires consultation between the Threatened Species Section (DPIW) and the Forest Practices Authority to develop appropriate conservation prescriptions.

The Forest Practices Authority has undertaken annual monitoring of populations in the Meander and Franklin areas since 2002 (Wapstra *et al.* 2005). Additional surveys have been undertaken by the Forest Practices Authority in relation to proposed forestry coupes. Informal monitoring also occurs on private land subject to a conservation covenant.

What is needed?

Improved management of *Thismia rodwayi* will rely on increased understanding of the biology and ecology of this cryptic species. The following research avenues are suggested:

- Detailed examination of the macro-habitat (e.g. forest type, geology, slope, aspect and altitude) and micro-habitat (e.g. leaf-litter depth, soil type and moisture levels) variables associated with the species.
- Bioclimatic modelling of *Thismia rodwayi* and subsequent field-surveys of potential habitat.
- Biological study of the characteristics of the flowers (e.g. "life span" of individual flowers and proportion of buds that grow to maturity).
- Long-term monitoring of known populations to examine patterns of flowering and understand population recruitment dynamics.
- Examination of the pollination and dispersal mechanisms of the species through a combined field experiment.
- Genetic relationships between populations from Tasmania and those on mainland Australia and New Zealand.

ADVICE FOR LANDOWNERS/MANAGERS

The following actions will assist to conserve *Thismia rodwayi* in Tasmania:

- Consider some form of long-term protection, e.g. management agreement or covenant.
- Manage areas known to support the species to ensure maintenance of habitat.
- If you are visiting potential habitat, actively search for new populations and forward site details to the Threatened Species Section.
- Help us monitor known populations.

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Prepared by: Threatened Species Section in consultation with Mark Wapstra, June 2007.

Review Date: 2011

Cite as: Threatened Species Section (2007) Listing Statement for *Thismia rodwayi* (Fairy lanterns), Department of Primary Industries & Water, Tasmania.

View: http://www.dpiw.tas.gov.au

and follow the links to Native Plants & Animals, Threatened Species, then List of Threatened Species.

Contact details: Threatened Species Section, Department of Primary Industries & Water, GPO Box 44, Hobart, Tasmania, Australia, 7001. Ph (03) 6233 6556 fax (03) 6233 3477.

Permit: It is an offence to collect, disturb, damage or destroy this species unless under permit.