OVERVIEW OF TASMANIA'S OFFSHORE ISLANDS AND THEIR ROLE IN NATURE CONSERVATION

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(with one text-figure, two tables, eight plates and two appendices)

Bryant, S.L. & Harris, S. 2020 (9:xii): Overview of Tasmania's offshore islands and their role in nature conservation. *Papers and Proceedings of the Royal Society of Tasmania* 154: 83–106. https://doi.org/10.26749/rstpp.154.83 ISSN: 0080–4703. Tasmanian Land Conservancy, PO Box 2112, Lower Sandy Bay, Tasmania 7005, Australia (SLB*); Department of Archaeology and Natural History, College of Asia and the Pacific, Australian National University, Canberra, ACT 2601 (SH). *Author for correspondence: Email: sally.bryant181@outlook.com

Since the 1970s, knowledge of Tasmania's offshore islands has expanded greatly due to an increase in systematic and regional surveys, the continuation of several long-term monitoring programs and the improved delivery of pest management and translocation programs. However, many islands remain data-poor especially for invertebrate fauna, and non-vascular flora, and information sources are dispersed across numerous platforms. While more than 90% of Tasmania's offshore islands are statutory reserves, many are impacted by a range of disturbances, particularly invasive species with no decision-making framework in place to prioritise their management. This paper synthesises the significant contribution offshore islands make to Tasmania's land-based natural assets and identifies gaps and deficiencies hampering their protection. A continuing focus on detailed gap-filling surveys aided by partnership restoration programs and collaborative national forums must be strengthened if we are to capitalise on the conservation benefits islands provide in the face of rapidly changing environmental conditions and pressure for future use.

Key Words: Tasmanian islands, island conservation, island endemics, invasive species.

INTRODUCTION

Tasmania as a place is defined by islands: physically, culturally and ecologically. The enduring connection of Tasmania's Aboriginal people to offshore islands remains integral to their culture, and physical evidence of their occupation is found in cave sites, middens and artefacts, little of which has been documented. Many islands were named by the French during early scientific expeditions and are the type locations for plant and animal specimens sent back to the museums of Europe (examples in Bryant 2014, Harris 2014). Biologically, Tasmania's offshore islands contain sites of unique habitats, and in a context of uncertain environmental change, have become threatened species arks and refugia for species that are declining elsewhere (Moro *et al.* 2018). Islands through their limited size and isolation are the windows to evolution and are recognised globally for the role they play in conserving nature (Secretariat of the Convention of Biodiversity 2014). The interconnection between land and water is fundamental to island ecologies; for example, the nutrient-rich run-off from seabird and seal islands is an important driver for surrounding marine ecosystems and even phenomena such as 'Ashmole's halo' can regulate the population dynamics of seabird colonies through food depletion cycles (Gaston *et al.* 2007). The terrestrial biodiversity on islands is also supported by factors such as windthrown drifts of algal wrack and from products of nesting seabirds (Polis & Hurd 1996), which can often be important for islands with low primary productivity (Harris & McKenny 1999). However, while we recognise the intrinsic link between island landmass and sea, an analysis of marine systems is beyond the scope of this paper. Instead, we provide a land-based perspective and draw on selected historical and contemporary information to highlight the importance of Tasmania's offshore islands to nature conservation and recommend measures needed if their values are to survive in the future.

Since the 1970s our knowledge of Tasmania's offshore islands has expanded greatly. This has been due to the island field surveys attributable to biologists in the founding years of the National Parks and Wildlife Service, new sources of funding, more recent surveys and better access to island information. Two key works, one by Brothers *et al.* (2001) providing information on 280 islands and the second by Harris *et al.* (2001) on the flora of 100 islands of the outer Furneaux Group resulted from extensive fieldwork from the 1980s. Systematic surveys of heathlands, saltmarshes, eucalypt forests and wetlands included investigation of these biomes on the larger offshore islands (for example, Kirkpatrick & Harwood 1983). Knowledge of islands has continued to be supplemented through work under the Hamish Saunders Memorial Program (24 islands surveyed) and islands surveyed in anticipation of oil spill response (13 islands) (reports available DPIPWE Nature Conservation Report Series) and land management updates by the Tasmanian Aboriginal Centre (http://tacinc.com.au/programs/land-management/).

To compile this overview, we used information from the sources mentioned and a range of institutional databases, geospatial systems, web inventories, the scientific literature and the authors' professional experience. Tasmania's reserve management plans contain topographical maps, title boundaries, lists of species, history of disturbances and management regulations (http://www.parks.tas.gov.au), with many older plans also summarising widely scattered reports such as those of early field naturalists' visits. Tasmania's State of the Environment Reports were used as sequenced documents for changes in coastal and marine habitats but

these have not been updated for some time and not all are publicly available (RPDC 2006, TPC 2009).

Useful public databases include the systematic inventory of Tasmania's islands on the 'Islandshare' web portal (www.islandshare.net/), developed in 2012 by the Wildcare Friends of the Bass Strait Islands, Tasmanian Conservation Trust and Birdlife Tasmania and the Tasmanian Government's Natural Values Atlas (www.naturalvaluesatlas.tas.gov.au) which includes the Tasmanian Geoconservation Database, although this information is not island-specific.

INVENTORY AND TENURE

Mainland Tasmania has 5890 islands, islets, rock stacks and reefs located in the sea situated above the mean highwater mark (TASMAP 2006), not all of which are named. Of these, over 330 islands are greater than one hectare in size, 65 are greater than 20 hectares in size and Flinders Island (1340.4 km^2) and King Island (1093.9 km^2) are Australia's sixth and seventh largest islands. Tasmania's offshore islands are scattered around its entire coast, many occur in groups or clusters with the highest densities found in the Bass Strait region especially the Furneaux area (fig. 1). On Tasmania's northern border, Rodondo Island is less than 10 km from the Victorian coast with the border running through Boundary Islet in the Hogan Group. To the south of Tasmania, Pedra Branca and Eddystone Rock lie 27 km from South East Cape and are the southernmost exposed land on Australia's continental shelf. A further 1,500 km to the south is subantarctic Macquarie Island which became part of Tasmania's territorial jurisdiction during the Van Diemen's Land proclamation in 1825.

Few of Tasmania's offshore islands are permanently settled. The larger King, Flinders, truwana-Cape Barren and Bruny islands have established population centres and some others, for example, Maria, Macquarie, Deal, Maatsuyker, Robbins, Three Hummock, Swan and lungtalanana-Clarke islands have staffed field stations, private houses or visitor accommodation. Many islands, however, retain a range of infrastructure such as lighthouses (pl. 1), airstrips, fences, tracks, homesteads and huts, reflecting current or past use and are visited for a variety of purposes.

From the 1970s onwards Tasmania's offshore islands were systematically reviewed for statutory protection. Maria, Schouten, Tasman, South Bruny and the Kent Group of

FIGURE 1 — Flinders Island showing density of surrounding islands.

PLATE 1 — Maatsuyker Island showing lighthouse station and the Needle Rocks offshore.

islands, were all incorporated into the boundary of existing national parks whereas other islands transitioned in status over time from unallocated Crown land or private lease, to Game Reserve, Conservation Area or Nature Reserve depending on their values. Macquarie Island, including Judge and Clerk and Bishop and Clerk islets, was proclaimed a Wildlife Sanctuary in 1933, a Conservation Area in 1971, State Reserve in 1972, Nature Reserve in 1978 and in 1997 was inscribed on the World Heritage List (PWS 2006) with its boundaries extended several times since to incorporate marine reserves. The Tasmanian Wilderness World Heritage Area incorporates numerous islands around the southwest coast, the larger being the Maatsuyker Island Group, De Witt, Ile du Golfe, Louisa Island, Hen and Chicken Islands, Pedra Branca, Mewstone, Eddystone Rock, Trumpeter Islet, Muttonbird Island, Breaksea Island and the Swainson Group (DPIPWE 2016).

Of Tasmania's larger offshore islands, 229 islands (more than 90% of them) have some level of statutory protection (table 1). This includes 75 islands previously classified as non-allocated Crown land but declared Conservation Areas through the Crown Lands Assessment Classification process in 2012. In 1995, as an act of reconciliation, the Tasmanian Government transferred control of seven islands (titima-Trefoil, Babel, Badger, Big Dog, Hummocky-Mt Chappell, Steep, lungtalanana-Clarke) and most of truwana-Cape Barren Island to the Aboriginal Land Council of Tasmania. Five of these islands are registered Indigenous Protected Areas (IPAs) managed by the Tasmanian Aboriginal Centre, which also manages 'Wybalenna' on Flinders Island and a small parcel of coastal land at Great Bay, Bruny Island. 'Murrayfield Station' on Bruny Island (4,097 ha) is owned and managed by the Indigenous Land Corporation.

Over thirty Reserve Management Plans and Indigenous Healthy Country Plans contain over 112 islands within their jurisdictional boundary; however, some plans (e.g., *Small Bass Strait Island Reserves*, *Small North-East Islands* and *Small South-East Islands*) have been in draft form for nearly two decades awaiting formal adoption (https://parks.tas.gov.au/about-us/managing-our-parks-and-reserves/management-plans-reports).

TABLE 1 — Status of Tasmania's larger offshore islands.

Statutory Reserves	**No.**
National Park	62
Conservation Area	103
Nature Reserve	44
State Reserve	4
Game Reserve	9
Nature Rec. Area, Historic Site	2
Indigenous Protected Area	5
Total	229

Multi or Private Tenure	**No.**
Private Freehold	9
Multiple Land Tenure (Aboriginal, private, reserved)	12
Aboriginal Lands (Trefoil, Steep)	2
Total	23

Source: http://www.islandshare.net/; https://eatlas.org.au/node/1703.

Tasmanian Parks and Wildlife Service is the land manager for islands or parts of islands reserved under the *National Parks and Reserves Management Act 2002* and the Tasmanian Aboriginal Centre manages IPAs dedicated under the International Union for Conservation of Nature (IUCN). There is no single managing authority for unreserved islands in Tasmania; instead a range of state and local government agencies in accordance with Tasmania's Resource Management and Planning System (TPC 2009) are responsible for aspects of their management and protection.

NATURE CONSERVATION VALUES

Geo-conservation values

Macquarie Island, Tasmania's only oceanic island, gained World Heritage status for its globally significant geological formation and is the only island in the world composed entirely of oceanic crust and rocks originating from deep below the Earth's surface (Williamson 1988). Macquarie Island is the only place where this exposed rock sequence is a uniquely complete section which can be studied in detail to better understand the processes of oceanic crust formation and plate boundary dynamics above sea-level (Comfort 2014).

All of Tasmania's nearer offshore islands were formed as the sea level rose after the Last Glacial, hence their geologies are often directly related to the adjacent mainland (Jennings 1959, Dixon 1996). King Island and the Fleurieu Group formed part of the peninsula northwest from Tasmania, and the Furneaux Group (and Kent and other island groups to the north) were part of the Bassian Rise land bridge between Tasmania and Victoria in the east.

Tasmania's islands are a range of hard and soft rock features, sandy dunes, spits, tombolos and isthmuses, with some displaying a range of significant geological features and diverse landforms (Banks 1993, Dixon 1996, Seymour *et al.* 2007). Features illustrating this diversity include: the tombolo on Actaeon Island, the tessellated pavements of Reid Rocks, the caves on Erith Island and De Witt, the lagoon on Southwest Island and the flowstone comprised of seal excrement on Judgement Rock.

Eberhard (2011) observed several bizarre-shaped weathered boulders on the coast of Inner Sister Island and identified the fabric of the granitic rock (mineral segregations and/or xenoliths) and presumed Pleistocene colluvial fans as features worthy of listing on the Tasmanian Geoconservation Database. On Hunter Island he identified the Cave Bay raised sea cave, Hunter Island cobble berms, and the Hunter Passage perched lagoons as being distinctive in the broader western Bass Strait region and also worthy of inclusion (Eberhard 2017).

On King Island, the Cambrian rocks along the City of Melbourne Bay foreshore contain globally significant lava pillows demonstrating seafloor volcanism, with other islands in northwest Tasmania, e.g., Robbins Island, displaying outstanding examples of beach ridge sequences marking at least two major phases of Quaternary activity. Maria Island's fossil cliffs, gulches, sea caves, raised shore platforms, blow hole and a razor-backed saddle-ridge are recognised as a globally unique set of features. The spectacular parallel dune systems enclosing brackish lagoons along the east coast of the Furneaux Islands, and the saline lagoon systems of truwuna-Cape Barren Island and lungtalanana-Clarke Island, are also of high geo-conservation significance (Dixon 1996).

Other islands of geo-significance are Black Pyramid for its Tertiary basaltic volcanic features, the sea caves and seal-related flowstone of Ile des Phoques, the geology of Pedra Branca and Eddystone Rock, and Tasman Island for its well-exposed columnar dolerite (pl. 2).

Fauna values

Over one third of Tasmania's land-based threatened fauna species occur on offshore islands (63 of 181 species, 35 %, appendix 1) demonstrating the significant role islands play in fauna conservation. Some islands are critical breeding sites or provide seasonal foraging habitat and some faunal groups, particularly island endemics or invertebrates, and found in only one island location. Even though the invertebrate values on Tasmania's offshore islands are becoming better known, this faunal group remains significantly under-surveyed. The coastal mollusc fauna on King Island contains at least 408 species with 78 being recorded for the first time by Grove and de Little (2014). Hamish Saunders Memorial Island surveys and Oil Spill Response surveys have targeted the

PLATE 2 — Dolerite structural columns on Tasman Island.

PLATE 3 — Rare Tasman Island Cricket *Tasmanoplectron isolatum*.

collection of invertebrates during their expeditions often focusing on threatened species or specific groups such as butterflies, grasshoppers, freshwater crayfish or molluscs, and invariably these surveys have resulted in new species finds and range expansions. For example, the invertebrate surveys conducted on Tasman Island identified a new snail species, Planilaoma? sp. nov. "Tasman Island", a previously undescribed snail species, Pedicamista sp. "Southport", and the lodgement of voucher specimens of the rare Tasman Island Cricket *Tasmanoplectron isolatum* (Bryant & Shaw 2006, pl. 3). New records of the molluscan *Magilaoma penolensis* and *Scelidoropasp* "Ridges Road" were made on Rodondo Island (Carlyon *et al.* 2015) and a species of stick insect was recorded for the first time in the eastern Bass Strait on Inner Sister Island (Harris & Reid 2011). Unique assemblages of troglobitic cave invertebrates occur on Flinders Island and range extensions for other species such as the endemic Furneaux Burrowing Crayfish *Engaeus martigener* and Fringed Heath-blue Butterfly *Neolucia agricola insulana* (NCHD 2014) have been made there. The discontinuation of integrated island survey programs has meant that invertebrates are now often overlooked during short-stay visits and this gap in knowledge concurs with Mesibov's (2019) findings of a decrease in records of invertebrates lodged in museums and on databases since the turn of the century.

Islands are recognised globally as places with high levels of endemism and sites of extinction, and Tasmania's islands follow this trend. In addition to the Thylacine *Thylacinus cynocephalus* and Tasmanian Emu *Dromaius novaehollandiae diemenensis* now extinct on mainland Tasmania, three island-specific endemic vertebrate species or subspecies have been destroyed on Tasmania's islands (Macquarie Island Parakeet *Cyanoramphus erythrotis*, Macquarie Island Rail *Gallirallus philippensis macquariensis*, King Island Emu *Dromaius novaehollandiae minor*) with a probable fourth, a Macquarie Island seal species, exterminated before it was scientifically described (Terauds & Stewart 2009). Even more localised island extinctions have occurred. For example, on King Island, the King Island Emu, Forty-spotted Pardalote *Pardalotus quadragintus*, Spotted-tailed Quoll *Dasyurus maculatus*, Common Wombat *Vombatus ursinus* and Southern Elephant Seal *Mirounga leonine* are now extinct with a further 12 island species on the verge of extinction including the critically endangered King Island Scrub Tit *Acanthornis magnus greenianus* and King Island Brown Thornbill *Acanthiza pusilla subsp. archibaldi* (Donaghey 2003, TSS 2012, Webb *et al.* 2016). Other examples of regional extinctions are: Australian Sea Lions *Neophoca cinerea* no longer breed in Bass Strait after being eliminated on Christmas and New Year islands by harvesting in the nineteenth century, and an Australasian Gannet *Morus serrator* colony destroyed on Cat Island in the Furneaux Group before protective measures could be implemented (D. Pemberton, pers. comm).

The core breeding range for the Nationally Endangered Swift Parrot *Lathamus discolour* and Forty-spotted Pardalote centre on Flinders Island, Bruny Island and Maria Island and the Critically Endangered Orange-bellied Parrot *Neophema chrysogaster* depends on saltmarsh habitat on King Island and probably uses a number of northwest islands during its annual autumn migration (Bryant & Jackson 1999). On Flinders, truwuna-Cape Barren and lungtalanana-Clarke islands (pl. 4), the saltmarsh communities, heathland and remnant forests are breeding sites for threatened or naturally restricted species such as the Dwarf Galaxias *Galaxiella pusilla*, New Holland Mouse *Pseudomys novaehollandiae*, Green and Gold Bell Frog *Litoria aurea* and other genetically or regionally distinct fauna species (e.g., Bass Strait Common Wombat *Vombatus ursinus subsp. ursinus*, Chappell Island Tiger Snake *Notechis scutatus*). Islands are also microcosms for bird species like Silvereye *Zosterops* or poor-dispersers such as scrub wren *Sericornis* sp. and thornbill *Acanthiza* sp. which all over the world have evolved into specific island forms (Kirkwood & O'Connor 2010) and in Tasmania show distinct behavioural or morphological variation in the Bass Strait region (Bryant & Carlyon 2013). Pedra Branca

PLATE 4 — Northeast ridge on Mt Munro, truwuna-Cape Barren Island, looking across to Mount Strzelecki on Flinders Island.

islet (2.5 ha, pl. 5) is one of only three breeding sites for Endangered Shy Albatross *Thalassarche cauta* and critical habitat for the endemic Pedra Branca Skink *Niveoscincus palfreymani*, one of the rarest and most restricted reptiles in the world (Threatened Species Unit 2001).

The Ramsar wetlands of Lavinia (King Island), Logan Lagoon (Flinders Island) and truwuna-Cape Barren Lagoons are essential feeding sites for migratory waders during their annual East Asian migration (Woehler & Ruoppolo 2010) and the islands in the Boullanger Bay-Robbins Passage area are the stronghold for 17 species of migratory and resident waders including Hooded Plover *Thinornis rubricollis*, Pied Oystercatcher *Haematopus longirostris*, Little Tern *Sternula albifrons* and Fairy Tern *Sternula nereis* (Bryant 2002). These values are recognised internationally with 29 Important Bird Areas (IBAs) designated wholly or partly on Tasmanian islands, the highest number of island-IBAs of any Australian state (Kirkwood & O'Connor 2010).

Tasmania's islands are central to the ecology of all our land-breeding marine vertebrates including globally threatened albatrosses, giant petrel and burrowing seabird species and seal species (Bryant & Jackson 1999). Over 60 species of seabird including massive aggregations of Short-tailed Shearwater *Ardenna tenuirostris* and Little Penguin *Eudyptula minor* breed on the Bass Strait islands, including those in the Hogan Group (Brothers *et al.* 2001, Carlyon *et al.* 2011). Sub-Antarctic Macquarie Island has an estimated biomass of 3.5 million breeding seabirds, predominantly penguins with some (e.g., Royal Penguin *Eudyptes schlegeli*, Macquarie Island Shag *Leucocarbo purpurascens* and several species of burrowing petrel) breeding only there (Bryant & Shaw 2007, Terauds & Stewart 2009).

PLATE 5 — Pedra Branca Islet located ~ 27 km off South East Cape.

Flora values

The flora species on the littoral margins of the large islands and all low-lying islands are predominantly vagile and consequently tend to be widespread in occurrence. The autochthonous components of the floras on the larger islands are of special significance in some localities where the vegetation and floras are the result of climatic and fire factors peculiar to those sites. For example, Rodondo Island supports climax communities of *Eucalyptus globulus*, and *Melaleuca armillaris* as well as several plant taxa of regional biogeographic significance (Carlyon *et al.* 2015) which have evolved in the long absence of fire. Rodondo and Craggy islands also have one of the few indigenous Tasmanian occurrences of the shrub *Paraserianthes lophantha*, representing the eastern extremity of its natural distribution (Harris *et al*. 2001). Bass Strait islands are of particular biogeographical interest. The cloud forest on Mt Strzelecki on Flinders Island contains rainforest elements such as *Atherosperma moschatum* and a high proportion of the 137 species of liverworts and mosses recorded for the Strzelecki National Park (Harris *et al*. 2015). Such species assemblages assist in unravelling the palaeoenvironmental history of Bass Strait. The cloud forest on Mt Munro on truwuna-Cape Barren Island has the only Tasmanian stands of the tree *Bedfordia arborescens* within an unusual mosaic of plant communities (Harris & Lazarus 2006).

The east shelf of Maria Island has an ecologically important forest boundary, where stands of pure *Callitris rhomboidea* abut *Phyllocladus asplenifolius*-dominated rainforest, a situation attributable to an unusual combination of site factors, one of which appears to be the stripping of moisture by the rainforest from easterly sea mists. Such a sharp boundary between climax dry forest and climax cool temperate rainforest is significant in demonstrating the coincidence of forest types which may have been more common prior to the radiation of the eucalypts.

Many islands have one or more threatened plant species (appendix 2) or vegetation communities. For example, Bruny Island has approx. 39 state or nationally threatened plant species (Cochran 2003), and in 2019 a population of *Acacia acinacea* new to Tasmania was identified there (TLC 2019). In Bass Strait, *Apium insulare* and *Bulbine crassa* (pl. 6) represent taxa confined to the islands according to present knowledge, with so many other species such as *Isopogon ceratophyllus* and *Leiocarpa supina* occurring there as distribution range outliers.

Other island floras of national significance occur on Ile du Golfe, Maatsuyker Island and Flat Witch in the Tasmanian Wilderness World Heritage Area (Balmer *et al.* 2004) and the limestone flora on Prime Seal Island retains direct affinities with the Recherche Archipelago in Western Australia and the limestone coastal flora of South Australia (Harris *et al.* 2001). Deal Island in the Kent Group was visited in 1803 by the botanist Robert Brown who consequently made this the type locality for several plant taxa he collected there and first described.

Macquarie Island has a unique assemblage of vegetation communities and 48 plant species including four endemics (de Salas & Baker 2018), with one of these endemics, the critically endangered cushion-forming *Azorella macquariensis*, a dominant species of the fjaeldmark community (Selkirk *et al*. 1990).

INTRODUCTIONS AND TRANSLOCATIONS

Islands are often regarded as stocking grounds for plants and animals declining elsewhere. Historically, several islands in Tasmania have had ad hoc releases such as Koala *Phascolarctos cinereus*, Forester Kangaroo *Macropus giganteus* and Cape Barren Geese *Cereopsis novaehollandiae* to Three Hummock Island (Bryant 2008) and Tasmanian Devil *Sarcophilus harrisii* to Badger Island in 1996 (DPIPWE 2010a). By

PLATE 6 — Island Leek Lilly *Bulbine crassa*, Neds Reef, near truwana-Cape Barren Island.

far the highest number of alien introductions have been to Maria Island with over 90 exotic plant species introduced as ornamental plants or for cultivation and 19 vertebrate species actively liberated or a legacy of European settlement (PWS 1998). Fallow Deer *Dama dama* were introduced to the pastures around Frenchs Farm but eradicated in 1998. Forester Kangaroo and Cape Barren Geese were introduced as they were declining in populations elsewhere and in 1968 Australian Emu *Dromaius novaehollandiae* were introduced in a failed experiment to recreate the extinct Tasmanian Emu but were removed in the 1980s (Rounsevell 1989). Between 1969 and 1972, over 760 individuals from 13 species of mammal and bird were liberated on Maria as a potential food source for Thylacine should they ever be re-discovered and need to be relocated there (National Parks & Wildlife Service 1972). The legacy of these multiple introductions has compounded disturbance to Maria's ecosystem and imposed a burden of ongoing management to reduce several problematic species.

In 2012, Nationally Endangered Tasmanian Devils free of facial tumour disease were released on Maria Island to establish a free-ranging population under an approved translocation plan. Devils have subsequently successfully established and bred to a level where they are now being actively removed to re-populate mainland Tasmania sites (Wise *et al*. 2016). Tasmanian islands also provide opportunities for plant translocations though few have been undertaken to date. An ex-situ planting of the Critically Endangered endemic *Epacris stuartii* on Southport Island was undertaken in 2001 to prevent the species extinction should *Phytophthora cinnamoni* infect the only known wild population on nearby Southport Bluff. Recent suggestions of re-wilding some Bass Strait islands by reintroducing native extirpated predators to benefit threatened species is a novel approach which may become a recognised conservation tool of the future (Fielding *et al.* 2020).

ISLAND MONITORING PROGRAMS

It is difficult to assess the trends in the condition of Tasmania's offshore island environments as no baseline indicators are in place (Tasmanian Planning Commission 2009). However, at least 50 islands undergo repeat site visits to assess vertebrate breeding populations or monitor numbers; the most regularly visited are shown in table 2. One of the longest running wildlife monitoring programs in the world is on Fisher Island, where Short-tailed Shearwaters have been monitored annually since 1947 when first established by the ornithologist Dominic Serventy (Bradley *et al.* 2008).

TABLE 2 —Vertebrate assessments on Tasmanian islands.[1,2]

Species or group	Islands monitored
Australian fur seal breeding and haul-out sites	Maatsuyker, De Witt, Needles, Walker, Little Witch, Pedra Branca, Mewstone, Sugarloaf Rocks, Tasman, Hippolyte Rock, Albatross, Black Pyramid, Tenth, Judgement Rocks, West Moncoeur, Bass Pyramid, Wright Rocks, Reid Rocks, East Moriarty, West Moriarty Rocks; Bull Rocks, Ile des Phoques, Bruny, The Friars
Shy Albatross	Albatross, Mewstone, Pedra Branca
Albatrosses (4 species), Giant Petrel (2 species), burrowing seabirds (21 species), penguins (4 species), seals (5 species)	Macquarie
Australasian Gannett	Pedra Branca, Eddystone, Black Pyramid, Bass Pyramid, Cat
Little Penguin	Bruny, Ninth, Passage, Forsyth, King, Councillor, Georges Rocks, Diamond, Maria, Schouten, Huon, Tasman, De Witt, Maatsuyker, Louisa, Flinders
Pacific Gull	Goose, Flinders
Shorebirds (~17 resident and migratory species)	Robbins, Walker, Perkins, Kangaroo, Wallaby Islets, Montague, Maria, Flinders, Cape Barren, King, Bruny
Forty-spotted Pardalote, Swift Parrot	Maria, Flinders, Bruny including Partridge
Orange-bellied Parrot	King, Robbins, Walker, Perkins, Port Davey islands
Eagles (2 species)	Most regularly Maria, Bruny, Flinders
Short-tailed Shearwater, Cape Barren Goose, Brown Quail	Maatsuyker, Fisher, Big Green, East Kangaroo, Little Green, Great Dog, Little Dog, Chappell, Bruny, Tasman, Flinders, Vansittart, Tin Kettle, Woody, East Kangaroo, Goose, Isabella, Inner Sister, Badger
Pedra Branca Skink	Pedra Branca
Common Pheasant	Hunter group, Furneaux group, King
Macropods, Brush-tailed Possum	Maria, Flinders, King

[1] Visits may be irregular or repeat visits for breeding or population assessments, or determining harvesting quotas, etc.
[2] Referenced from multiple sources including back issues of *Game Tracks* (https://dpipwe.tas.gov.au/Documents/Game-tracks.pdf), Driessen & Hocking (2008).

Short-tailed Shearwater, Cape Barren Geese and Brown Quail *Coturnix ypsilophora* are monitored on several islands in the Furneaux Group to determine harvesting quotas (Wildlife Management Branch 2010) and over 20 islands and rock stacks are surveyed regularly for Australian Fur Seal *Arctocephalus pusillus* activity (Bryant & Jackson 1999, Kirkwood *et al.* 2010). Shorebirds are surveyed seasonally on multiple islands in Boullanger Bay area, with over 70 islands having been surveyed repeatedly for these species during the past 30 years (Bryant 2002, Woehler & Ruoppolo 2010). Critical research on Shy Albatross has been undertaken on Albatross Island, Mewstone and Pedra Branca for over 20 years as part of this species recovery efforts, and monitoring programs on Macquarie Island have been critical to determine population numbers pre- and post-pest eradication programs (Springer 2018). Another Macquarie Island research program monitoring the impact of European Rabbit *Oryctolagus cuniculus* browsing on sensitive vegetation has continued since 1981 (Whinam & Shaw 2018).

THREATS

Invasive species

Invasive species are an insidious threat that impact most of Tasmania's offshore islands and often go unnoticed and unmanaged. While no current comprehensive information exists on the number of Tasmanian islands impacted by invasive species, at least 70 have been recorded with introduced mammal species (Brothers *et al.* 2001, Terauds 2005, Pfennigwerth 2008, TPC 2009). The most commonly recorded are European Rabbit *Oryctolagus cuniculus*, feral Cat *Felis catus*, Black Rat *Rattus rattus*, House Mouse *Mus musculus* and a variety of domestic stock. Feral Pigs *Sus scrofa* are widespread on parts of Flinders Island since their introduction in the early 1880s (Statham & Middleton 1987) and recent Fallow Deer *Dama dama* have yet to be removed from the wild on Bruny Island and King Island. Many introduced bird species occur on islands often liberated for hunting or pleasure such as Ring-necked (Common) Pheasant *Phasianus colchicus*, Turkey *Meleagris gallopavo* and Indian Peafowl *Pavo cristatus* on Flinders Island and King Island.

Weeds are widespread on even more offshore islands, many being either cosmopolitan or ruderal species or possibly benign in their ecological impacts. Weeds that pose problems include, for example: African Boxthorn *Lycium ferocissimum*, Gorse *Ulex europaeus*, Canary Broom *Genista monspessulana*, Spanish Heath *Erica lusitanica,* Shining Coprosma *Coprosma repens,* Blackberry *Rubus fruticosus* and Sea Spurge *Euphorbia paralias*. Marram Grass *Ammophila arenaria* was introduced to Tasmania to stabilise sand dunes and is now widespread and well-established on the sandy coasts of most near onshore islands. Macquarie Island has seven alien plant species, two of which *Anthoxanthum odoratum* and *Rumex crispus* have already been removed (de Salas & Baker 2018).

The occurrence of the water mould *Phytophthora cinnamomi* is a significant cause of degradation in heathland communities on larger islands such as Schouten Island, Three Hummock Island, Flinders Island, truwuna-Cape Barren Island and lungtalanana-Clarke Island where it infests swathes of heathland. The result is the selective mortality of plants in the susceptible families, especially Proteaceae, Myrtaceae, Ericaceae and Fabaceae.

Until recently, vertebrate control programs on islands have been largely ad-hoc with mixed success. However, over the past decade Tasmania has significantly improved its eradication methodologies with several now cited as exemplars of success. Pest management on Macquarie Island had systematically eradicated Weka *Gallirallus australis* by 1988, feral Cats by 2002, and finally Rabbits, Black Rat and House Mouse by 2014 in a multipronged multi-species approach (Springer 2018, pl. 7). Feral Cats have been eradicated from Tasman Island and Wedge Island (Robinson *et al.* 2015, Robinson & Gadd 2020), House Mouse from Fisher Island (S. Robinson, pers. com.) and Black Rat from Big Green Island (Robinson & Dick 2020) with planning underway on other islands. The Bruny Island Cat Management program commenced in mid-2016 and has already significantly reduced cat numbers aiming to meet the Commonwealth's target of being one of Australia's Five Cat Free Islands (Allan 2019). Several feasibility plans have been prepared for the removal of feral Pig *Sus scrofa* from Flinders Island, but none have yet to secure funding. The improved success of government-led eradication efforts has been largely due to a combination of

PLATE 7 — European Rabbit denuding the slopes of Macquarie Island prior to eradication.

PLATE 8 — Taillefer Rocks off Schouten Island, Freycinet National Park.

better planning, improved technology, aid from volunteer labour and philanthropic financial support (Springer 2018, Robinson & Dick 2020).

Uncontrolled access

Inappropriate or uncontrolled access to islands can cause disturbance to sensitive breeding species, and increase the risk or spread of invasive species, disease and fire. Several Tasmanian islands restrict public access unless authorised by permit (Macquarie Island, Judgement Rocks, North East Isle, South West Isle, Vissher Island, Ile de Phoques, Albatross Island, Rodondo Island and others) and partial restrictions apply to a number of islands within Freycinet National Park (The Nuggets, Refuge Island, Promise Rock, Lemon Rock, Half Lemon Rock, Eastern Rock and Taillefer Rocks (pl. 8)).

A government protocol is in place which identifies 12 steps to preventing pests, weeds and diseases spreading to Tasmania's islands (http://www.islandshare.net/Documents/Island_Biosecurity_Guide.pdf), with additional biosecurity measures recommended for islands in Tasmania's Southwest Wilderness Area (Mallick & Driessen 2009). Minimal impact guidelines have been prepared for sea kayakers to ensure that sensitive areas are not disturbed or compromised during recreational visits which for some even remote islands have become a constant summer destination (D. Pemberton, pers. com.). Rigorous biosecurity procedures are in place for Macquarie Island and these are included as part of the guidelines for tourist operations to the island (PWS 2006, http://www.parks.tas.gov.au/).

Climate change

Australia's most recent species extinction resulting from the loss of habitat by sea level rise (Woinarski et al. 2018) was the endemic Bramble Cay *Melomys Melomys rubicola*, from the northern Great Barrier Reef. More than 1,440 km of Tasmania's coast is subject to flooding, and over 975 km of shoreline at risk of erosion, sand dune mobility, rock falls and slumping as a result of sea level rise and more frequent storm surges (Sharples 2006, DPIPWE 2010b). A rise in mean sea level due to global warming of between 5 cm and 14 cm for Tasmania is projected to occur by 2030 meaning 1-in-100-year storm tide events could occur as frequently as once every 50 years, and are therefore likely to impact all low-lying Tasmanian islands. Southeastern Tasmania is predicted to experience the greatest increase in sea surface temperature and in Mercury Passage the rise of 1.6°C recorded in the past 50 years, is already three times the average rate of global warming (ACE CRC 2010, Parsons 2011). Ocean acidification and reduced calcification is anticipated to cause increased erosion of coral reefs like those off the islands in the Kent Group, having potential consequences for the marine food chain (TPC 2009). Australia-wide nearly 20% of migratory bird species are likely to be affected through the loss of habitat due to sea level rise and coastal development (Mallon 2007). Loss of frontline beach foredune, shrubland communities and tussock grassland will reduce breeding habitat for marine seabirds, most of which have high site fidelity. Sea level has fluctuated during the Holocene and there is evidence of fossil shorelines many metres above the current high-water mark. The response of the terrestrial biota to such sea level changes is poorly understood, although the ameliorative effects of higher sea levels in creating new habitats has been investigated by Prahalad and colleagues on coastal saltmarshes. They use predictive models to anticipate where new habitat may be created under different sea level change scenarios (e.g., Prahalad *et al.* 2012, Prahalad & Pearson 2013). Seminal research on the Macquarie Island Cushion Plant identified the cause of its decline was due to a climatic shift, exposing this unique cold, wet adapted species to prolonged periods of drying (Whinam & Shaw 2018). The long-term monitoring of island species in remote environs is often pivotal for identifying the impact of insidious threats and recommending recovery actions that could benefit groups of co-located species (e.g., response of burrow nesting petrels to climate change in Brothers & Bone 2008).

ISLAND PARTNERSHIPS

Volunteers and philanthropic partnerships remain instrumental in helping deliver a range of conservation initiatives on Tasmania's islands and are pivotal for ongoing success (Bryant & Copley 2018). Groups such as the Bruny Island Environmental Network are community-based collectives that assess policy, development applications and all manner of local issues to ensure transparency and protection of island values. Since the 1970s Birdlife Tasmania volunteers have collected bird data on species distribution, sensitive bird breeding islands (www.birdlife.org.au/locations/birdlife-tasmania) and assisted in island monitoring and eradication efforts. In 2020 Wildcare Tasmania (www.wildcaretas.org.au/) had 11 registered island-specific Wildcare groups contributing to weed removal, track or heritage restoration or caretaker positions on islands. Some, for example, the Friends of Bass Strait Islands manage weed removal on ten outer Furneaux Islands, and the Friends of Maatsuyker Island undertake lighthouse preservation, caretaker duties, weed removal and seabird monitoring, often at their own expense (Bryant & Copley 2018). The Cradle Coast Authority is aiming to protect shorebird species on Three Hummock Island by removing feral Cats and controlling Sea Spurge and other weeds in the Robbins Passage area.

The Tasmanian Aboriginal community including the Tasmanian Aboriginal Centre and the people on truwuna-Cape Barren Island, Flinders Island and Bruny Island have formed strong partnerships with a range of government and private bodies to undertake research and collaborate on land management projects on their islands, including with Australian National University researchers, allowing the investigation of palaeoenvironments reconstructed from sediment and pollen cores (McWethy *et al.* 2017).

Since 1989 the Princess Melikoff Trust has financially supported government marine mammal conservation by funding surveys of seal breeding and haul-out sites on numerous islands around Tasmania, and from 2003 to 2017 a partnership with the Hamish Saunders Memorial Island Survey Program facilitated multi-disciplinary expeditions to 24 offshore islands and the publication of results. While several commercial businesses (e.g., Maria Island Walk (www.mariaislandwalk.com.au)) support local island initiatives, the most influential island partnership to date has been with Pennicott Wilderness Journeys, who make sizeable donations from the Pennicott Foundation which have been pivotal in the success of so many island management programs (https://www.pennicottfoundation.org.au/projects/).

Collaborating in international symposia like the Small Island Developing States (www.first.org/events/symposium/nadi2019/) and the National Island Arks Symposia (http://islandarks.com.au/) are instrumental for the sharing of knowledge across multi-disciplines dealing with island management including the role of local communities and indigenous practice. Participation in collaborative forums such as these is essential for island managers to discuss commonly shared problems as islands become increasingly more attractive for developments and expanding populations at the cost of their natural values.

CONCLUSIONS

Tasmania's offshore islands contain globally unique natural values and play a significant role in nature conservation, but their ongoing management is necessary to prevent degradation and local species extinction. A national review by Ecosure (2009) identified 15 Tasmanian islands among Australia's top 100 most conservation important islands greater than 200 ha in size. While those identified are significant, size is not a valid criterion to determine conservation value as most, even small, islands can contain inherently unique assemblages. Management of islands requires a multi-disciplinary approach supported by comprehensive evidence and a decision support system (Lohr *et al.* 2018) that can simplify the myriad of possible actions involved in protecting island species. One such system designed by Helmstedt *et al.* (2016) for island invasive species eradication factored in a range of attributes including likelihood of success and cost-effectiveness, and demonstrated that for a fixed budget, a higher conservation benefit could be achieved across multiple islands. Assigning a set of baseline indices for island condition are also essential if we are to track the ecological health of islands in response to management programs or pressures from future use or climate change.

Due to competing demands and costs associated with their access and management, islands seldom receive the timely attention they deserve, leaving them exposed to existing and emerging threats including inappropriate development. Designating islands that contain important nature conservation values as 'Matters of National Environmental Significance' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) has been proposed by Woinarski *et al.* (2018). This mechanism could be strengthened further by the listing of 'important island populations' as threatened communities or threatened ecosystems under Tasmania's *Nature Conservation Act 2001*. If important islands were designated as a 'threatened ecological community' it might focus attention and justify the direction of additional resources towards their management.

With improving knowledge, technology and increased volunteer-philanthropic support, invasive species are being reduced with greater efficiency providing island systems time to recover. However, these efforts need to be supported and expanded if we are to retain our unique island ecologies in the future.

ACKNOWLEDGEMENTS

This paper is based on a keynote address given by the lead author at the Island Arks Symposium in 2012. Mr Keith Springer, Dr Justine Shaw, Mr Grant Dixon and Mr Christian Bell kindly provided advice at that time. We thank Dr David

Pemberton and Dr Michael Driessen for their review of this manuscript and very helpful suggestions. Ms Eve Lazarus assisted with the compilation of appendix 2. All photos are those of the authors.

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(Accepted 30 October 2020)

APPENDIX 1 — Threatened Land-based fauna recorded on Tasmania's offshore islands.

Species identified from (https://dpipwe.tas.gov.au/conservation/threatened-species-and-communities/lists-of-threatened-species/full-list-of-threatened-species; last updated 16 July 2020). Status in Tasmania TAS on the Threatened Species Protection Act 1995 and Commonwealth CW status refers to listings under the Environment Protection and Biodiversity Conservation Act 1999. Status code: CR critically endangered, e, EN endangered, x, EX extinct, v, VU vulnerable, r rare. Accuracy of distribution records on the Natural Values Atlas (Department of Primary Industries, Water and Environment, accessed 20 Oct 2020), is variable for many species (https://dpipwe.tas.gov.au/conservation/development-planning-conservation-assessment/planning-tools/natural-values-atlas). See notes below for more information.

Vertebrate species[1]	Common name	Group	Status TAS	Status CW	Key island or group[2]
Arctocephalus forsteri	Long-nosed (NZ) Fur Seal	MAMMALS	r	-	Macquarie, Maatsuyker, Flat Witch, Tasman, Taillefer Rocks, Ile des Phoques, Cape Raoul, Cape Pillar, Wendar and others in Bass Strait
Arctocephalus tropicalis	Subantarctic Fur Seal	MAMMALS	e	EN	Macquarie and occasionally elsewhere
Dasyurus maculatus	Spotted-tailed Quoll	MAMMALS	r	VU	King (now extinct)[3]
Dasyurus viverrinus	Eastern Quoll	MAMMALS	-	EN	Bruny[4]
Mirounga leonina	Southern Elephant Seal	MAMMALS	e	VU	Macquarie, Maatsuyker, Bruny, King, Forsyth and occasionally elsewhere
Perameles gunnii gunnii	Eastern-barred Bandicoot	MAMMALS	-	VU	Bruny[4]
Pseudomys novaehollandiae	New Holland Mouse	MAMMALS	e	VU	Flinders
Sarcophilus harrisii	Tasmanian Devil	MAMMALS	e	EN	Robbins, Maria
Acanthiza pusilla archibaldi	Brown Thornbill (King Is)	BIRDS	e	EN	King
Acanthornis magna greeniana	Scrubtit (King Island)	BIRDS	e	CR	King
Accipiter novaehollandiae	Grey Goshawk	BIRDS	e	-	Bruny[5], may be elsewhere
Aquila audax fleayi	Wedge-tailed Eagle	BIRDS	e	EN	Many islands inc Bruny

APPENDIX 1 – cont.

Vertebrate species[1]	Common name	Group	Status TAS	Status CW	Key island or group[2]
Botaurus poiciloptilus	Australasian Bittern	BIRDS	-	EN	King, Flinders, Bruny[5]
Calidris ferruginea	Curlew Sandpiper	BIRDS	-	CR	King, Perkins, Furneaux Group, occasionally elsewhere
Ceyx azureus diemenensis	Tasmanian Azure Kingfisher	BIRDS	e	EN	Flinders, King, Bruny, occasionally elsewhere
Cyanoramphus novaezelandiae erythrotis	Macquarie Island Parakeet	BIRDS	x	EX	Macquarie[6]
Diomedea exulans	Wandering Albatross	BIRDS	e	VU	Macquarie[6]
Dromaius minor	King Island Emu	BIRDS	x	EX	King
Gallirallus philippensis macquariensis	Macquarie Island Rail	BIRDS	x	EX	Macquarie[6]
Haliaeetus leucogaster	White-bellied Sea-Eagle	BIRDS	v	-	Many islands including King, Flinders, Maria, Bruny and Maatsuyker Group
Halobaena caerulea	Blue Petrel	BIRDS	v	VU	Macquarie[6]
Lathamus discolor	Swift Parrot	BIRDS	e	CR	Maria, Bruny, Flinders, Partridge, possibly elsewhere
Leucocarbo atriceps purpurascens	Macquarie Island Shag	BIRDS	v	VU	Macquarie[6]
Macronectes giganteus	Southern Giant Petrel	BIRDS	v	EN	Macquarie[6], occasionally elsewhere
Macronectes halli	Northern Giant Petrel	BIRDS	r	VU	Macquarie[6], occasionally elsewhere
Neophema chrysogaster	Orange-bellied Parrot	BIRDS	e	CR	King, possibly others in Boullanger Bay, Bruny (historic)[5]
Numenius madagascariensis	Eastern Curlew	BIRDS	e	CR	Flinders, King, Bruny, Robbins, Kangaroo, recorded elsewhere
Oceanites oceanicus	Wilson's Storm Petrel	BIRDS	r	-	Macquarie[6]
Pachyptila turtur subantarctica	Fairy Prion southern sub-species	BIRDS	e	VU	Macquarie[6]
Pardalotus quadragintus	Forty-spotted Pardalote	BIRDS	e	EN	King (extinct)[3], Flinders, Maria, Bruny, Partridge
Phoebetria fusca	Sooty Albatross	BIRDS	r	VU	Macquarie[6]
Phoebetria palpebrata	Light-mantled Albatross	BIRDS	v	-	Macquarie[6]
Platycercus caledonicus brownii	King Island Green Rosella	BIRDS	v	VU	King
Procellaria cinerea	Grey Petrel	BIRDS	e	-	Macquarie[6]
Pterodroma lessonii	White-headed Petrel	BIRDS	v	-	Macquarie[6]
Pterodroma mollis	Soft-plumaged Petrel	BIRDS	e	VU	Macquarie[6], Maatsuyker
Sterna striata	White-fronted Tern	BIRDS	v	-	Mainly islands in the Furneaux including truwana-Cape Barren, also Albatross and elsewhere
Sterna vittata bethunei	Antarctic Tern	BIRDS	e	EN	Macquarie[6]
Sternula albifrons sinensis	Little Tern	BIRDS	e	-	King, Flinders, islands in Bass Strait and Boullanger Bay
Sternula nereis nereis	Fairy Tern	BIRDS	v	VU	King, Flinders, islands in Bass Strait and Boullanger Bay and elsewhere
Strepera fuliginosa colei	Black Currawong (King Is)	BIRDS	-	VU	King
Thalassarche cauta	Shy Albatross	BIRDS	v	EN	Albatross, Pedra Branca, Mewstone, occasionally elsewhere

APPENDIX 1 – cont.

Vertebrate species[1]	Common name	Group	Status TAS	Status CW	Key island or group[2]
Thalassarche chrysostoma	Grey-headed Albatross	BIRDS	e	EN	Macquarie[6], occasionally elsewhere
Thalassarche melanophris	Black-browed Albatross	BIRDS	e	VU	Macquarie[6], occasionally elsewhere
Thinornis cucullatus cucullatus	Hooded Plover (Eastern)	BIRDS	-	VU	Many islands including King, Flinders, Bruny, Maria and in Bass Strait
Tyto novaehollandiae castanops	Masked Owl	BIRDS	e	VU	Bruny[5], Maria, Trefoil, Betsey, occasionally elsewhere
Litoria raniformis	Green and Gold Frog	AMPHIBIANS	v	VU	King, Flinders, Maria
Limnodynastes peroni	Striped Marsh Frog	AMPHIBIANS	e	-	King
Carinascincus palfreymani	Pedra Branca Skink	REPTILES	e	VU	Pedra Branca
Pseudemoia rawlinsoni	Glossy Grass Skink	REPTILES	r	-	truwana-Cape Barren, Picnic?
Pseudemoia pagenstecheri	Tussock Skink	REPTILES	v	-	truwana-Cape Barren
Galaxiella pusilla	Dwarf Galaxias	FISH	v	VU	Flinders

Invertebrate species	Common name	Order	Status TAS	Status CW	Island or group
Austrorhytida lamproides	Keeled Snail	SIGMURETHRA	r	-	Three Hummock
Cavernotettix craggiensis	Craggy Island Cave Cricket	ORTHOPTERA	r	-	Craggy (north west of Flinders)
Chloritobadistes victoriae	Southern Hairy Red Snail	EUPULMONATA	v	-	King
Dasyurotaenia robusta	Tapeworm (Tasmanian Devil)	CYCLOPHYLLIDEAE	r	-	Robbins, Maria
Echinodillo cavaticus	Flinders Island Cave Slater	ISOPODA	r	-	Flinders
Engaeus martigener	Furneaux Burrowing Crayfish	DECAPODA	v	EN	Flinders, truwana-Cape Barren
Lissotes latidens	Broad-toothed Stag Beetle	COLEOPTERA	e	EN	Maria
Lissotes menalcas	Mt. Mangana Stag Beetle	COLEOPTERA	r	-	Bruny
Parvotettix rangaensis	Cave Cricket	ORTHOPTERA	r	-	truwana-Cape Barren
Parvotettix whinrayi	Whinray's Cave Cricket	ORTHOPTERA	r	-	Flinders
Theclinesthes serpentata	Chequered Blue	LEPIDOPTERA	r	-	Flinders, Diamond

[1] Table does not include Grey-headed Flying-fox *Pteropus poliocephalus*, or Great Knot *Calidris tenuirostris* (listed on EPBC but not on https://dpipwe.tas.gov.au/conservation/threatened-species-and-communities/lists-of-threatened-species/full-list-of-threatened-species) or White-throated Needletail *Hirundapus caudacutus* as mainly arboreal

[2] Only main islands mentioned and may be recorded on islands elsewhere.

[3] Additional reference for Spotted-tailed Quoll and Forty-spotted Pardalote: **Donaghey, R.** (ed.) 2003: The fauna of King Island: A guide to identification and conservation management. King Island Natural Resource Management Group Inc. King Island: 152 pp.

[4] Additional reference for Eastern Quoll and Eastern-barred Bandicoot: **Driessen, M.M., Carlyon, K., Gales, R., Mooney, N., Pauza, M., Thurstans, S., Visoiu, M. & Wise, P.** 2011: Terrestrial mammals of a sheep-grazing property on Bruny Island, Tasmania. *Papers and Proceedings of the Royal Society of Tasmania* 145: 51-64.

[5] Birds on Bruny Island supported by the checklist: https://www.brunybirdfestival.org.au/images/downloads/Bird_Festival_2018_-_Checklist_of_bird_species_found_on_Bruny_Island.pdf

[6] Macquarie Island species source https://avibase.bsc-eoc.org/checklist.jsp?region=AUmi&list=howardmoore (accessed 1 October 2020).

APPENDIX 2 — Threatened flora species recorded on Tasmania's offshore islands.[1]

Species name[3]	Common name	Family[3]	Status[2] TAS	Status[2] CW	Island or group
Acacia ulicifolia	Juniper Wattle	Fabaceae	rare		Flinders Island; Three Hummock Island; Bruny Island
Acrotriche cordata	Coast Groundberry	Ericaceae	vulnerable		Prime Seal Island; Flinders Island
Allocasuarina crassa	Cape Pillar Sheoak	Casuarinaceae	rare		Tasman Island
Allocasuarina duncanii	Conical Sheoak	Casuarinaceae	rare		Bruny Island
Aphelia gracilis	Slender Fanwort	Centrolepidaceae	rare		Flinders Island
Asperula minima	Mossy Woodruff	Rubiaceae	rare		Inner Sister Island; Vansittart Island; Inner Sister Island; Flinders Island
Asperula scoparia var. *scoparia*	Prickly Woodruff	Rubiaceae	rare		Bruny Island
Asperula subsimplex	Water Woodruff	Rubiaceae	rare		Flinders Island
Atriplex suberecta	Sprawling Saltbush	Amaranthaceae	vulnerable		Little Chalky Island; Wybalenna Island; Boxen Island; Badger Island; Beagle Island; Little Badger Island; Outer Green Island
Australina pusilla subsp. *muelleri*	Shade Nettle	Urticaceae	rare		King Island
Austrodanthonia remota	Remote Wallabygrass	Poaceae	rare		Hibbs Pyramid
Austrostipa bigeniculata	Doublejointed Speargrass	Poaceae	rare		Anderson Islands
Austrostipa blackii	Crested Speargrass	Poaceae	rare		Bruny Island
Azorella macquariensis	Macquarie Cushions	Apiaceae	endangered	Critically endangered	Macquarie Island
Banksia integrifolia	Coast Banksia	Proteaceae	extinct		Long Island; Hogan Group
Banksia serrata	Saw Banksia	Proteaceae	rare		Flinders Island
Baumea gunnii	Slender Twigsedge	Cyperaceae	rare		Schouten Island, Flinders Island
Bedfordia arborescens	Tree Blanketleaf	Asteraceae	vulnerable		Cape Barren Island
Bolboschoenus caldwellii	Sea Clubsedge	Cyperaceae	rare		King Island
Bolboschoenus medianus	Marsh Clubsedge	Cyperaceae	rare		King Island
Brachyloma depressum	Spreading Heath	Ericaceae	rare		Flinders Island; Clarke Island; Schouten Island
Brachyscome perpusilla	Tiny Daisy	Asteraceae	rare		Flinders Island
Caladenia aurantiaca	Orangetip Fingers	Orchidaceae	endangered		Deal Island
Caladenia australis	Southern Spider-Orchid	Orchidaceae	endangered		Flinders Island
Caladenia brachyscapa	Short Spider-Orchid	Orchidaceae	endangered	Extinct	Clarke Island; Cape Barren Island
Caladenia cardiochila	Heartlip Spider-Orchid	Orchidaceae	extinct		Flinders Island
Caladenia caudata	Tailed Spider-Orchid	Orchidaceae	vulnerable	Vulnerable	Bruny Island; Schouten Island; Clarke Island; Cape Barren Island; Flinders Island
Caladenia filamentosa var. *filamentosa*	Daddy Longlegs	Orchidaceae	rare		Bruny Island; Schouten Island; Flinders Island

APPENDIX 2 – cont.

Species name[3]	Common name	Family[3]	Status[2] TAS	Status[2] CW	Island or group
Caladenia prolata	White Fingers	Orchidaceae	endangered		Deal Island; Flinders Island
Caladenia pusilla	Tiny Fingers	Orchidaceae	rare		King Island; Three Hummock Island; Cape Barren Island; Flinders Island; Deal Island
Calandrinia granulifera	Pygmy Purslane	Portulacaceae	rare		Cape Barren Island; Flinders Island
Callitriche sonderi	Matted Waterstarwort	Plantaginaceae	rare		King Island
Calochilus campestris	Copper Beard-Orchid	Orchidaceae	endangered		Cape Barren Island; Clarke Island
Calystegia marginata	Forest Bindweed	Convolvulaceae	endangered		Cape Barren Island
Calystegia soldanella	Sea Bindweed	Convolvulaceae	rare		Bruny Island; King Island; East Kangaroo Island; Anderson Islands
Carex gunniana	Mountain Sedge	Cyperaceae	rare		Bruny Island
Caustis pentandra	Thick Twistsedge	Cyperaceae	rare		Schouten Island
Centipeda cunninghamii	Erect Sneezeweed	Asteraceae	rare		King Island
Centrolepis strigosa subsp. *pulvinata*	Bassian Bristlewort	Centrolepidaceae	rare		Cape Barren Island, Hogan Island; Deal Island
Chenopodium erosum	Papery Goosefoot	Amaranthaceae	extinct		Kent Group
Chiloglottis trapeziformis	Broadlip Bird-Orchid	Orchidaceae	endangered		Flinders Island; Great Dog Island
Chiloglottis valida	Large Bird-Orchid	Orchidaceae	listing as endangered pending (unofficial)		King Island
Chrysocephalum baxteri	Fringed Everlasting	Asteraceae	rare		Clarke Island; Cape Barren Island; Flinders Island
Comesperma defoliatum	Leafless Milkwort	Polygalaceae	rare		Cape Barren Island, King Island
Conospermum hookeri	Tasmanian Smokebush	Proteaceae	vulnerable	Vulnerable	Bruny Island; Cape Barren Island; Schouten Island
Corybas dienemus	Windswept Helmet-Orchid	Orchidaceae	vulnerable	Critically endangered	Macquarie Island; Flinders Island; King Island
Corybas fordhamii	Swamp Pelican-Orchid	Orchidaceae	endangered		Flinders Island
Corybas sulcatus	Grooved Helmet-Orchid	Orchidaceae	endangered	Critically endangered	Macquarie Island
Cotula vulgaris var. *australasica*	Slender Buttons	Asteraceae	rare		King Island; Three Hummock Island; Cape Barren Island; Passage Island; Inner Sister Island; Flinders Island; Hogan Island; Deal Island
Crassula moschata	Musky Stonecrop	Crassulaceae	rare		Macquarie Island; King Island; Black Pyramid; Albatross Island; Trefoil Island; Vansittart Island; Curtis Island; Bruny Island; Gull Reef Port Davey
Cryptandra exilis	Slender Pearlflower	Rhamnaceae	listing as vulnerable under consideration (unofficial)		Schouten Island; Cape Barren Island

APPENDIX 2 – cont.

Species name[3]	Common name	Family[3]	Status[2] TAS	Status[2] CW	Island or group
Cryptostylis leptochila	Small Tongue-Orchid	Orchidaceae	endangered		Flinders Island; Cape Barren Island
Cuscuta tasmanica	Golden Dodder	Convolvulaceae	rare		Flinders Island
Cyathea cunninghamii	Slender Treefern	Cyatheaceae	endangered		King Island
Cyathea Xmarcescens	Skirted Treefern	Cyatheaceae	endangered		King Island
Cyathodes platystoma	Tall Cheeseberry	Ericaceae	rare		Bruny Island
Cyphanthera tasmanica	Tasmanian Rayflower	Solanaceae	rare		Maria Island; Schouten Island
Cyrtostylis robusta	Large Gnat-Orchid	Orchidaceae	rare		Flinders Island; West Sister Island; Prime Seal Island; Hunter Island; King Island; Deal Island
Desmodium gunnii	Southern Ticktrefoil	Fabaceae	vulnerable		Schouten Island
Deyeuxia minor	Small Bentgrass	Poaceae	rare		Bruny Island
Diuris palustris	Swamp Doubletail	Orchidaceae	endangered		Flinders Island
Drosera glanduligera	Scarlet Sundew	Droseraceae	rare		Flinders Island
Elaeocarpus reticulatus	Blueberry Ash	Elaeocarpaceae	rare		Flinders Island; King Island
Epacris barbata	Bearded Heath	Ericaceae	endangered	Endangered	Schouten Island
Epacris virgata (Kettering)	Pretty Heath	Ericaceae	vulnerable (unofficial)		Bruny Island
Epilobium pallidiflorum	Showy Willowherb	Onagraceae	rare, delisting pending		King Island; Hunter Island
Eucalyptus globulus subsp. globulus	Gippsland Blue Gum	Myrtaceae	rare		Flinders Island; Inner Sister Island; Rodondo Island
Euphrasia collina subsp. *deflexifolia*	Eastern Eyebright	Orobanchaceae	rare		Schouten Island
Euphrasia fragosa	Shy Eyebright	Orobanchaceae	endangered	Critically endangered	Bruny Island
Eutaxia microphylla	Spiny Bushpea	Fabaceae	rare		Prime Seal Island; Flinders Island; Cape Barren Island
Frankenia pauciflora var. *gunnii*	Southern Seaheath	Frankeniaceae	rare		Harcus Island, Short Island; Little Goose Island; Preservation Island; Spike Island; Clarke Island; Rum Island; Cone Island
Galium antarcticum	Subantarctic Bedstraw	Rubiaceae	endangered	Critically endangered	Macquarie Island
Geococcus pusillus	Earth Cress	Brassicaceae	rare		Mount Chappell Island; Little Chalky Island; Mile Island; King Island
Gompholobium ecostatum	Dwarf Wedgepea	Fabaceae	endangered		Flinders Island
Gratiola pubescens	Hairy Brooklime	Plantaginaceae	rare		King Island; Cape Barren Island; Bruny Island
Gynatrix pulchella	Fragrant Hempbush	Malvaceae	rare		Flinders Island; Cape Barren Island; Maria Island
Gyrostemon thesioides	Broom Wheelfruit	Gyrostemonaceae	rare		Deal Island; Flinders Island; Cape Barren Island; Clarke Island
Hackelia latifolia	Forest Houndstongue	Boraginaceae	rare		King Island

APPENDIX 2 – cont.

Species name[3]	Common name	Family[3]	Status[2] TAS	Status[2] CW	Island or group
Hakea ulicina	Furze Needlebush	Proteaceae	vulnerable		Flinders Island; Cape Barren; Clarke Island
Haloragis myriocarpa	Prickly Raspwort	Haloragaceae	rare		Flinders Island; Clarke Island; Cape Barren Island; King Island
Hedycarya angustifolia	Australian Mulberry	Monimiaceae	rare		King Island
Hibbertia obtusifolia	Grey Guineaflower	Dilleniaceae	extinct		Clarke Island
Hydrocotyle comocarpa	Fringefruit Pennywort	Araliaceae	rare		Flinders Island; Cape Barren; Deal Island
Hydrorchis orbicularis	Swamp Onion-Orchid	Orchidaceae	rare		Bruny Island; Clarke Island; Cape Barren Island; Flinders Island
Hypolepis distans	Scrambling Groundfern	Dennstaedtiaceae	endangered	Endangered	King Island
Hypolepis muelleri	Harsh Groundfern	Dennstaedtiaceae	rare		Flinders Island; King Island
Isoetes drummondii subsp. drummondii	Plain Quillwort	Isoetaceae	rare		Flinders Island
Isopogon ceratophyllus	Horny Conebush	Proteaceae	vulnerable		Cape Barren Island; Flinders Island; Clarke Island
Juncus amabilis	Gentle Rush	Juncaceae	rare, delisting pending		Bruny Island
Juncus prismatocarpus	Branching Rush	Juncaceae	rare		Bruny Island
Juncus vaginatus	Clustered Rush	Juncaceae	rare		Wedge Island
Lachnagrostis billardierei subsp. *tenuiseta*	Small-Awn Blowngrass	Poaceae	rare		Flinders Island; Forsyth Island; Passage Island
Lachnagrostis robusta	Tall Blowngrass	Poaceae	rare		Cape Barren Island; Gull Reef Port Davey; Celery Top Islands; Maria Island; Cape Barren Island; Flinders Island
Lasiopetalum baueri	Slender Velvetbush	Malvaceae	rare		Flinders Island
Lasiopetalum discolor	Coast Velvetbush	Malvaceae	rare		Prime Seal Island; Cape Barren Island
Lepidium flexicaule	Springy Peppercress	Brassicaceae	rare		Bruny Island; Three Hummock; Gull Reef Port Davey; Black Swan Island; Muttonbird Island
Lepidosperma forsythii	Stout Rapiersedge	Cyperaceae	rare		Schouten Island; Cape Barren Island
Lepidosperma tortuosum	Twisting Rapiersedge	Cyperaceae	rare		Clarke Island
Lepidosperma viscidum	Sticky Swordsedge	Cyperaceae	rare		Bruny Island
Lepilaena patentifolia	Spreading Watermat	Potamogeton-aceae	rare		Flinders Island; King Island
Lepilaena preissii	Slender Watermat	Potamogeton-aceae	rare		Flinders Island
Leucopogon affinis	Lanceleaf Beardheath	Ericaceae	rare		King Island; Three Hummock Island; Clarke Island; Cape Barren Island; Flinders Island
Leucopogon esquamatus	Swamp Beardheath	Ericaceae	rare		Flinders Island; Cape Barren Island
Levenhookia dubia	Hairy Stylewort	Stylidiaceae	extinct		Flinders Island

APPENDIX 2 – cont.

Species name[3]	Common name	Family[3]	Status[2] TAS	Status[2] CW	Island or group
Limonium australe	Yellow Sea-Lavender	Plumbaginaceae	rare		Harcus Island, Short Island; Perkins Island
Lobelia pratioides	Poison Lobelia	Campanulaceae	vulnerable		Flinders Island
Lotus australis	Australian Trefoil	Fabaceae	rare		Flinders Island; Swan Island; Foster Island; Trefoil Island; Three Hummock Island
Microtis atrata	Yellow Onion-Orchid	Orchidaceae	rare		Bruny Island, Cape Barren Island and Flinders Island
Myoporum parvifolium	Creeping Boobialla	Scrophulariaceae	vulnerable		Flinders Island
Myriophyllum muelleri	Hooded Watermilfoil	Haloragaceae	rare		King Island; Long Island; Vansittart Island; Cape Barren Island, Clarke Island
Orthoceras strictum	Horned Orchid	Orchidaceae	rare		King Island; Schouten Island; Clarke Island; Cape Barren Island; Flinders Island
Pandorea pandorana	Wonga Vine	Bignoniaceae	rare		Flinders Island
Parietaria debilis	Shade Pellitory	Urticaceae	rare		King Island; Three Hummock Island; Erith Island, Deal Island, Rodondo Island; West Sister Island; Prime Seal Island; Great Dog Island; Puncheon Island; Little Green Island; Passage Island; Babel Island; Mount Chappell Island; Swan Island; Bruny Island
Pellaea calidirupium	Hotrock Fern	Adiantaceae	rare		Deal Island
Persicaria decipiens	Slender Waterpepper	Polygonaceae	vulnerable		King Island
Phyllangium distylis	Tiny Mitrewort	Loganiaceae	rare		Flinders Island; Cape Barren Island; King Island
Phyllangium divergens	Wiry Mitrewort	Loganiaceae	vulnerable		Bruny Island; Clarke Island; Cape Barren Island
Phylloglossum drummondii	Pygmy Clubmoss	Lycopodiaceae	rare		King Island, Cape Barren Island and Flinders Island
Pimelea axiflora subsp. *axiflora*	Bootlace Bush	Thymelaeaceae	endangered		King Island
Pimelea curviflora	Curved Riceflower	Thymelaeaceae	parent species (unofficial)		Schouten Island; Flinders Island; Badger Island
Pimelea micrantha	Silky Curved Riceflower	Thymelaeaceae	rare		Flinders Island
Pneumatopteris pennigera	Lime Fern	Thelypteridaceae	endangered		King Island
Poa cookii	Cooks Tussockgrass	Poaceae	endangered		Macquarie Island
Poa halmaturina	Dune Tussockgrass	Poaceae	rare		Clarke Island; Flinders Island
Podotheca angustifolia	Sticky Longheads	Asteraceae	extinct		King Island
Polystichum vestitum	Prickly Shieldfern	Dryopteridaceae	endangered		Macquarie Island
Pomaderris intermedia	Lemon Dogwood	Rhamnaceae	rare		Flinders Island; Cape Barren Island; Schouten Island
Pomaderris oraria subsp. *oraria*	Bassian Dogwood	Rhamnaceae	rare		Flinders Island

APPENDIX 2 – cont.

Species name[3]	Common name	Family[3]	Status[2] TAS	Status[2] CW	Island or group
Pomaderris paniculosa subsp. paralia	Shining Dogwood	Rhamnaceae	rare		King Island; Erith Island; Hogan Island, Prime Seal Island; Outer Sister Island; Swan Island; East Sister Island
Prasophyllum apoxychilum	Tapered Leek-Orchid	Orchidaceae	vulnerable	Endangered	Bruny Island
Prasophyllum atratum	Three Hummock Leek-Orchid	Orchidaceae	endangered	Critically Endangered	Three Hummock Island; Hunter Island
Prasophyllum castaneum	Chestnut Leek-Orchid	Orchidaceae	endangered	Critically Endangered	Bruny Island
Prasophyllum secutum	Northern Leek-Orchid	Orchidaceae	endangered	Endangered	Cape Barren Island, Flinders Island; Hunter Island; Robbins Island
Pterostylis cucullata	Leafy Greenhood	Orchidaceae	endangered	Vulnerable	King Island; Hunter Island; Three Hummock Island; Flinders Island
Pterostylis lustra	Small Sickle Greenhood	Orchidaceae	endangered		Perkins Island
Pterostylis sanguinea	Banded Greenhood	Orchidaceae	rare		Cape Barren Island; Clarke Island; Flinders Island; Deal Island
Pterostylis squamata	Ruddy Greenhood	Orchidaceae	vulnerable		Bruny Island
Pterostylis tunstallii	Tunstalls Greenhood	Orchidaceae	endangered		Vansittart Island; Flinders Island; Swan Island
Ranunculus diminutus	Brackish Buttercup	Ranunculaceae	endangered		Badger Island
Ranunculus pumilio var. *pumilio*	Ferny Buttercup	Ranunculaceae	rare		Flinders Island
Scaevola albida	Pale Fanflower	Goodeniaceae	vulnerable		Flinders Island
Schenkia australis	Spike Centaury	Gentianaceae	rare		Hunter Island; Three Hummock Island; Cape Barren Island; Flinders Island
Schoenoplectus tabernaemontani	River Clubsedge	Cyperaceae	rare		Flinders Island; King Island
Schoenoplectus validus	River Clubsedge	Cyperaceae	rare		King Island
Schoenus brevifolius	Zigzag Bogsedge	Cyperaceae	rare		Bruny Island
Scleranthus fasciculatus	Spreading Knawel	Caryophyll-aceae	vulnerable		Flinders Island; Bruny Island
Scutellaria humilis	Dwarf Skullcap	Lamiaceae	rare		Maria Island
Senecio psilocarpus	Swamp Fireweed	Asteraceae	endangered	Vulnerable	Flinders Island; King Island
Senecio squarrosus	Leafy Fireweed	Asteraceae	rare		Partridge Island; Bruny Island
Sicyos australis	Star Cucumber	Cucurbitaceae	rare		Inner Sister Island; Outer Sister Island
Solanum opacum	Greenberry Nightshade	Solanaceae	endangered		Deal Island; Kent Group; Prime Seal Island; Inner Sister Island; King Island
Spyridium parvifolium var. *molle*	Soft Dustymiller	Rhamnaceae	rare		Flinders Island; Cape Barren Island; Clarke Island
Spyridium parvifolium var. *parvifolium*	Coast Dustymiller	Rhamnaceae	rare		Flinders Island; Cape Barren Island
Spyridium vexilliferum var. *vexilliferum*	Helicopter Bush	Rhamnaceae	rare		Prime Seal Island; Flinders Island; Schouten Island
Stellaria multiflora subsp. *nebulosa*	Nebulous Rayless Starwort	Caryophyllaceae	rare		Deal Island; Curtis Island; Flinders Island; Vansittart Island; Little Dog Island; Swan Island

APPENDIX 2 – cont.

Species name[3]	Common name	Family[3]	Status[2] TAS	Status[2] CW	Island or group
Stuckenia pectinata	Fennel Pondweed	Potamogetonaceae	rare		Flinders Island; Cape Barren Island; Clarke Island
Stylidium beaugleholei	Blushing Triggerplant	Stylidiaceae	rare		King Island; Flinders Island; Cape Barren Island; Flinders Island
Stylidium despectum	Blushing Triggerplant	Stylidiaceae	rare		King Island; Flinders Island; Clarke Island
Stylidium perpusillum	Tiny Triggerplant	Stylidiaceae	rare		King Island; Cape Barren Island; Clarke Island
Taraxacum cygnorum	Coast Dandelion	Asteraceae		Vulnerable	Prime Seal Island; Flinders Island
Teloschistes flavicans	Golden-Hair Lichen	Teloschistaceae	rare		Inner Sister Island; Outer Sister Island; Babel Island
Teucrium corymbosum	Forest Germander	Lamiaceae	rare		Bruny Island
Teucrium corymbosum	Forest Germander	Lamiaceae	rare		Maria Island; Bruny Island
Thelymitra antennifera	Rabbit Ears	Orchidaceae	endangered		Hunter Island
Thelymitra atronitida	Blackhood Sun-Orchid	Orchidaceae	endangered		Bruny Island; Cape Barren Island
Thelymitra benthamiana	Blotched Sun-Orchid	Orchidaceae	endangered		Flinders Island
Thelymitra holmesii	Bluestar Sun-Orchid	Orchidaceae	rare		King Island; Bruny Island; Cape Barren Island; Flinders Island
Thelymitra improcera	Coast Sun-Orchid	Orchidaceae	endangered		King Island
Thelymitra jonesii	Skyblue Sun-Orchid	Orchidaceae	endangered	Endangered	Schouten Island; Cape Barren Island; Bruny Island
Thelymitra malvina	Mauvetuft Sun-Orchid	Orchidaceae	endangered		Hunter Island; Three Hummock Island; Robbins Island; Cape Barren Island; Flinders Island
Thelymitra mucida	Plum Sun-Orchid	Orchidaceae	rare (unofficial), listing as endangered pending		Bruny Island; Flinders Island
Thynninorchis huntiana	Elbow Orchid	Orchidaceae	extinct		Flinders Island
Tmesipteris parva	Small Forkfern	Psilotaceae	vulnerable		Flinders and King Islands
Tricostularia pauciflora	Needle Bogsedge	Cyperaceae	rare		Cape Barren Island; Schouten Island
Triglochin minutissima	Tiny Arrowgrass	Juncaginaceae	rare		Erith Island; Flinders Island; Clarke Island; Forsyth Island; King Island
Triglochin mucronata	Prickly Arrowgrass	Juncaginaceae	endangered		Vansittart Island; Flinders Island
Trithuria submersa	Submerged Watertuft	Hydatellaceae	rare		Cape Barren Island; King Island
Utricularia australis	Yellow Bladderwort	Lentibulariaceae	rare		Flinders Island; Bruny Island
Utricularia tenella	Pink Bladderwort	Lentibulariaceae	rare		King Island; Clarke Island; Cape Barren Island; Flinders Island
Utricularia violacea	Violet Bladderwort	Lentibulariaceae	rare		Flinders Island
Velleia paradoxa	Spur Velleia	Goodeniaceae	vulnerable		Bruny Island
Vittadinia muelleri	Narrowleaf New-Holland-Daisy	Asteraceae	rare		Bruny Island; Maria Island
Wilsonia humilis	Silky Wilsonia	Convolvulaceae	rare		Flinders Island

APPENDIX 2 – cont.

Species name[3]	Common name	Family[3]	Status[2] TAS	Status[2] CW	Island or group
Wilsonia rotundifolia	Roundleaf Wilsonia	Convolvulaceae	rare		Deal Island; Cape Barren Island
Xanthoparmelia microphyllizans	Lichen	Parmeliaceae	rare		Deal Island
Xerochrysum bicolor	Eastcoast Paperdaisy	Asteraceae	rare		Mount Chappell Island; Maria Island
Zygophyllum billardierei	Coast Twinleaf	Zygophyllaceae	rare		Flinders Island; Prime Seal Island

[1] Species listed were generated from the Natural Values Atlas (Department of Primary Industries, Water and Environment: DPIPWE) which relies on multiple sources both Herbarium vouchered and observational. The information was accessed on 30 October 2020. The Threatened Species Section (DPIPWE) should be consulted for up to date status, especially for those taxa whose status is listed as "pending" or "unofficial".

[2] Tasmanian status is in accordance with listings under the *Threatened Species Protection Act 1995*. National status (Status CW) refers to listings under the *Environment Protection and Biodiversity Conservation Act 1999*.

[3] Nomenclature of species and family follows de Salas & Baker (2018).