Image by Mark Wapstra ©

Oreixenica ptunarra

ptunarra brown butterfly

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Scientific name: ***Oreixenica ptunarra*** (Couchman, 1953)

Common name: ptunarra brown butterfly

Group: Lepidoptera, Nymphalidae, family Satyrinae

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

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

IUCN Red List: **Not listed**

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

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

Tasmanian IBRA Regions: **Central Highlands and South East (most records); West, Northern Slopes, Southern Ranges and Northern Midlands (few records)**

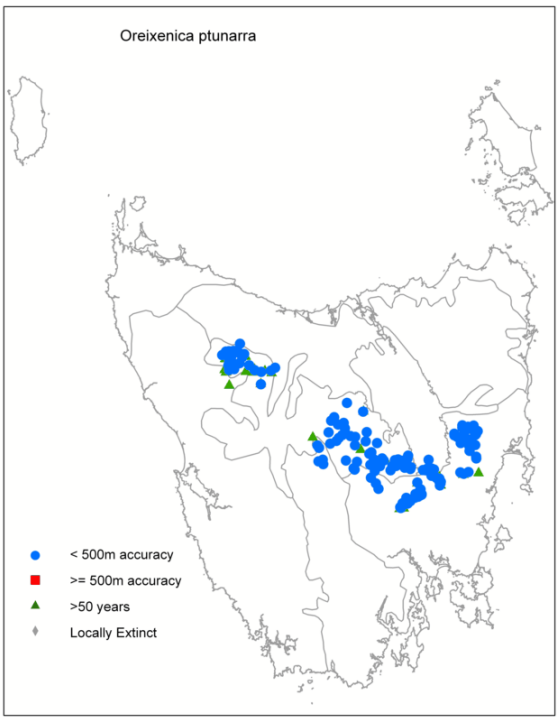

Figure 1. The distribution of the ptunarra brown butterfly, showing IBRA regions (from Natural Values Atlas)

Plate 1. Ptunarra brown butterfly: male (LHS) and female (RHS); showing upper side (top) and underside (bottom). Image: Phil Bell.

SUMMARY: The ptunarra brown butterfly (*Oreixenica ptunarra*) is a small, orange-brown butterfly that is endemic to the highland *Poa* grasslands of Tasmania. The caterpillars live and feed within the *Poa* tussocks until pupation, after which the butterflies emerge and feed on the nectar of flowers in the grasslands. The flight period is March to mid-April.

Ptunarra brown butterfly numbers have declined dramatically over the last 20 years and a number of local extinctions have been recorded. A poor capacity for dispersal and fragmented habitat make it challenging for the species to recolonise areas from which it becomes extinct.

The ptunarra brown butterfly is threatened primarily due to habitat loss, the associated fragmentation of the remaining habitat, unsuitable fire and grazing regimes, and predation by European wasps.

IDENTIFICATION AND ECOLOGY

The ptunarra brown butterfly is a small butterfly with a wingspan of about 28 mm. The females and males are similar in size but are distinctly different in colour. The female is light orange-yellow with faint light brown basal areas and two short bars on the front margins of the forewings. The male is brownish black with cream-white markings. Both sexes have eye spots on both wings (Plate 1).

The ptunarra brown butterfly has a one-year life cycle. The adult butterflies emerge in March and the flying season lasts for two to three weeks. Adult males emerge before females, and butterflies at higher altitudes before those at lower elevations.

Upon emergence the females are soon mated, followed shortly by egg-laying. Females drop 20–30 tiny, grass-green eggs into *Poa* grass tussocks, often in flight. The larvae hatch after about six weeks and feed at night on the tips of the *Poa* grass sporadically throughout winter and into the following summer. Larvae shelter in the base of the *Poa* tussocks. Two colour morphs of the larvae have been identified, grass-green and terracotta brown (Anderson 2010). Larvae are difficult to identify in the field, as they are similar to those of closely related species.

Pupation takes place in *Poa* tussocks in February and lasts for four to five weeks (Bell 1998). The pupa is greenish-grey flecked with black, with a pair of black spots on each body segment.

The species shows a preference for *Poa labillardierei* and *P. hiemata* in northwest Tasmania (Potter-Craven 2019). Larvae have also been collected from *P. gunnii* and *P. rodwayi*. Additionally, *P. clelandii*, *P. clivicola*, *P. hookeri* and *P. sieberiana* are also likely to be larval food plants (Bell 1998).

Adult ptunarra brown butterflies are generalist nectar feeders that visit any flowers blooming in the grasslands (Anderson 2001). They are commonly observed feeding on the flowers of *Hypochaeris radicata* (an introduced dandelion) and *Xerochrysum subundulatum* (a native golden everlasting daisy). The presence of nectar is believed to be important for the long-term persistence of subpopulations (Potter-Craven 2019).

The ptunarra brown butterfly is preyed upon by a variety of native species such as birds and spiders, but in recent years predation by introduced European wasps (*Vespula germanica* and *V. vulgaris*) has decreased butterfly numbers considerably and is suspected to be the cause of the local extinction of some colonies (Potter-Craven et. al. 2018).

[Description from Bell 1998, TSS 1999, Braby 2000, Anderson 2010]

Plate 3. Female ptunarra brown butterfly.
Image: Jo Potter-Craven ©

Survey techniques

The ptunarra brown butterfly is best surveyed during its flight period in March to mid-April. Areas containing suitable habitat are identified and targeted. Favourable weather conditions include warm (≥18°C) sunny days with little wind. Surveys are best conducted between 10am and 3pm when butterflies are on the wing and expected to be at their greatest abundance (Neyland 1993, Bell 1998).

Butterfly numbers have been monitored intermittently since 1997 to detect changes in abundance. Repeated counts of butterflies are performed along permanent transects established throughout the species' range.

The highest number of individuals recorded (males and females) at each site is expressed as an index of density (i.e. number of individuals on the wing per hectare) (Bell 2002).

Taxonomic issues

Three subspecies of ptunarra brown butterfly were initially described by Couchman (1953) corresponding to the three main regions known to be occupied by *O. ptunarra* at the time (Central Highlands, Midlands and East Coast).

Following the discovery of the Northwest subpopulation, McQuillan & Ek (1997) instead proposed that the variations within *O. ptunarra* were clinal variations due to altitude and suggested subsuming the subspecies into *O. ptunarra ptunarra* while creating a new subspecies for the Northwest subpopulation, *O. ptunarra north-west*.

Genetic analysis performed by Anderson (2010) identified three main subpopulations, which fit the subspecies described by Couchman, with the Northwest subpopulation being part of the Central Highlands subpopulation.

Anderson (2010) determined that while genetic mixing still occurs between the regions, that the three main subpopulations are becoming increasingly genetically isolated due to the fragmentation of the landscape and could be regarded as subspecies.

Currently, all subpopulations are referred to and managed together as *O. ptunarra*.

Confusing species

The identification of the ptunarra brown butterfly requires expertise. There are three similar species of butterfly that can co-occur, including the silver xenica (*Oreixenica lathoniella)*, orichora brown (*Oreixenica orichora)* and Klug's xenica (*Geitoneura klugii)*.

DISTRIBUTION AND HABITAT

The ptunarra brown butterfly is endemic to Tasmania and is restricted to sites above 400 m where there is >25% cover of *Poa* tussocks.

The species occurs in six biogeographic (IBRA) regions: predominantly the Central Highlands and South East, and to a lesser extent the West, Northern Slopes, Northern Midlands and Southern Ranges (Figure 1, Table 1). The ptunarra brown butterfly does not extend into the lowland plains of the Midlands, where it is believed to be too warm for the species (Bell 1998, Neyland 1992).

The species has been well surveyed and the majority of colonies of the ptunarra brown butterfly are now believed to have been located.

The habitat ranges from *Poa* tussock grassland and sedgy grassland to *Hakea microcarpa* grassy shrubland to grassy open eucalypt woodland (Bell 1998, TSS 1999) (Plate 2).

The species' distribution is severely fragmented, as extensive areas of its habitat have been cleared for agriculture and forestry plantations. The remaining grassland fragments are often isolated and separated by unsuitable habitat (e.g. exotic pasture, dense forest, and forestry plantations).

Plate 3. Native *Poa* grassland habitat in the northwest plains. Image: Jo Potter-Craven ©

Table 1. Population summary by regions for ptunarra brown butterfly

Region	Tenure	NRM region	IBRA Region	Year last (first) seen	Extent of occurrence (EOO) (km²)	Area occupied (AOO) (km²)	Main threat
Northwest	Private land, Conservation Covenants, Reserves (Reynolds Falls Nature Recreation Area, Vale of Belvoir Conservation Area, Cradle Mountain-Lake St Clair National Park)	North West	Central Highlands (some in West and Northern Slopes)	2020 (1989)	810	192	Wasps
Central Highlands	Private land, State forest[1], Conservation Covenants, Reserves (Walls of Jerusalem National Park, Central Plateau Conservation Area)	South (some in North)	Central Highlands (some in Southern Ranges and South East)	2020 (1952)	3,345	304	Land clearing and grasslands becoming overgrown. (Possibly wasps)
Midlands	Private land and Crown land	South (some in North)	South East (some in Northern Midlands)	2020 (1963)	484	156	Land clearing and grasslands becoming overgrown. (Possibly wasps)
East Coast	Private land, Crown land (local government), State forest[1], Conservation Covenant, Reserves (Tooms Lake & Long Marsh Conservation Areas, Snowy River Regional Reserve)	North (some in South)	South East	2001 (1948)	720	140	Land clearing and grassland becoming overgrown. (Possibly wasps)

1 State forest = permanent timber production zone land (PTPZ) and future potential production forest land (FPPF)

The butterflies are not able to fly long distances through unsuitable habitat, so genetic interchange is unlikely to occur between fragmented colonies where no connecting corridors of suitable habitat exist (Bell 1998).

Population parameters

In 2021, the extent of occurrence (EOO) was estimated to be 11,084 km², with an area of occurrence (AOO) estimated to be 792 km² (estimate based on IUCN criteria, generated from the Geocat model, using records from the Natural Values Atlas).

Ongoing loss and degradation of habitat due to land clearing and conversion, fragmentation, overgrazing and drought has resulted in a reduction in the butterflies' extent of occurrence and losses of subpopulations.

The loss of four colonies was reported following an extensive survey for the species in 1993, of which only Mike Howes Marsh was specified (Neyland 1993). At least three more colonies have become extinct since then namely, Thompsons Park in the Northwest, most likely due to European wasp predation, and Ladies Mile Marsh and Stony Gully Road in the Eastern Highlands, attributed to a decline in *Poa* tussocks due to grazing and drought, and possible wasp predation (Bell 2014).

RESERVATION STATUS

Almost a third of ptunarra brown butterfly records occur within formal reserves. The species occurs within the Tasmanian Wilderness World Heritage Area in the Central Plateau Protected Area, and the Cradle Mountain Lake St Clair National Park. The species is also reserved within conservation covenants on private land.

Conservation status

The ptunarra brown butterfly is listed as endangered on the Tasmanian *Threatened Species Protection Act 1995*, since 2022. The species was previously listed as vulnerable in 1995. The species meets:

Criterion A2: a reduction of at least 50%, of the total population projected to be met within the next ten years based on:
a) direct observation (surveys)
b) an index of abundance appropriate for the taxon (species has declined by 44% over ca. 15 years in the northwest plains),
c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (loss of colonies, habitat loss),
e) the effects of introduced taxa (predation impact by European wasps).

The ptunarra brown butterfly is also listed as Endangered on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Please note that this assessment was conducted under the previous version of the *Guidelines for Listing under the Threatened Species Protection Act 1995*, which has since been superseded by a newer version endorsed by the Scientific Advisory Committee (Threatened Species) in March 2023.

THREATS, LIMITING FACTORS & MANAGEMENT ISSUES

Loss and fragmentation of habitat: Loss and fragmentation of habitat by land clearing is an ongoing threat to the ptunarra brown butterfly. It is difficult for the species to recolonise areas due to the fragmentation of the landscape, as the butterflies are unable to fly long distances through inhospitable habitat.

Throughout Tasmania 40% of the original area of *Poa* grassland has been cleared since 1802 (Harris & Kitchener 2005).

Highland *Poa* grasslands are also under threat from invasion by woody shrubs due to a low incidence of fire (Kirkpatrick et al. 2020).

Inappropriate grazing regime: Few butterflies are found on sites that are heavily grazed, but in areas where there has been little or no grazing and where the tussocks have become large and overgrown, butterfly numbers also tend to be low (Neyland 1992). Light grazing by native animals or stock appears to be beneficial to the butterfly, as the butterfly often avoids dense grasslands (TSS 1999). Cattle generally graze more heavily than sheep, tending to graze the tussocks down lower and pulling them out of the ground, which can be detrimental to the habitat. For sheep grazing, a light set stocking rate of around 2–3 DSE per hectare has been recommended (Anderson 2001).

Inappropriate fire regime: Too frequent burning of *Poa* grassland habitat can cause declines in ptunarra brown butterflies. However, infrequent fires promote the invasion of shrubby species, thus reducing the cover of *Poa* habitat (Kirkpatrick et al. 2020).

It is recommended that ptunarra brown butterfly habitat be burnt in a mosaic pattern, with cool, low-intensity fires, on a rotation of 5–10 years (Bryant & Jackson 1999), outside of the species' flying season (March to mid-April).

Fires in late autumn to winter are recommended, as the larvae are likely to be sheltering deep within the tussock during this time and are less likely to be killed by a cool burn that just consumes the outside of the tussock.

European wasps: Predation by introduced European wasps (*Vespula germanica* and *V. vulgaris*) is a significant threat to the ptunarra brown butterfly (Bell 2002, Potter-Craven et al. 2018). European wasps have been directly observed killing, dismembering and carrying away adult ptunarra brown butterflies.

Wasp control trials in the northwest plains have shown that where European wasp numbers are

high, there is a reduction in ptunarra brown butterfly numbers. When wasp numbers were reduced through poisoning, butterfly numbers increased (Potter-Craven et al. 2018).

Additionally, a decline of 44% in ptunarra brown butterfly numbers in the northwest plains over a period of approximately 15 years was attributed to European wasps (Potter-Craven et al. 2018).

It is likely that past extinctions of some butterfly colonies are directly related to wasp predation. The most abundant butterfly subpopulations occur where European wasp numbers are low. Ongoing wasp management is recommended at key sites where wasp numbers are high in order to protect ptunarra brown butterfly subpopulations.

High European wasp numbers observed in new plantation forests and along roadsides are believed to be due to the disturbed ground creating an increase in wasp nesting habitat. This can be an issue where disturbed ground occurs adjacent to grasslands containing ptunarra brown butterfly colonies. It has been suggested that placing buffers of native vegetation around grasslands containing ptunarra brown butterflies may protect them from wasp incursions (Potter-Craven 2019).

Drought and climate change: Drought is thought to have an effect on the abundance and biodiversity of native grasslands but this interaction has not yet been studied in detail.

Climatic modelling suggests that the Tasmanian highlands will get drier and warmer (Grose et al. 2010), which will potentially have a negative impact on subpopulations at lower altitudes as these areas become too warm for the species to persist.

An increased occurrence of dry lightning is also already being observed (Styger et al. 2018). These climatic changes will likely alter the distribution and composition of vegetation communities, with modelling showing that the grasslands will become woodier (Kirkpatrick et al. 2020), which may impact on ptunarra brown butterfly habitat.

European wasp numbers are likely to increase with rising temperatures in years that correspond with extreme low rainfall events in the springtime. This may consequently result in an increased predation rate on ptunarra brown butterflies (Potter-Craven 2019).

It is also likely that there will be years of low wasp numbers, when high rainfall events in the springtime cause flooding of wasp nests, resulting in their failure (Potter-Craven 2019).

MANAGEMENT STRATEGY

Management objectives

The main objective for the management of the ptunarra brown butterfly is to decrease the risk of extinction by maintaining the quality of habitat at known sites through appropriate land management and reducing the risk posed by European wasp predation.

What has been done?

- **Recovery planning:** There is no contemporary recovery plan for this species. Most of the objectives of the Recovery Plan 1998–2003 were implemented such as: increasing habitat protection for specific subpopulations, providing advice and information to landowners and managers, establishing a new colony by translocation, and clarifying the taxonomy (Bell 1998). However, the conservation status of the subspecies has not been assessed, the long-term persistence of the species throughout its area of occupancy has not been achieved, and the overall objective of downlisting the species within 5 years was not achievable.
- **Surveys:** The ptunarra brown butterfly has been well surveyed over the last 3 decades (see Prince 1988, Neyland 1991, Bell 1998, Potter-Craven et al. 2018). Most subpopulations are believed to have been located.
- **Population monitoring:** The abundance of butterflies has been monitored at a number of sites across the species range since 1998. Monitoring of the species is currently intermittent and resource dependant.

  An ongoing program to monitor subpopulations of butterflies and control the

threat of predation by wasps is conducted by Forico Ltd on their Surrey Hills forestry plantation estate in northwest Tasmania.

- **Fire management:** Fire management of native grasslands occurs on some areas of public land, as well as on private land such as the Vale of Belvoir by the Tasmanian Land Conservancy, and at Surrey Hills by Forico Ltd, where the aim has been to create spaces between tussocks and reduce woody invasion.
- **Translocations:** Translocation was identified in the Recovery Plan as an action required to ensure the long-term persistence of the ptunarra brown butterfly (Bell 1998).

  Translocations were trialled within the species' historical range at Surrey Hills in northwest Tasmania, to counteract local extinctions by establishing new subpopulations.

  Gravid female butterflies and eggs were translocated to four sites over a four-year period, with a new subpopulation being successfully established at one site (Potter-Craven 2019).

  Vegetation surveys indicated that the successful translocation site had a greater abundance of nectar flowers than unsuccessful sites, suggesting that nectar is an essential feature required at future translocation sites (Potter-Craven 2019).

  Translocations should be performed with caution and used only as an interim tool, while other conservation actions are being developed, but may become increasingly necessary if the species becomes locally extinct at sites due to threats such as wasp predation and climate change.
- **Wasp control:** Some European wasp control trials have been performed at Surrey Hills in northwest Tasmania resulting in a reduction in wasp numbers and a subsequent increase in butterfly numbers (Potter-Craven et al. 2018). Ongoing wasp management is recommended in areas where European wasp numbers are high to protect ptunarra brown butterflies from predation.

  Reducing wasp numbers in areas of disturbed ground by directly poisoning nests or by placing poisonous baits are effective means of wasp control but are labour intensive and must be repeated annually (Bell 2020, Potter-Craven 2019).

  Modelling suggests that placing native vegetation buffers of about 500 m around ptunarra brown butterfly habitat could protect them from predation by European wasps nesting in nearby plantation forests (Potter-Craven 2019).
- **Research:** Prince (1988) and Neyland (1993) initially examined the ecology and conservation management of the species. McQuillan & Ek (1997) then examined the biogeographical variation in the species. Anderson (2001) conducted a study on the fecundity of captive female ptunarra brown butterflies and the phenotypic variation in the species as influenced by altitude. Anderson (2010) later examined the evolutionary patterns in the genus *Oreixenica* with a special emphasis on the ecology and population genetics of the ptunarra brown butterfly. Potter-Craven (2019) investigated the conservation management required to protect the ptunarra brown butterfly from the threat of predation by introduced European wasps.

What is needed?

Agencies, groups or individuals may assist with some or all of the following recovery actions (coordinated efforts may achieve the best and most efficient results):

- 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;
- Minimise the loss or degradation of subpopulations by minimising the clearing and conversion of habitat, reserving areas of habitat known to support subpopulations of the species, and by developing management agreements with land managers.

- Minimise the impact of predation by European wasps by controlling wasp numbers with poison and by establishing undisturbed vegetation buffers around grasslands to keep wasps out of sites containing ptunarra brown butterflies, particularly in the northwest at sites where wasp numbers are high.
- Continue to monitor subpopulations at selected colonies to detect changes in butterfly abundance and to assess the efficacy of conservation management actions such as wasp control, grazing management and fire management.
- Conduct research and modelling on the effect of drought and climate change on ptunarra brown butterflies and how to best mitigate any impacts.
- Perform further translocations, if necessary, to re-establish the species at sites where it has become locally extinct, in combination with European wasp control measures.
- Improve the protection of the species by working with landowners to minimise stock grazing within subpopulations and habitat of the ptunarra brown butterfly.
- Improve awareness of the species by providing information and support to landowners/managers on the location, significance and management of subpopulations and habitat of the ptunarra brown butterfly.

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Permit: It is an offence under Tasmanian legislation to collect, catch, damage, injure, destroy, or kill a threatened species listed under the *Threatened Species Protection Act 1995,* without a permit.