

Barbarea australis

native wintercress

TASMANIAN THREATENED SPECIES LISTING STATEMENT



Image by Mick Ilowski

Scientific name: *Barbarea australis* Hook.f., *Fl. Nov.-Zel.* 1: 14 (1852)

Common name: native wintercress (Wapstra et al. 2005)

Group: vascular plant, dicotyledon, family **Brassicaceae**

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

Environment Protection and Biodiversity Conservation Act 1999: **Endangered**

Distribution: Endemic status: **Endemic to Tasmania**

Tasmanian NRM Region: **Cradle Coast, North, South**

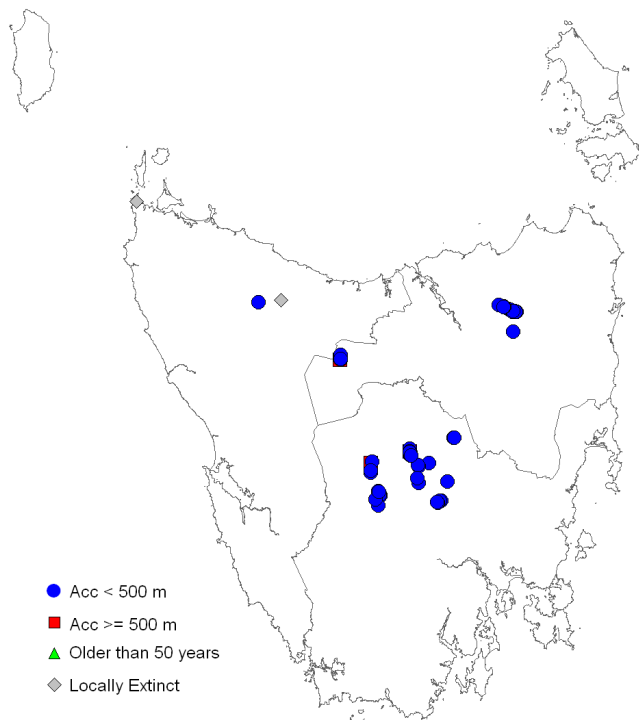


Figure 1. Distribution of *Barbarea australis* (unconfirmed Parramatta Creek location not shown)



Plate 1. *Barbarea australis* growing amongst river rocks (image by Mick Ilowski)

IDENTIFICATION AND ECOLOGY

Barbarea australis is an annual or short-lived (perhaps biennial) perennial herb in the Brassicaceae family, occurring along flood-prone rocky river systems. Being a short-lived species, it is largely reliant on germination of seed for recruitment and population persistence. It is a prolific seed producer and after disturbance such as flooding, hundreds of seedlings can emerge in resultant gaps in winter and early spring. However, few generally survive to maturity due to browsing (mainly by native species) and disturbance by natural flood events. In the wild, bare ground is required for recruitment. Seed is set in the first year of growth. The plant can also reproduce vegetatively with a new plant growing from the base of an existing plant (TSU 2005). *Barbarea australis* appears to be a poor competitor.

Survey techniques

Surveys should be conducted during the species' peak flowering period, which is November to February (Kirkpatrick & Gilfedder 1998). Any survey effort should be focused on potential habitat (i.e. flood-prone riparian habitats). Due to the wide variation in numbers in any one year, it is advisable that a relatively extensive survey is undertaken at any site because the species can be spread over several kilometres of river system, and may shift from site to site between years, dependent on disturbance conditions.

Description

Barbarea australis is an erect plant up to 50 to 100 cm high. The lower stem leaves are 8 to 10 cm long and form a rosette or radiating cluster. The leaves are stalked, broader at the ends and develop 2 to 3 small lateral lobes on the leaf stalk below the main part of the leaf. The leaves on the upper stem are simple with wavy margins. The flowers are yellow, the petals 2 to 8 mm long. The many seed capsules or pods are 20 to 40 mm long and 2 to 2.5 mm wide. The seeds are broad and oval, 1.5 mm long and have irregular edges or narrow wings.

[description from Hooker 1859, Curtis 1956, Hewson 1982]

Confusing species

Three species of *Barbarea* occur in Tasmania, two of them, *Barbarea intermedia* and *Barbarea verna*, being introductions from the northern hemisphere. The introduced *Barbarea* species can be distinguished from *Barbarea australis* by their deeply-divided upper stem leaves and by seeds that lack a defined edge and that are relatively rounded.

DISTRIBUTION AND HABITAT

Barbarea australis is endemic to Tasmania, known from about 10 river systems extending from northern Tasmania to rivers flowing south from the Central Highlands (Figure 1, Table 1). Based on extant subpopulations, the linear range of the species is about 170 km, extent of occurrence 13,045 km² (Table 1), and area of occupancy 0.2 km².

Barbarea australis is a riparian plant species found near river margins, creek beds and along flood channels adjacent to the river. It has not been found on steeper sections of rivers, and tends to favour slower reaches. It occurs in shallow alluvial silt deposited on rock slabs or rocky ledges, or between large cobbles on sites frequently disturbed by fluvial processes. Some of the sites are a considerable distance from the river in flood channels scoured by previous flood action, exposing river pebbles. One site observed was on bare soil at the base of a cliff approximately 40 m from the river and 3 to 4 m above a secondary stream. There was little apparent influence of water at the site but active soil movement kept the site bare and moisture seeping from the base of the cliff kept it moist. The sites range in altitude from 260 to 700 m on alluvial silt overlying a number of rock types including dolerite, basalt and granite. A number of the localities are associated with watercourses along contact zones between Permian mudstone and either dolerite or basalt.

Barbarea australis is found at the margins of riverine scrub with *Leptospermum lanigerum*, *Dodonaea viscosa* and *Pomaderris* species in forest communities dominated by *Eucalyptus delegatensis*, *E. dalrympleana*, *E. pauciflora* and *E. ovata*. Adjacent sites often consist of tussock grassland or grassy woodland dominated by *Poa*

labillardierei or *Themeda triandra*. At most sites it grows in open rocky situations with little competition from other plant species, although at some localities it grows amongst large *Poa* tussocks in relatively dense vegetation.

POPULATION ESTIMATE

Total population size is estimated to be about 900 mature individuals (Table 1; TSU 2005). As the species is short lived and recruitment is largely by seed, particularly following disturbance, numbers of individuals in subpopulations can fluctuate widely from year to year though subpopulation sizes are typically no more than 50 mature individuals and often a lot smaller. Estimates in Table 1 are counts of mature individuals from subpopulations when last seen. The largest subpopulation yet recorded had 135 mature individuals (St Patricks River), while other subpopulations with over 100 mature individuals are known from the River Ouse near Waddamana, the River Clyde and the Nive River (Table 1). The number of subpopulations is also likely to fluctuate as local extinctions occur due to increased risks associated with small populations (TSU 2005).

It is likely that *Barbarea australis* has always been relatively locally uncommon. *Barbarea australis* was presumed extinct until rediscovered in the 1980s, having not been collected since the 1830s from northwest Tasmania. However, the close similarity of *Barbarea australis* with introduced *Barbarea* species may have caused the species to be overlooked by collectors. Since 2000, only two additional subpopulations have been located. Of these, the Hellyer River site is a significant extension of the extant range into the State's far northwest. While there is considerable potential habitat within the species' current known range, formal and informal surveys have failed to locate further subpopulations.

It is unlikely that the recording of additional subpopulations will alter the estimates of total population numbers by orders of magnitude because all known subpopulations tend to be of relatively low numbers (usually less than 100).

RESERVATION STATUS

Barbarea australis is reserved within Mole Creek Karst National Park, Mersey River Forest Reserve, Hellyer Gorge State Reserve and North Esk Forest Reserve. Protection to some subpopulations is also afforded by their occurrence in Crown river reserves (e.g. parts of the St Patricks River subpopulations) or in informal reserves under Forestry Tasmania's Management Decision Classification mapping system (Orr & Gerrand 1998).

CONSERVATION STATUS

Barbarea australis was listed in 1995 as endangered on the Tasmanian *Threatened Species Protection Act 1995*, meeting criterion C: total population estimated to number fewer than 2,500 mature individuals, specifically criterion C2. a continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either: a.(i). severely fragmented (i.e. no subpopulation estimated to contain more than 250 mature individuals); and b. extreme fluctuations in the number of mature individuals. It also meets criterion D: total population very small or area of occupancy restricted, specifically D1. total population estimated to number fewer than 1,000 mature individuals.

THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

Barbarea australis is at risk because most subpopulations are on private land and are at risk from habitat loss and modification, increased grazing pressure and stochastic events as follows.

Habitat loss and modification: *Barbarea australis* has suffered significant loss of potential habitat since European settlement (TSU 2005). This was largely due to land clearance through early exploitation of accessible and relatively fertile areas including riparian ecosystems for agricultural purposes. It should be noted that much of the habitat of the species is 'Riparian scrub', a threatened vegetation community listed under *Nature Conservation Act 2002*.

Table 1. Population summary for *Barbarea australis*

	Subpopulation	Tenure	NRM region	1:25 000 mapsheet	Year last (first) seen	Area of occupancy (ha)	Number of plants
1	River Clyde (north of Bothwell)	private land	South	Dennistoun	1999	0.0003	3 (seedlings)
2	River Clyde (south of Falls of Clyde)	private land	South	Cawood	2007 (1994)	0.011	111
3	River Derwent (north of Wayatinah Dam)	State forest, Hydro Tasmania	South	Wayatinah	2000	0.0001	1
4	River Derwent (north of Wayatinah Dam)	State forest, Hydro Tasmania	South	Wayatinah	2001	0.001	2
5	Mersey River (south of Lake Parangana)	Mersey River Forest Reserve, Mole Creek Karst National Park	South	Liena	2002 (1997)	0.006 (along 2.8 km of river)	63 (1999)
6	Micks Creek (Silver Plains)	private land	South	Penny	1999 (1984)	0.002	20
7	Nive River (Clarence Pipeline north of Liapootah Dam)	private, Hydro Tasmania	South	D'Arcys	1999	0.0003	3
8	Nive River (west of Bradys Lake)	Wentworth Creek Forest Reserve, private land	South	D'Arcys	1999 (1996)	0.01 (over > 1 km of river length)	104
9	Nive River (south of Liapootah Dam)	State Forest, Hydro Tasmania	South	Wayatinah, Tarraleah	2005 (1999)	0.004 (over 3.5 km of river)	50 (in 2001)
10	North Esk River (north of Blessington)	North Esk Forest Reserve	North	Ben Nevis	2000	0.0002	2
11	River Ouse (north of Waddamana)	private land	South	Waddamana	1999	0.01	104
12	River Ouse (Waddamana)	private land, Crown land	South	Waddamana	2005 (1982)	0.002	23 (2001)
13	River Ouse (south of Waddamana)	private land	South	Waddamana	1984 2002 2009	0.0005 (2002)	60 (2002) 6 (2009)
14	River Ouse (near Shannon River)	private land	South	Cluny	2002 (1984)	0.005	50
15	River Ouse (northwest of Carrot Hill)	private land	South	Hermitage	2002 (1984)	0.0025	100
16	Shannon River (near Blackburn Creek)	private land	South	Hermitage	2002 (2001)	0.0045	seedlings
17	Shannon River (near Ouse River)	private land	South	Cluny	2002 (1984)	0.005	50 (1991)

	Subpopulation	Tenure	NRM region	1:25 000 mapsheet	Year last (first) seen	Area of occupancy (ha)	Number of plants
18	Clarence River (near Nive River)	Hydro Tasmania	South	D'Arcys	1986	unknown	unknown
19	St Patricks River (Diddleum Plains)	river reserve, private land	North	Patersonia	2000	0.0016	16*
20	St Patricks River (Diddleum Plains)	river reserve	North	Maurice	2000	unknown	unknown
21	St Patricks River (Corkerys Road)	State forest	North	Patersonia	2000	0.0001	1
22	St Patricks River (upper reaches)	private land	North	Maurice	2004	unknown	135
23	Hellyer River	river reserve near Hellyer Gorge State Reserve	Cradle Coast	Parrawe	2002	0.0001	1
24 ¹	Parramatta Creek	State forest	Cradle Coast	Railton	2004	unknown	unknown
25 ²	Hampshire Hills	Private land	Cradle Coast	unknown	1837	presumed extinct	
26 ³	Woolnorth	Private land	Cradle Coast	unknown	1835	presumed extinct	

*numbers boosted to 100s at times by redistributing seed *in situ* though numbers are curtailed by browsing (Chris Calverly, pers. comm.); ¹ identity requires confirmation; ² possibly same as subpopulation 23; ³ location marked as 'W' on specimen presumed to be Woolnorth

Habitat loss has also occurred through invasion of exotics, mainly gorse (*Ulex europaeus*) and willows (*Salix* species) which exclude other vegetation. Willows significantly modify river channels. The presence of willow and dams upstream of occurrences affect flow regimes, which may impact on seed dispersal as well as availability of suitable habitat for recruitment. Willow removal may have adverse impacts due to the bank disturbance and channel modification that occurs following removal. Habitat loss is an ongoing threat, particularly as most occurrences are on private land.

Impoundment construction: Many of the upper reaches of the rivers where *Barbarea australis* occurs have been dammed for electricity production and irrigation schemes. Dams, along with effects of willows on flow regimes, may have an adverse impact on seed dispersal and availability of suitable habitat for recruitment, particularly if the frequency and intensity of flooding is reduced leading to a

reduction in the creation of bare ground favoured for recruitment. In the longer term, damming will also lead to a reduction in silt levels below the dam walls, thereby reducing recruitment niches. This is becoming apparent below dams on the Mersey, Ouse and Shannon rivers.

Grazing pressure: As a member of the Brassicaceae family, *Barbarea australis* is palatable to animals, including native mammals, domestic stock, rabbits, snails and insects. Even though hundreds of seedlings may emerge following disturbance, if grazing pressure is high, the plants may not survive long enough for seed set to be achieved. At some sites, established plants are so heavily browsed that seed set is prevented, even though the plants themselves may survive. As well as the grazing pressure from introduced animals and stock, as more pasture has been created, the numbers of native browsers have also increased (TSU 2005). Grazing pressure is different for each

subpopulation, being dependent on whether native and/or domestic browsers are present. Grazing pressure is highest for subpopulations on private property that allow domestic stock to access riparian areas (e.g. subpopulations on the Ouse and Clyde rivers).

Forestry activities: Forest clearing is a potential threat to unreserved sites, either directly from physical impacts of operations or indirectly via alterations to flow regimes of adjacent rivers and streams. However, there are regulatory and policy mechanisms in place within the Forest Practices system to ensure that known subpopulations of threatened flora are managed in wood production forests (Forest Practices Board 2000).

Stochastic risk: Numbers of individuals within subpopulations can fluctuate widely from year to year. Typically there are fewer than 50 mature individuals in a subpopulation, often much fewer. Such small subpopulations have an increased risk of becoming extinct through chance events. Due to the widespread distribution of the species, the risk of stochastic extinction is low at a State-wide level, but may be higher at the level of subpopulation. Translocating nursery grown plants to increase subpopulation size to reduce stochastic risk is problematic due to difficulties associated with caging or fencing on river edges, and risk of introducing insect pests such as root aphids. Dispersal of seed into suitable gaps may be more suitable though, if nursery produced, there is a risk that brassica seed-borne bacterial disease will be introduced to the wild.

MANAGEMENT STRATEGY

What has been done?

Recovery actions undertaken during implementation of previous Recovery Plans for *Barbarea australis* (Potts & Gilfedder 2000, TSU 2005) have included:

- monitoring transects along a number of significant rivers (Ouse, Nive, Mersey rivers) to assess subpopulation fluctuation over time;
- preparing and distributing management prescriptions and a decision-making support manual for land managers and

authorities controlling areas that support *Barbarea australis*;

- surveying numerous rivers to determine the species' presence and condition of subpopulations;
- signing a management agreement with one landowner;
- establishing plants as seed orchards for seed input into the wild at one site;
- reducing grazing pressure on individuals at some sites by placing tree branches over plants;
- collecting seed *in situ* and manually dispersing to several nearby sites along the St Patricks River, successfully increasing the size of the subpopulation;
- collecting seed for long term conservation storage at the Tasmanian Seed Conservation Centre;

The current Recovery Plan for *Barbarea australis* (TSS 2005) is being updated.

Management objectives

The overall objective for the management of *Barbarea australis* is to reduce the extinction risk to the species by protecting known subpopulations, increasing plant numbers and managing subpopulations and habitat.

What is needed?

- boost numbers in subpopulations by encouraging seed production *in situ* and distributing seed into suitable recruitment niches, monitoring seed germination success, and protecting seedlings from grazing through fencing and brush coverings;
- identify and map potential habitat and conduct follow-up surveys of potential habitat;
- verify reports of any new occurrences of *Barbarea australis*;
- control willows (where feasible), control gorse in subpopulations threatened by that weed, and prevent the invasion or further

invasion by willows and other woody weeds in all subpopulations;

- manage environmental flows to allow the persistence of the species;
- periodically monitor selected subpopulations and surrounding habitat during the flowering period to identify threats as well as conditions that promote recruitment, better understand the dynamics of subpopulations, determine the impacts of grazing and other disturbance, gauge the success of management actions, and determine whether management intervention is required;
- support the Private Land Conservation Program (DPIPWE) with the establishment of conservation covenants for private land supporting the species, and ensure that current priorities for the species are incorporated into the program's reservation strategies;
- provide information and extension support to relevant Natural Resource Management committees, local councils, government agencies, the local community and development proponents on the locality, significance and management of known subpopulations and potential habitat.

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