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RARE AND ENDEMIC VASCULAR PLANTS OF THE PITCAIRN ISLANDS, SOUTH-CENTRAL PACIFIC OCEAN: A CONSERVATION APPRAISAL*

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Abstract

The endemic and threatened plants of the Pitcairn Islands (Pitcairn, Henderson, Oeno, Ducie) are listed and their conservation status assessed. The volcanic Pitcairn and the raised atoll Henderson are the most floristically rich of the islands, and each has a number of endemic taxa. Over half of the native Pitcairn flora is either threatened or insufficiently known (but likely to be threatened), the main threats being removal of native vegetation cover and the invasion of exotic taxa, particularly Syzygium jambos. *A detailed survey of the Pitcairn flora is urgently needed to determine fully the status, likely threats, and measures required to conserve the native flora.* Ex situ *conservation of the endangered Pitcairn taxa and protection of suitable remaining habitats are the most urgent conservation requirements in the whole of the island group. Less than 20% of the Henderson taxa are threatened, and only two of the endemic taxa (*Myrsine hosakae *and* Santalum insulare *var.* hendersonensis*) are considered threatened. Threatened taxa on Henderson are mostly species which occur very locally on the island or in small populations; they include several very widespread species. Oeno and Ducie are atolls with depauperate floras; Oeno contains three threatened taxa, one of which may be a recent colonist, and another may be extinct. We recommend an immediate floristic survey of Pitcairn, the establishment of a Conservation Officer and the implementation of a sustainable development and conservation policy for the island.*

Keywords: Pitcairn Islands, Henderson, Pitcairn, Oeno, Ducie, threatened taxa, endemism, island ecology, red data list.

INTRODUCTION

Oceanic islands are of particular scientific interest because they contain many species of very restricted distribution, either as relicts of formerly more widespread and often primitive taxa, or as the products of more recent evolutionary radiation from initial colonisation. Unfortunately many island ecosystems are extremely fragile and many are seriously threatened (Melville, 1979).

The Pitcairn group consists of four islands — Pitcairn, Henderson, Oeno and Ducie (Fig 1). Geographically the group lies at the south-eastern end of the Tuamotu archipelago, slightly south of the Tropic of Capricorn. They are administered by Britain as an overseas protectorate, the rest of the Tuamotus being part of French Polynesia. Pitcairn itself is the only inhabited island of the four, and is well known as the refuge of the *Bounty* mutineers; however, at least Pitcairn, Oeno and Henderson had earlier periods of Polynesian occupation (Weisler *et al.*, 1991; Weisler, in press). All are oceanic islands of volcanic origin; Oeno, Henderson and Ducie have all developed carbonate caps and formed atolls. Pitcairn is much younger than the others, and is a 'high' volcanic island with a maximum altitude of about 300 m. Its eruption has resulted in lithospheric flexure which has up-lifted Henderson (Spencer, 1989), most of which is now a plateau about 30 m above sea level. Oeno and Ducie remain as typical low atolls, with a land surface of 1–2 m above sea level.

The island group therefore presents an interesting diversity of habitat types, but due to their remoteness, previous studies of the islands have been of relatively short duration. Much of the scientific interest has centred on the raised atoll Henderson, which has a more

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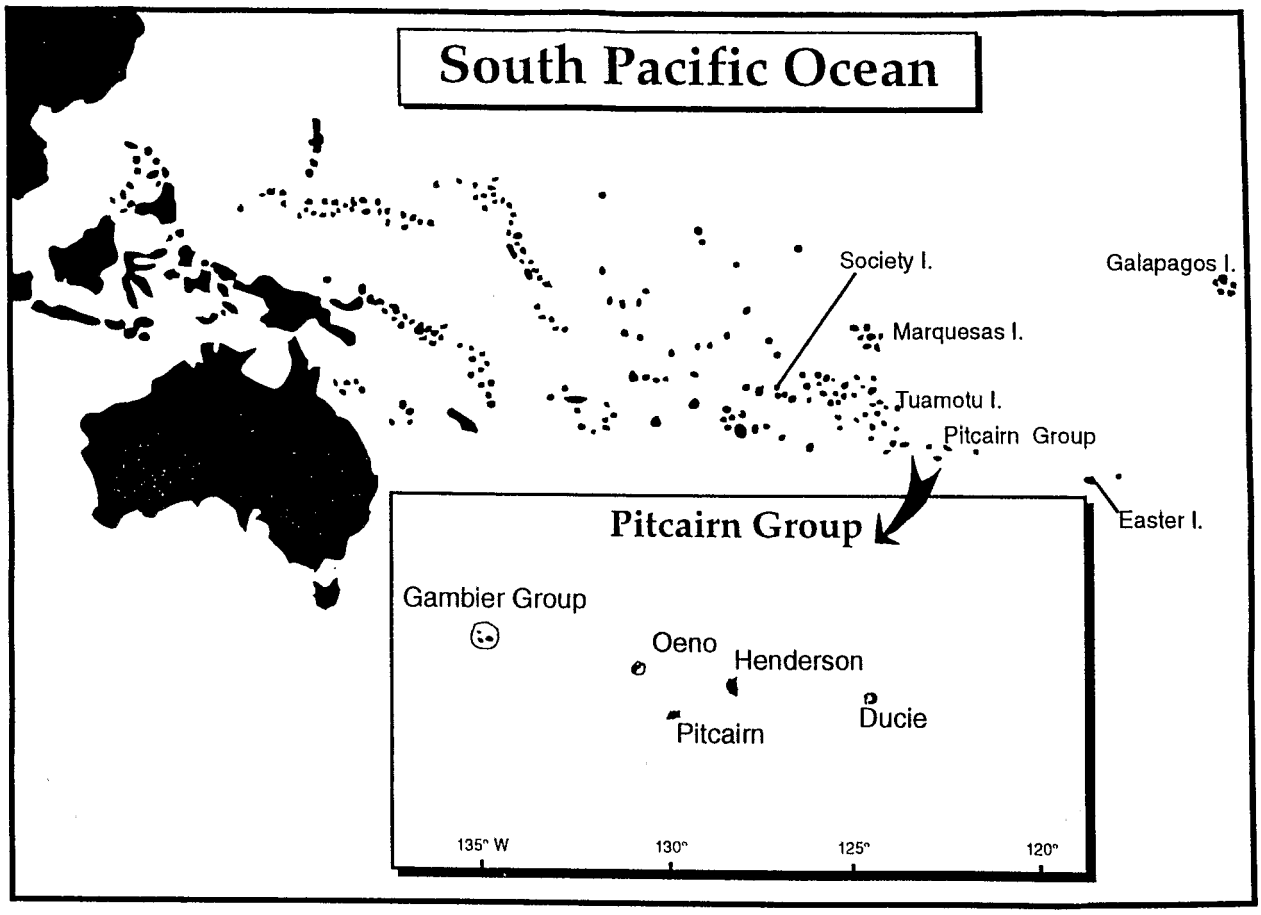

Fig. 1. The southern Pacific Ocean, with inset showing the Pitcairn group.

diverse flora than the atolls. Fosberg *et al.* (1983) summarised the biological knowledge of Henderson, following a proposal by an individual to settle on the island. The information available in 1983 was based on limited exploration, mostly of the northern end of the island, and revealed that a more extensive ecological study of Henderson was desirable. Between January 1991 and March 1992, a very detailed survey of the Pitcairn Islands in general and Henderson in particular was carried out by the Sir Peter Scott Commemorative Expedition to the Pitcairn Islands (PISE), which aimed to provide a complete and detailed study of the terrestrial and marine biota, the geology, geomorphology and archaeology, and to provide a detailed management plan for Henderson (Weisler *et al.*, 1991), which has been nominated as a World Heritage Site.

We spent 3 months in the Pitcairn group in 1991 as part of the PISE collecting specimens and mapping the vegetation. In total, 11 weeks were spent on Henderson, 1 week on Oeno and slightly over 1 week on Pitcairn. A description of the flora and vegetation of Henderson and the other three islands will be published elsewhere (Florence *et al.*, in press; Waldren *et al.*, in press); in the present paper we document the status of the endemics and the rarer plants of the islands, and the conservation measures needed to ensure their continued survival. Information on the floras of Henderson (St John & Philipson, 1960; Fosberg *et al.*, 1989), Oeno (St John & Philipson, 1962), Ducie (Rehder & Randall, 1975) and Pitcairn (Brownlie, 1961; St. John, 1987) has appeared previously, but was generally based on expeditions of limited duration. The PISE has enabled a more complete survey of populations to be undertaken, and we are now able to provide detailed conservation information, based mainly on our observations of the populations *in situ*, supplemented with information from the appropriate literature.

In the list which follows, the species name is followed by the islands from which the taxon has been recorded (H, Henderson; P, Pitcairn; O, Oeno; D, Ducie). There then follow notes about each taxon in the following order: 1, World distribution; 2, Ecological distribution and notes; 3, Status; 4, Growth habit: 5, Regeneration; 6, Dispersal and pollination agents; 7, Specific threats; 8, Special conservation measures; and 9, Cultivation notes. Where population estimates are given, these are usually based on likely numbers from field observations. In the case of trees and shrubs from Henderson, the estimated density in 10 × 10 m quadrats was multiplied by the estimated area of occupancy in the various vegetation types (see Waldren *et al.*, in press). We acknowledge that there will be large errors associated with these values; however, they do allow the application of population size criteria for threatened status assessment (Mace & Stuart, 1994). Cultivation notes are based on experiences with recently collected material from the islands at Trinity College Botanic Garden and from information kindly supplied by Botanic Gardens Conservation

Table 1. List of the endangered taxa of the Pitcairn group, with their present WCMC and recommended conservation status

Taxon	Occurrence[a]	WCMC status[b]	Recommended status[c]
Psilotum nudum (L.) P. Beauv.	H, P	H,P–R	H,P–EN (D)
Angiopteris chauliodonta Copeland	***P***	E	CR (D)
Trichomanes endlicherianum Presl.	P	E	CR(D)
Cyathea medullaris (G. Forster) Swartz	P	V	EN (D)
Ctenitis cuningii Holttum	***P***	E	CR (D)
Diplazium harpeodes T. Moore	P	I	DD
Asplenium polyodon G. Forster	H	V	VU (D1)
Asplenium shuttleworthianum Kunze	P	K	DD
Loxoscaphe gibberosum (J. R. & G. Forster) T. Moore	P	K	DD
Phymatosorus powellii (Baker) Pichi-Serm.	P	R	VU (D1)
Phymatosorus commutatus (Blume) Pichi-Serm.	P	V	EN (D)
Vittaria elongata Swartz	P	I	DD
Dianella intermedia Endl.	H, P	H–R; P–I	H–VU (D); P–DD
Hernandia sonora L.	P	I	DD
Hernandia stokesii (F. Brown) Kubitzki	H	R	VU (D1)
Peperomia hendersonensis Yuncker	***H***	nt	VU (D2)
Peperomia rapensis F. Brown	P	I	DD
Peperomia pitcairnensis (Lauterbach) C.DC.	***P***	I	VU (D2)
Cocculus trilobus (Thunberg) DC.	P	I	DD
Pisonia umbellifera (J. R. & G. Forster) Seem.	P	I	DD
Triumfetta procumbens G. Forster	H, O	H–nt; O–V	H–LR (iii); O–CR (D)
Abutilon pitcairnense Fosberg	***P***	I	VU (D2)
Celtis pacifica Planchon	H, P	H–nt; P–I	H–LR (iii); P–DD
Procris pedunculata (J. R & G. Forster) Wedd.	H, P	H–nt; P–K	H–LR (iii); P–DD
Homalium taypau St John	***P***	nt	LR (iii)
Xylosma suaveolens (J. R. & G. Forster) G. Forster	P	E	CR (D)
Xylosma suaveolens (J. R. & G. Forster) G. Forster ssp. *haroldii* Sleumer	***H***	nt	VU (D2)
Capparis cordifolia Lam.	H, P	H–nt; P–K	H–LR (iii); P–DD
Lepidium bidentatum Montin	H, P, O	H, O–nt; P–K	H, O–LR (iii); P–DD
Nesoluma st-johnianum Lam & Meeuse	***H***	nt	VU (D2)
Myrsine hosakae St John	***H***	R	VU (D2)
Myrsine aff. *niauensis* Fosberg & Sachet	***P***	I	DD
Pittosporum arborescens Rich. *ex* Gray	H	E	CR (D)
Osteomeles anthyllidifolia (Sm.) Lindl.	P	I	DD
Senna glanduligera (St John) A. C. Smith	H	nt	LR (iii)
Sesbania coccinea ssp. *atollensis* (St John) Sachet	H	X/E	EX/CR (D)
Canavalia rosea (Swartz) DC.	H	E	CR (D)
Pemphis acidula J. R. & G. Forster	H, P, D	H–nt; D–V; P–I	H–LR (iii); D–CR (D); P–DD
Eugenia reinwardtiana (Blume) DC	H, P	H–nt; P–I	H–LR (iii); P–DD
Santalum insulare Bertero *ex* DC. var. *hendersonense* (F. Brown.) Fosberg & Sachet	***H***	R	VU (D2)
Glochidion pitcairnense (F. Brown) St John	H, P	H–nt; P–I	H–LR (iii); P–DD
Glochidion sp. nov.	***P***	I	VU (D2)
Allophyllus rhomboidalis (Nadeaud) Radlkofer	H	R	EN (D)
Meryta brachypoda Harms.	H	R	CR (D)
Geniostoma hendersonense St John	***H***	nt	VU (D2)
Cerbera manghas L.	P	I	DD
Alyxia scandens Roemer & Schultes	P	I	DD
Alyxia sp. nov.	***H***	nt	VU (D2)
Jasminum didymum G. Forster	P	I	DD
Solanum viride G. Forster *ex* Sprengel	O	E	CR (D)
Ipomoea macrantha Roemer & Schultes	H, P	H–nt; P–V	H–LR (iii); P–VU(D1)
Operculina turpethum (L.) S. Manso	H	R	EN (D)
Argusia argentea (L. f.) Heine	H, P, O, D	H, O, D–nt; P–V	H, O, D–LR (iii); P–EN (D)
Coprosma rapensis F. Brown var. *benefica* (Oliver) Fosberg	***P***	I	VU (D2)
Ixora fragrans (H. & A.) A. Gray	***H***	nt	VU (D2)
Bidens hendersonensis Sherff	***H***	nt	VU (D2)
Bidens hendersonensis Sherff var. *oenoensis* Sherff	***O***	X/E	EX
Bidens mathewsii Sherff	***P***	I	VU (D2)

[a]P, Pitcairn; H, Henderson; O, Oeno; D, Ducie. Endemic taxa in bold italics.
[b]WCMC categories: X, probably extinct; E, endangered; V, vulnerable, R, rare; I, insufficient knowledge; NT, not threatened.
[c]Follows Mace and Stuart (1994). EX, extinct; CR, critically endangered (D, population estimated to number less than 50 mature individuals); EN, endangered (D, population estimated to number less than 250 mature individuals); VU, vulnerable [D1, population estimated to number less than 1000 mature individuals; D2, population with restricted area of occupancy (less than 100 Km^2) or number of locations (less than 5)]; LR, low risk (iii, presently abundant and unlikely to face extinction in the foreseeable future); DD, data deficient. The criteria met are indicated in parentheses for each case on each island, as recommended.

International (BGCI); it should be pointed out that seed and spores could not be dried properly or transported in a fully desiccated state, which undoubtedly added to the difficulties experienced with some of the species.

The list includes all known endemic taxa, whether threatened or not, all species listed as threatened by the World Conservation Monitoring Centre (WCMC), and all taxa which we consider to be rare or threatened on any one of the islands (although they may not be elsewhere). It may seem unnecessary to list very widespread and common species as endangered, such as *Argusia argentea* or *Pemphis acidula* on Pitcairn. However, because the taxa listed are all locally rare, any change in the local environment is likely to affect these rare species before others, and they may therefore provide an indication of environmental or vegetation change for future botanists visiting the islands. For example, based on observations made largely during the Mangarevan expedition of 1934, St John (1987) lists *Dicranopteris linearis* as rare and local on Pitcairn, whereas we found it locally dominant in 1991. We recommend therefore that future visitors and collectors make special efforts to check the status of all of the taxa listed below, including those that may be widespread and common elsewhere. We have made no attempt to assess the status of aboriginal and recent introductions to any of these islands; Polynesian plant introductions to Henderson and their current status will be reported elsewhere. Table 1 gives a list of the taxa concerned and the recommended status, based on the suggestions given in Mace and Stuart (1994). Nomenclature follows Florence *et al.* (in press), where more detailed taxonomic discussion may be found.

LIST OF ENDANGERED TAXA

PTERIDOPHYTA

PSILOTACEAE

Psilotum nudum (L.) P. Beauv.: H, P

1. Pitcairn, Henderson; pantropical to tropical/temperate.
2. On Henderson found in species-poor *Xylosma* forest towards the island centre, growing in bare coral rubble beneath the canopy. On Pitcairn in damp shady valleys.
3. Rare and very local on both islands; 'not common' according to Brownlie (1961), although St John (1987) claimed it was common. Population size probably less than 1000 on each island. Not threatened over most of its very extensive range.
4. Herb with shortly creeping rhizome; Brownlie (1961) records it as an epiphyte but we were unable to confirm this.
5. Some local rhizome spread is likely, otherwise regeneration unknown.
6. Spores dispersed on air currents.
7. No specific threats.
8. No special conservation measures needed.
9. Pitcairn and Henderson material is unlikely to be in cultivation, but very widely grown from other sources; in some botanic gardens it regenerates freely, to the extent of becoming a weed. This taxon is a large cytological complex, and study of cultivated material from the Pitcairn group may be helpful in elucidating some of the problems within this complex (A. C. Jermy, pers. comm.).

MARATTIACEAE

Angiopteris chauliodonta Copeland: P

1. Endemic to Pitcairn. The genus has been interpreted in various ways by different authors, some recognising only a single species (*A. evecta*; Brown & Brown, 1931); we retain Copeland's endemic species in the lack of a recent detailed study. Related to *A. longifolia* of Tahiti.
2. Damp shady stream sides, growing in a rich loam. Probably requires dense shade, high humidity and abundant root moisture.
3. Extremely rare. Two populations known of a handful of individuals, but other likely sites require survey (Copeland, 1938); only one population seen in 1991. Probably always very local, described as occasional by St John (1987); population size probably less than 20. In need of immediate conservation measures.
4. A large herb (upto 3 m) with a massive rhizome.
5. No small plants noted.
6. Spores dispersed on air currents.
7. Reduction of potential habitat by invading *Syzygium jambos*, and removal of native vegetation communities. The site visited in 1991 is a steep gully, and landslip could remove the few individuals. Disruption of the water supply to the small stream flowing through the gully could adversely affect *A. chauliodonta*.
8. Cultivation *ex situ*, and reintroduction are priorities. This is a highly decorative species which might prove suitable for amenity plantings. Remaining sites must be closely guarded.
9. Spore germination problematic, not known in cultivation. It may be bud-propagated by the leaf stipules (A. C. Jermy, pers. comm.). *A. evecta* and related taxa are grown occasionally in Botanic Gardens (including Foster Garden, Honolulu), and as decorative specimens in various other places, including Tahiti.

HYMENOPHYLLACEAE

Trichomanes endlicherianum Presl.: P

1. Pitcairn, and west through the Australs (Hallé, 1980), Society Islands, Marquesas, Fiji, Samoa, New Zealand to Norfolk Island (Copeland, 1938).
2. Moist crumbling rocks in very dense shade. Undoubtedly requires high humidity.
3. Very rare; one small population of very few individuals known, the same site as *Angiopteris chauliodonta*. Brownlie (1961) mentions only a single population, probably the same as that found in 1991. Population probably less than 50 individuals. Not threatened elsewhere.
4. An epilithic (possibly epiphytic elsewhere) herb, with creeping rhizome.
5. Mature and very small fronds were seen.
6. Spores dispersed on air currents; rhizomes creeping for short distances over the substrate.
7. Habitat loss through inadvertent destruction of native vegetation cover, and invasion by exotic species. *Trichomanes* species have exacting microclimate requirements, mainly on account of their thin frond texture; any change in local shading or relative humidity could be detrimental.
8. The known site needs special protection. It may be possible to introduce it to other suitable sites.
9. Cultivation of rhizome cuttings has proved successful, using conditions similar to those used for the cultivation of other filmy ferns. Not known in cultivation from elsewhere.

CYATHEACEAE

Cyathea medullaris (G. Forster) Swartz: P

(*C. cumingii* Baker)

1. *C. cumingii* was described from Pitcairn (Brown & Brown, 1931), Tubuai and Rurutu (Copeland, 1938; Hallé, 1980), but this is now included in *C. medullaris* which occurs from Pitcairn through the high islands of the Pacific to New South Wales.

2. Native *Homalium/Metrosideros* forest, particularly along main ridge, growing beneath canopy.
3. Endangered. Main ridge has a small population of *c.* 30 individuals; isolated individuals (presumed to be the same species) occur in scattered locations elsewhere. Total population certainly less than 250, may be less than 50. Cited as endangered on Tubuai and Rurutu by Hallé (1980). Probably locally threatened in other parts of its range.
4. The only tree fern in the Pitcairn group, with an erect trunk to 3 m.
5. Some small plants noted with trunks less than 20 cm. Fertile fronds freely produced.
6. Spores dispersed on air currents.
7. Invasion of native vegetation by *Syzygium jambos*, probably more widespread before native forest replaced by *Syzygium*. At present not cut by Pitcairners for fibre.
8. Removal of *Syzygium*. Reintroduction to 'safe' sites is feasible, one site close to Adamstown might prove suitable for amenity planting.
9. Spores germinate freely, and young sporophytes are readily produced. They grow slowly until the first bipinnate leaves are produced, but subsequent growth is rapid. Not known in cultivation from elsewhere, but possibly cultivated in New Zealand.

ASPIDIACEAE

Ctenitis cumingii Holttum: P

1. Endemic to Pitcairn. Very close to the *C. samoensis* group from Samoa, the Cooks, Society and Austral Islands (including *C. sciaphila* from the Societies and Australs, and *C. rapensis* from Rapa).
2. Humid shady lanes on deep soils. Growing beneath introduced tree species, but probably also in native forest.
3. Very rare. A few individuals found in 1991. Only collected once previously, known from the same site as *Angiopteris chauliodonta* and *Trichomanes endlicherianum* (see above). Population likely to be less than 25 individuals.
4. Herbaceous, with an erect rhizome.
5. Regeneration little known, a single young individual seen.
6. Spores dispersed by air currents.
7. Spread of exotic species, maintenance work on track ways, damage to native vegetation.
8. Full survey of the island needed; *ex situ* propagation and reintroduction required.
9. Spores failed to germinate. Not known in cultivation.

Diplazium harpeodes T. Moore: P
(*Athyrium polyanthes* (Sol. *ex* Baker) Copeland)

1. Pitcairn; Brownlie (1961) records it as *A. polyanthes*, which occurs from Fiji to Pitcairn. Copeland (1938) described it as *A. pitcairnense* Copeland, an endemic species related to *A. ellipticum* of Tahiti. Copeland also records *A. membranaceum* (Mett.) Copeland from Pitcairn, but does not list any specimens; both taxa are now considered part of *D. harpeodes*. Not found by the PISE.
2. Shady lane sides near Adamstown, Outer Valley.
3. Uncommon, a few small populations known. Population size unknown.
4. Herbaceous, with an erect rhizome.
5. Regeneration not known.
6. Spores dispersed by air currents.
7. Spread of exotic species, maintenance work on track ways, damage to native vegetation.
8. Full survey of the island needed. *Ex situ* propagation and reintroduction required.
9. Pitcairn material not known in cultivation; material of unknown source in cultivation at the Foster Garden, Honolulu, Hawaii. Also known to be cultivated in Tahiti.

ASPLENIACEAE

Asplenium polyodon G. Forster *sensu latissimo*: H

1. Henderson; Tahiti, Hawaii (Copeland, 1938), and Fiji to New Zealand. This taxon seems of uncertain status, previously recorded as *A. lobulatum* Mett., but clearly not that species.
2. Restricted to deeply dissected limestone, growing in crevices. Probably not tolerant of competition and dense shade, sometimes occurring in relatively open sites.
3. Rare; two populations known, the largest on the deeply fissured limestone inland from the North West Beach is extensive and the plant is locally common; only a few individuals seen in the second population near the termination of the plateau forest about 1·5–2 km inland from the south-west point. Appears to require a specialised habitat, making it very local (cf. *Hernandia stokesii*). Population probably 200–600 individuals.
4. Herbaceous, with an erect rhizome.
5. Some small plants seen in the north-western population.
6. Spores dispersed by air currents.
7. No specific threats.
8. No specific conservation measures needed; the north-western population is probably large enough to ensure continued survival of the species.
9. Gametophyte growth and development very slow. Young, otherwise healthy sporophytes prone to die suddenly for no apparent reason; they may have exacting microclimate requirements.

Asplenium shuttleworthianum Kunze/*Loxoscaphe gibberosum* (J. R. & G. Forster) Moore: P

1. Pitcairn, Society Islands, Cook Island west to Fiji (Brownlie, 1961). The identity of this taxon as *A. shuttleworthianum* or *L. gibberosum* needs further study; our collections matched the former.
2. Shaded habitats, in *Homalium* and *Metrosideros* forests to the island summit, and in more open sites south of the Landing Place and the cliffs at St Pauls.
3. Several small populations are known, but due to the uncertainty of identification the status of individuals assigned to one or other taxon is not clear. Population size uncertain.
4. Herbaceous, with an erect rhizome.
5. Appears to regenerate freely.
6. Spores dispersed by air currents.
7. Spread of exotic species and removal of native vegetation.
8. Probably enough genetic variation still present to conserve this species adequately. *Ex situ* propagation and reintroduction to various sites around the island is desirable; these are highly attractive taxa which might be used in amenity plantings around Adamstown.
9. Gametophyte development of spores from fronds approaching *L. gibberosum* is poor, and no sporophytes were produced. Although not recorded by BGCI, these taxa are highly decorative and are sometimes cultivated, as in several New Zealand gardens.

POLYPODIACEAE

Phymatosorus powellii (Baker) Pichi-Serm. : P
(*Phymatodes pitcairnensis* (Copeland) Brownlie)

1. Samoa, Cooks, Society Islands, Pitcairn, Fiji.
2. In native *Homalium/Metrosideros* forest on main ridge. Growing in moderate shade with *Phymatosorus scolopendria* and *Arachnoides aristata*.
3. Recorded as common by Brownlie (1961). However, Brownlie does not list *P. scolopendria* from Pitcairn, which is very common, and may have been taken for *P. powellii*. We consider *P. powellii* to be rare, and found very few plants; population size likely to be considerably less than 1000 individuals.
4. Herbaceous, with a creeping rhizome.
5. Regeneration not known.
6. Spores dispersed on air currents. Rhizomes far-creeping.
7. Invasion of native forest by *Syzygium*.
8. Removal of *Syzygium* required. *Ex situ* conservation and

reintroduction to other parts of the island are both feasible and desirable.
9. Spores germinate poorly, gametophyte growth is much slower than *P. scolopendria*. Sporophyte production so far unsuccessful. Not known in cultivation.

Phymatosorus commutatus (Blume) Pichi-Serm.: P, H
(*Phymatodes sylvaticum* (Brack.) Copeland, *Microsorum vitiense* Baker)
1. Pitcairn (Henderson?) west across the Pacific. We consider that the single, unlocalised Quayle specimen from Henderson (see St John & Philipson, 1962) may have been collected from Pitcairn.
2. Moist, shaded valleys; found in same location as *Angiopteris* and *Trichomanes*.
3. Very local on Pitcairn, a few scattered localities known; population less than 250 individuals. The plant could not be found on Henderson in 1991; we are doubtful about some of Quayle's records, which are not localised.
4. Herbaceous, with a creeping rhizome.
5. No information on regeneration.
6. Spores dispersed on air currents; some local spread of rhizomes is likely.
7. Removal of native vegetation cover.
8. Detailed survey of Pitcairn, and special protection of remaining native woodlands.
9. Not known in cultivation.

VITTARIACEAE
Vittaria elongata Swartz : P
1. Pitcairn westwards through Eastern Polynesia and Fiji to Madagascar (Copeland, 1938).
2. Moist rocks (Brownlie, 1961).
3. Very local; St John (1987) lists three localities and describes the species as rare. Not found by PISE; probably in the shaded upper *Homalium* forests. Population size uncertain.
4. Epiphytic herb with a creeping rhizome.
5. Not known.
6. Spores distributed by air currents.
7. Not known, but probably similar to other Pitcairn pteridophytes.
8. Probably similar to other Pitcairn endangered species.
9. Pitcairn material unlikely to be cultivated, but probably in cultivation from elsewhere.

SPERMATOPHYTA

LILIACEAE
Dianella intermedia Endl.: H, P
1. Pitcairn group west to New Zealand and Norfolk Island (Brown, 1931).
2. Several very different habitats: on Henderson in shaded *Nesoluma/Pisonia* forest, on unshaded bare coral rubble in the *Xylosma/Timonius* scrub of the island centre (local), and in low coastal scrub near south end of island. On Pitcairn a single collection by St John in 1934 from the summit of the Rope. Variation in leaf size and texture may be accounted for by the different habitats occupied by this species.
3. Local on Henderson; probably very rare on Pitcairn (not seen there by PISE), but other suitable habitat exists. Population on Henderson likely to be in excess of 1000 individuals; Pitcairn population much smaller but uncertain.
4. Herbaceous, with a creeping rhizome.
5. Fruits and young plants seen on Henderson. Local rhizome spread occurs.
6. Pollinators unknown; fruits likely to be taken by Pacific rats, *Rattus exulans* (the only rodent species known from the group), and the endemic Henderson fruit dove *Ptilinopus insularis*.
7. No specific threats on Henderson, and none can be determined for Pitcairn until the population is re-examined.
8. No conservation measures necessary on Henderson; a detailed survey of the Pitcairn population is needed.
9. Not in cultivation from the Pitcairn group; other *Dianella* species sometimes grown for ornament.

HERNANDIACEAE
Hernandia sonora L.: P
(*Hernandia nymphaeifolia* (Presl.) Kubitzki
1. Pitcairn, west across the Pacific islands. Our collection matched *H. sonora*, and we presume the Mangarevan expedition specimens named as *H. nymphaeifolia* by St John (1987) are the same taxon; a full revision is needed, including comparison with Henderson plants.
2. Probably woodlands on Pitcairn, elsewhere more typical of strand communities.
3. Very rare in disturbed valley forests; population probably less than 250 individuals.
4. Tree.
5. Regeneration not known.
6. The monoecious flowers are probably insect-pollinated.
7. Threats not known, presumably destruction of native vegetation.
8. Detailed survey needed to determine conservation measures.
9. Not known in cultivation.

Hernandia stokesii (F. Brown) Kubitzki: H
1. Henderson, Rapa (Fosberg *et al.*, 1989; Hallé, 1980 [as *H. sonora* L. var. *stokesii* F. Brown]). More detailed taxonomic study required (see above).
2. Restricted to the highly dissected karrenfield inland from North West Beach. Plants growing as small trees rooted in deep crevices, associated with *Pisonia grandis*.
3. Common within its very restricted range. Probably should receive the IUCN category of rare; population calculated to be about 500 individuals. Status on Rapa is not known.
4. Tree to 6 m.
5. No information available on regeneration.
6. The small monoecious flowers are probably insect-pollinated. Fruits freely produced; the fleshy aril surrounding the large seed is sweet smelling and very strong tasting; it is likely to attract fruit eaters such as crabs *Coenobyta* sp. and rats, but the seed is too large to be swallowed by the fruit doves. However, Polynesian pigeons *Ducula* spp., now extinct on Henderson but recorded as fossils (Wragg, in press), may have been able to disperse this species effectively.
7. No specific threats known.
8. Some efforts should be made to discover whether extant *Ducula* spp. are likely to have dispersed this species. It is possible that there is no living dispersal agent on the island. In view of the very limited world distribution, and its restricted distribution on Henderson, it may be desirable to introduce the species to another site on the island. Introduction of threatened *Ducula* spp. may also aid the conservation of this species, if it can be proven that they are effective dispersal agents.
9. Seed germinates slowly, and unpredictably. Young seedlings soon develop the perfoliate leaves, but grow slowly; they seem to require partial shade. The foliage is damaged by various insecticide sprays.

PIPERACEAE
Peperomia hendersonensis Yuncker: H
1. Endemic to Henderson. Related species occur throughout Polynesia.
2. Occurs in limestone crevices, and on the forest floor, usually in shade. Probably fairly drought-tolerant. Absent from salt-sprayed locations close to plateau margin.
3. Widespread and common in suitable habitats throughout the island; not threatened. Population probably at least a million individuals.
4. Succulent terrestrial or epilithic herb with decumbent branches.

5. Sets seed freely, which germinates readily (see 9); seedling plants observed.
6. Probably pollinated by small insects; sticky seeds may be dispersed by adhesion to animals (e.g. rats, the endemic Henderson rail *Porzana atra*) which forage in undergrowth, or may be collected by ants. Self-compatible.
7. No specific threats.
8. No conservation measures needed.
9. Seed germinates freely and quite rapidly. Cultivated plants grow best in partial shade, and have flowered and set seed when less than a year old. Readily propagated from stem cuttings under mist. Growth best in moderate shade. Likely to become a weed of glasshouse staging.

Peperomia rapensis F. Brown : P
1. Pitcairn, Rapa and Rurutu (Brown, 1935; St John, 1987).
2. 'Wooded shady places' (St John, 1987).
3. Collected once by Fosberg and Clark in 1934 from Middle Hill (see St John, 1987). Possibly overlooked, but probably very rare (not found by PISE); population size uncertain.
4. Herb; not known whether epilithic, terrestrial or epiphytic
5. No information on regeneration available.
6. Dispersal and pollination probably much as *P. hendersonensis*.
7. Main threats are likely to be the removal of *Homalium* forest and its invasion by exotics.
8. Detailed survey of Pitcairn needed to establish status; status on Rapa and Rurutu uncertain.
9. Probably not in cultivation.

Peperomia pitcairnensis (Lauterbach) C.DC.: P
1. Apparently endemic to Pitcairn, but the taxon is very poorly known. The type was at Berlin and is presumed destroyed. Yuncker's (1937) illustration suggests it may be close to *P. pallida*. More collections of Pitcairn *Peperomia* are needed before a full taxonomic appraisal can be given.
2. Probably occurs in rocky woodlands.
3. No information available; collected once by R. Young (see Yuncker, 1937). Population size uncertain.
4. Small herb (see *P. rapensis*).
5. No information on regeneration, probably similar to *P. hendersonensis*.
6. Dispersal and pollination probably much as in *P. hendersonensis*.
7. Removal of native vegetation and invasion of woodlands by exotics are likely threats.
8. Detailed survey of Pitcairn and adequate collecting needed before both taxonomic and conservation status can be assessed.
9. Probably not in cultivation.

MENISPERMACEAE

Cocculus trilobus (Thunberg) DC : P
(*Cocculus ferrandianus* Gaud.; St John, 1987)
1. Pitcairn and Pacific islands west to Malaysia.
2. Presumably native forest.
3. Very rare, a single collection by Fosberg and Clark in 1934 (see St John, 1987). Not seen by PISE. Population size uncertain, but probably less than 250 individuals.
4. Shrub.
5. No information on regeneration.
6. Fruit is a drupe that may be taken by birds or rats.
7. Specific threats not known until population can be refound.
8. Detailed survey needed to determine conservation measures.
9. Not known in cultivation.

NYCTAGINACEAE

Pisonia umbellifera (J. R. & G. Forster) Seem.: P
1. Pitcairn west to New Zealand, Australia and Mauritius.
2. Woodlands, known only from Parvler Valley.
3. A single collection by St John made in 1934 (St John, 1987); probably very rare. Not seen by PISE; population size uncertain, probably less than 250 trees.
4. Tree.
5. No information on regeneration.
6. Fruits probably dispersed by adhering to birds' feet and feathers as in *P. grandis* (Fosberg & Renvoize, 1980).
7. Destruction of native forest and invasion by exotics. The timber is soft and unlikely to be of value to the islanders.
8. Detailed survey needed; could be used to reforest degraded areas and prevent erosion.
9. Pitcairn material not in cultivation, but the plant is sometimes grown for ornament, and several cultivars have been described.

TILIACEAE

Triumfetta procumbens G. Forster: H, O
1. Indo-Pacific region, usually islands (Fosberg & Renvoize, 1980).
2. Above the strand line of sandy beaches. On the North and East Beaches of Henderson, and the Oeno sand-spit.
3. Locally common on Henderson, not threatened there; population size probably about 1000. Very rare on Oeno, only two individuals found in 1991 (first record for Oeno); probably a recent colonist, this obvious species was not seen during the 1987 Smithsonian Expedition.
4. Prostrate vine or shrub, forming patches.
5. Flowers and seeds well on both islands. Seedlings difficult to locate in the trailing mat of stems.
6. Fruit is indehiscent and covered with hooked spines; it readily adheres to feathers, fur and clothing.
7. No threats on Henderson; on Oeno only from storm damage to accreting sand-spit. Plenty of suitable habitat on Oeno which is unoccupied; this species is likely to spread, and this should be monitored by future visitors (cf. *Solanum viride* below).
8. No conservation measures necessary.
9. Seed removed from the fruit germinates, but seedling growth is slow. Specimens raised from seed collected on Oeno in cultivation at Trinity College Botanic Garden.

MALVACEAE

Abutilon pitcairnense Fosberg: P
1. Endemic to Pitcairn. Related species in the Gambier and Marquesas Islands.
2. Collected from thickets on the Parvler Valley Ridge (St John, 1987).
3. Very rare. Not seen in 1991, only three collections ever made; two listed by St John (1987) and a third (but described as a second) by Fosberg *et al.* (1989). Population size uncertain but undoubtedly very small, possibly less than 50 individuals.
4. Shrub.
5. Regeneration not known.
6. Dispersal agents not known, but likely to be insect-pollinated.
7. Presumably threatened by removal of native vegetation and its invasion by *Syzygium*.
8. Full survey of Pitcairn urgently needed. *Ex situ* conservation and reintroduction must be a priority if living specimens can be found.
9. Not in cultivation. Numerous cultivated *Abutilon* spp. should provide cultivation guidelines. Well worthy of cultivation, and may be of commercial value.

ULMACEAE

Celtis pacifica Planchon: H, P
(*Celtis* sp., Fosberg *et al.*, 1989; *Celtis paniculata* var. *viridis* F. Brown, St John & Philipson, 1962)
1. An Eastern Polynesian species from the Pitcairn group

and the Cook, Austral (including Rapa), Gambier, Marquesas and Society Islands. *C. paniculata* var. *viridis* was described as endemic to Henderson by Brown (1935).
2. Widely distributed as a member of the Henderson plateau forest types, occasionally as a shrub in scrubby vegetation above East Beach and near the North West Point. Best growth is on the deeper substrates derived from sand between the North West Beach and the island centre, where it forms an impressive round-crowned tree to 10 m. One collection from St Paul's Valley woodland, Pitcairn (St John, 1987).
3. Widespread and locally common on Henderson, not threatened. Probably very rare on Pitcairn (not seen by PISE). Calculated population on Henderson is 10,000–20,000 trees; probably less than 250 on Pitcairn.
4. Tree to 10 m; unlike many of the Henderson trees, usually erect.
5. Some saplings and seedlings seen on Henderson.
6. Monoecious, as with most Pacific *Celtis* spp. Dispersal and pollination not known with any certainty.
7. No threats on Henderson; destruction of native forest and its invasion by exotics on Pitcairn.
8. No conservation needed on Henderson; full survey of Pitcairn needed. Possible use as a shade tree on Pitcairn.
9. Not known in cultivation.

URTICACEAE

Procris pedunculata (J. R & G. Forster) Wedd.: H, P
1. Pitcairn and Henderson west through Polynesia and Micronesia to Malaysia and Madagascar.
2. In the shade of rock crevices and in woodlands of Henderson; on Pitcairn observed on cliffs at St Pauls (no specimen collected).
3. Common and abundant on Henderson, apparently very local on Pitcairn (not seen by PISE). Henderson population possibly about 100,000; very much smaller on Pitcairn, but numbers uncertain.
4. A slightly succulent terrestrial herb.
5. Fruits and regenerates freely on Henderson.
6. Probably pollinated by small flies or beetles. Fruits are a major food item for the fruit dove, and probably for rats.
7. No threats on Henderson, likely to be threatened by forest clearance and invasion by exotics on Pitcairn.
8. No conservation needed on Henderson; status on Pitcairn needs confirmation.
9. Seed germinates readily. Plants grow best in humid shaded conditions, but require free drainage.

FLACOURTIACEAE

Homalium taypau St John: P
1. Endemic to Pitcairn.
2. Hillsides and valleys away from Adamstown.
3. Still common, and the dominant tree in what remains of the native vegetation. Population possibly exceeds 1000 individuals, but a detailed survey needed.
4. Tree to about 15 m.
5. Flowers freely, and appears to set good seed.
6. Pollination agents not known. Seeds may be wind-dispersed.
7. Threatened by invasion of exotics, particularly *Syzygium jambos*.
8. Areas should be set aside for conservation, and cleared of invading exotics; this would benefit many other endangered Pitcairn species, many of which occur in *Homalium* woodland.
9. Not in cultivation.

Xylosma suaveolens (J. R. & G. Forster) G. Forster: H, P
1. Subspecies *haroldi* Sleumer apparently endemic to Henderson and Pitcairn (St John, 1987; Fosberg *et al.*, 1989), although we consider that the Henderson material may well be different from that of Pitcairn. Subspecies *gracile* (W. Hemsley) Sleumer also found on the Cooks and Australs, ssp. *suaveolens* in the Societies, ssp. *pubigerum* Sleumer in the Marquesas, Tuamotu and Makatea.
2. On Henderson, widespread in plateau forest, and locally frequent in drier areas, and in the relatively species-poor centre. Apparently not tolerant of excess salt spray. On Pitcairn very rare along the main ridge, with *Homalium* and *Metrosideros*; considered rare by Fosberg *et al.* (1989).
3. Not threatened on Henderson, common and widespread; population calculated to be about 10,000 trees. On Pitcairn extremely rare; very few individuals are likely to survive, only one seen by PISE and the population is likely to be less than 50 individuals.
4. Tree to 8 m, often partially decumbent on Henderson (cf. *Celtis pacifica* above)
5. Flowers freely at least on Henderson, with several spates of flowering throughout the year. Some young trees seen, but no seedlings. Fruits are freely set, and readily eaten by the fruit doves.
6. Dioecious. Probably pollinated by various insects, and possibly the endemic Stephen's lory *Vini stepheni*. Fruits heavily predated and the seed distributed by the endemic fruit dove.
7. No threats at present on Henderson. Habitat loss and inadvertent felling of trees is a threat on Pitcairn. The wood is extremely hard, and could be potentially useful to the Pitcairners; described as an important timber on Makatea in 1934 by Wilder, but possibly not in current use.
8. No conservation needed on Henderson. On Pitcairn in urgent need of conservation, the first stage of which must be a thorough survey, and taxonomic appraisal of Pitcairn and Henderson material. Remaining habitats must be protected, and *ex situ* conservation, propagation and reintroduction desirable, possibly as a timber crop.
9. Not known in cultivation from Pitcairn group.

CAPPARACEAE

Capparis cordifolia Lam.: P, H
(*C. sanwichiana* DC.)
1. Widespread on Pacific islands, including the Pitcairn group, Tuamotu, Fiji, Marianas.
2. Only a single unlocalised record from Pitcairn (St John, 1987); on Henderson in cliff-top scrub, and in scrubby vegetation on the cliff slopes at the back of beaches. Apparently not tolerant of full exposure to salt spray.
3. Not found on Pitcairn by PISE, probably rare, but there is a reasonable amount of suitable habitat available; population size uncertain. Locally frequent in suitable habitat on Henderson, especially the cliff slopes at the East Beach; not threatened, population probably exceeds 1000 individuals.
4. A decumbent shrub.
5. Regeneration not known.
6. Pollination and dispersal agents not known.
7. No threats on Henderson; threats to Pitcairn population uncertain.
8. A detailed survey of Pitcairn may reveal more populations. None needed for Henderson.
9. Not known in cultivation.

BRASSICACEAE

Lepidium bidentatum Montin: P, H, O
1. Pitcairn group and Tuamotu west to New Caledonia.
2. In relatively bare, coastal stations; on Henderson found on cliff ledges and bare limestone near the coast, on Oeno found in sandy areas inland, on Pitcairn only known from short turf on cliff tops.
3. Locally common on Henderson and Oeno, not threatened; Henderson population estimated to be at least 2000 individuals. A single St John collection in 1934 from Pitcairn (St John, 1987); population probably small, but numbers uncertain.
4. An erect terrestrial herb, probably monocarpic.
5. Seedlings and fruiting specimens frequent on Henderson and Oeno; no information from Pitcairn.

6. Presumably insect-pollinated. Seeds probably shaken free of siliqua by wind.
7. No threats, except possible trampling on Pitcairn.
8. No conservation measures necessary. Suitable habitat probably exists elsewhere on Pitcairn, and it should be looked for during future botanical visits to the island.
9. Seed from Henderson germinates freely and the plants flower and set seed within 1 year in a heated glasshouse. Monocarpic in cultivation.

SAPOTACEAE

Nesoluma st-johnianum Lam & Meeuse: H

1. Endemic to Henderson. Related species occur in the Australs, Society and Hawaiian Islands.
2. Plateau forest, often co-dominant with *Pisonia grandis* and *Xylosma suaveolens*. Also occurs as a more bushy plant in scrub vegetation, as in the fossil lagoonal patch reef areas; occasional in low vegetation on cliff slopes behind East and North Beaches.
3. Common to locally frequent, population calculated to be 20,000 to 40,000.
4. Tree to about 7 m but often much smaller.
5. Some saplings seen. Flowers freely, but few fruits noticed.
6. Probably insect-pollinated. The fruits are taken by fruit doves.
7. No specific threats.
8. No conservation measures needed. However, the timber is very hard, and may be useful to the Pitcairners if it can be brought into cultivation.
9. Not in cultivation.

MYRSINACEAE

Myrsine hosakae St John: H

1. Endemic to Henderson.
2. Widespread, but occasional in the plateau forests away from the cliff margin. Probably intolerant of salt spray.
3. Uncommon. One of the least common of the Henderson endemics. Population calculated to be about 7000 individuals, but possibly much less. Because this tree is dioecious and appears to suffer from poor fruit set, we classify this taxon as vulnerable.
4. Tree to about 7 m, sometimes partially decumbent.
5. Fruits heavily predated by the endemic fruit dove, often before fully ripe. Young saplings seen.
6. Dioecious, probably pollinated by small flies. Fruit likely to be distributed by doves.
7. No specific threats; probably naturally rare on the island. May suffer from excessive predation of fruit by the doves.
8. No specific conservation measures needed; however, attempts should be made to bring the plant into cultivation, and examine the fruit predation in more detail.
9. Seed has so far failed to germinate; many of the fruits set lack embryos.

Myrsine aff. *niauensis* Fosberg & Sachet: P
(*Bumelia* sp. of St John, 1987)

1. Pitcairn; status uncertain, probably endemic.
2. Not known, presumably native woodland.
3. Only two old collections known. Evidently rare and in need of conservation. Population size uncertain but probably less than 250 individuals.
4. Tree, size unknown.
5. No information available on regeneration.
6. Dioecious. Fruit dispersal unknown.
7. Removal of native forest cover and its invasion by exotics.
8. Thorough survey needed to determine status, followed by suitable conservation measures.
9. Not in cultivation.

PITTOSPORACEAE

Pittosporum arborescens Rich. *ex* Gray: H

1. Henderson, Fiji, Tonga (St John & Philipson, 1962).
2. Apparently close to plateau margin (St John & Philipson, 1962). In dwarfed shrub community near to South Point.
3. Extremely rare. Not found in 1987 by Paulay and Spencer (see Fosberg *et al.*, 1989) at the North Beach cliff sites reported by St John and Philipson (1962), nor by ourselves in 1991 despite careful searching. Small colony of few plants found near to the South Point; total population likely to be less than 50 individuals. Probably always widespread, rare and occurring as isolated individuals on Henderson.
4. The only plant seen was a prostrate shrub; may be more erect elsewhere.
5. Not seen in flower; no seedlings observed.
6. Dispersal agents not known. Seeds of this genus are sticky and may be distributed by adhesion to birds and other animals.
7. No specific threats.
8. More information on the Henderson populations is needed; it might be introduced to other areas of the island.
9. Not known to be in cultivation.

ROSACEAE

Osteomeles anthyllidifolia (Sm.) Lindl.: P

1. Pitcairn, Hawaii and Rapa west to New Zealand.
2. The Pitcairn location is uncertain.
3. A single collection from 1901; presumed to be native, and now very rare or extinct. Not seen by PISE; population size uncertain.
4. Shrub.
5. No information available on regeneration.
6. Dispersal and pollination agents not known.
7. Threats uncertain; may already be extinct.
8. Detailed survey needed to determine status of this species.
9. Pitcairn material not in cultivation, but this and other Osteomeles species are often grown for ornament.

CAESALPINACEAE

Senna glanduligera (St John) A. C. Smith: H
(*Cassia glanduligera* St John)

1. Henderson, Australs, Society Islands, Fiji, New Hebrides.
2. In plateau forest, frequently in glades or along old paths; conspicuously gregarious. Apparently restricted to the northern half of the island. Probably a gap colonist after *Senecio stokesii* and *Bidens hendersonensis*.
3. Locally common, but rare or absent from areas examined in the southern half of the island. Not threatened; population calculated to be about 12,000, with very many more immature plants. No information available on other populations.
4. Caulescent shrub or small tree to about 5 m, rarely more.
5. Seeds abundantly set. Young seedlings very frequent under the forest canopy, probably persisting in that state for some time; may form seedling banks. Saplings found along trails cut in 1987.
6. Probably insect-pollinated. Seeds may be toxic, which might account for apparent cohorts of saplings growing together. Lomentum apparently indehiscent at maturity; long-distance dispersal possibly by flotation.
7. No specific threats.
8. No conservation measures necessary.
9. Scarified seed germinates readily; care needed with young seedlings which do not seem tolerant of full exposure to sunlight, but older plants are more robust.

FABACEAE

Sesbania coccinea ssp. *atollensis* (St John) Sachet: H
(*Sesbania atollensis* St John)

1. Ssp. *atollensis* is endemic to the eastern Pacific: Henderson, Tuamotu, Society Islands. Ssp. *coccinea* from New Caledonia.
2. No information given on the Lintott specimen (St John & Philipson, 1962); presumably collected from coastal woodland.

3. Very rare, a single collection known from Henderson made by Lintott in 1957. Not found by PISE despite searches of likely habitats; population probably substantially less than 50 individuals.
4. Shrub.
5. No information available on regeneration.
6. Pollination and dispersal agents not known; presumably pollinated by bees and wasps.
7. No specific threats known.
8. Seed collection and cultivation would be a priority if this taxon can be located on Henderson.
9. Not known in cultivation.

Canavalia rosea (Swartz) DC.: H
1. Henderson; pantropical in coastal areas (Fosberg & Renvoize, 1980).
2. In dwarf shrub and halophytic herb communities along southern cliff tops. Partially defoliated when large amounts of salt spray are blown over the cliff top.
3. Very rare. A single population of probably less than five individuals near the South Point, the exact numbers being difficult to determine due to the trailing habit.
4. A prostrate shrub.
5. Flowers and seeds freely. Possibly a fairly recent colonist which might be expected to spread. Plenty of suitable habitat available on Henderson and other islands in the group.
6. Probably insect-pollinated by bees or wasps, or possibly selfed. Seed can float on seawater for at least 8 weeks and remain viable according to Fosberg and Renvoize (1980).
7. Severe storms only. Population very isolated from the landing sites in the north of the island.
8. No specific conservation measures needed.
9. Seed germination poor, but subsequent seedling growth is rapid in a freely drained, loam-based compost. Tolerant of full exposure to sunlight.

LYTHRACEAE

Pemphis acidula J. R. & G. Forster: P, H, D
1. Pitcairn group west through Pacific and Indian Oceans to the Mascarene Islands.
2. Typically found on the seaward side of motus, usually on rocky substrates. On Henderson, only found on coarse beach rock cobbles and coral rubble, replaced by *Suriana maritima* on fine sand.
3. A widespread species, not threatened over much of its extensive range, including Henderson, where the population was calculated to be 1000–2000. Only collected by the Whitney Expedition in 1922 from Pitcairn; probably less than 50 individuals occur. A single plant on Ducie, first recorded by PISE.
4. Usually a shrub to about 3 m, rarely a tree to 5 m on East Beach.
5. Regeneration good on Henderson.
6. Some populations known to be heterostylous, and therefore probably outcrossed by insect pollination. Seeds may float.
7. No threats likely, other than storm erosion.
8. No conservation measures necessary on Henderson or Ducie, but the Pitcairn population should be re-found and monitored.
9. Not in cultivation from the Pitcairn group.

MYRTACEAE

Eugenia reinwardtiana (Blume) DC.: H, P
1. Pitcairn group west through the Pacific.
2. On Henderson occurs mainly in the species-poor *Xylosma* forest and *Timonius* scrub near the island centre, and in dwarf shrub communities near the plateau margin at the southern end of the island. Less common in the shrub layer of closed-canopy *Pisonia* forest. On Pitcairn known only from shrubby cliff slope vegetation near Bounty Bay.
3. Common and locally abundant on Henderson; population calculated to be 20,000–40,000 plants. Rare on Pitcairn, numbers uncertain but probably fewer than 50.
4. An erect shrub usually 1–2 m tall, occasionally more in the Henderson plateau forests.
5. On Henderson flowers and fruits freely, young saplings seen. Regeneration uncertain on Pitcairn.
6. Pollination mechanism unknown. The large fruits have a thin, fleshy pericarp, and can just about be swallowed by the Henderson fruit dove (Jones *et al.*, in press); they may also be taken by migratory bristle-thighed curlews *Numenius tahitiensis*.
7. No specific threats.
8. No conservation measures necessary, but a detailed survey of Pitcairn needed.
9. Not known in cultivation from the Pitcairn group, possibly cultivated from other sources.

SANTALACEAE

Santalum insulare Bertero *ex* DC. var. *hendersonense* (F. Brown) Fosberg & Sachet: H
(*S. hendersonense* F. Brown)
1. Variety endemic to Henderson; see Fosberg and Sachet (1985). Other varieties occur throughout eastern Polynesia, many of which are likely to be threatened due to past exploitation.
2. Widespread but occasional throughout the plateau forests, except for those on the central fossil lagoonal patch reefs, where it is rare. Occurs as a shrub on the cliffs and cliff slopes to the rear of North Beach. Local in the dwarf maritime shrub communities close to the southern cliffs. The cliff slope and maritime populations usually have axillary rather than terminal inflorescences; they are smaller, more decumbent and with leaves more glaucous than forest individuals.
3. Not immediately threatened, scattered in a number of different communities (but see below). Listed as threatened (WCMC). Total population size calculated to be 2000–4000 plants.
4. In the plateau forests a semi-decumbent tree to 7 m, more shrubby on cliffs and in exposed locations.
5. Flowers freely, but fruit set appears to be poor. Some saplings seen.
6. Probably pollinated by small insects, but little information. In the Society Islands, the fruits are eaten by rats *Rattus exulans*.
7. The apparent poor fruiting gives rise to some concern, and requires further study. The species is potentially useful to the Pitcairners for perfumery; related species have been exterminated from much of their range in the Pacific. Cultivation is likely to be problematic, as the plant is partially parasitic.
8. A full study of this species (ecology, pollination, dispersal, parasitic requirements, cultivation, etc.) is urgently needed. Efforts should be made to prevent the exploitation of this species.
9. Not in cultivation.

EUPHORBIACEAE

Glochidion pitcairnense (F. Brown) St John: H, P
1. Endemic to Henderson, Pitcairn (see St John & Philipson, 1962) and the Gambier Islands (J. Florence, in prep.).
2. Widespread and locally common in the plateau forests. Also frequent in beach swale forest at the North, East and probably also North West Beaches. Commonly parasitised by *Korthalsella platycaula*. Pitcairn trees are scattered in semi-native scrub and remnant forest.
3. Fairly common on Henderson, not threatened; population calculated to be about 20,000. All Pitcairn *Glochidion* are rare (see below); probably less than 250 individuals of *G. pitcairnense* on Pitcairn.
4. Tree to about 6 m, usually erect.

5. Saplings and seedlings noted on Henderson. Not prolific in flower or fruit.
6. Likely to be pollinated by small flies and ants. Fruit dispersal by doves is likely on Henderson.
7. No specific threats on Henderson. Removal of remnant native vegetation and its invasion by *Syzygium* on Pitcairn.
8. No conservation measures needed on Henderson. Protection of remnant native vegetation and removal of *Syzygium* on Pitcairn. A full survey of Pitcairn required. *Ex situ* conservation, study, and reintroduction of Pitcairn material to safe sites are desirable.
9. Not in cultivation.

Glochidion sp. nov.: P
1. Apparently endemic to Pitcairn. Differs in several aspects from the previous taxon, notably in the pubescent ovaries. The species will be fully described elsewhere.
2. In native forest remnants and scrub.
3. Widespread, but very local; very few individuals seen. Population likely to be much less than 250 individuals.
4. Small tree or shrub to 6 m.
5. No information on regeneration.
6. Dispersal and pollination agents not known. The seeds are arillate, suggesting bird dispersal.
7. Threats likely to be removal of native vegetation, invasion of exotics, and possibly lack of a seed dispersal agent.
8. As for *G. pitcairnense*. More information urgently needed, together with a full taxonomic appraisal of the Pitcairn and Gambier *Glochidion*.
9. Unlikely to be in cultivation.

SAPINDACEAE

Allophyllus rhomboidalis (Nadeaud) Radlkofer: H
1. Henderson, Tuamotu, Society Islands; probably also Marquesas and Australs. Taxonomic status uncertain, revision of the *A. cobbe* group needed.
2. Widespread in plateau forest, seemed to be more frequent on the deeper soils north-west of the fossil lagoon depression. One seedling close to the North/South Trail probably germinated during the period of the expedition; trail opening may have stimulated germination.
3. Very rare. Less than 10 individuals known, mostly isolated or with two or three plants growing very close together. Likely to occur scattered throughout the island plateau, but obviously rare; a more complete coverage of the island would undoubtedly reveal more individuals. Population calculated to be about 100 individuals.
4. Tree to about 7 m.
5. One seedling found close to the plateau edge near North Beach directly above Pitcairners' camp, this would be relatively easy to relocate if it establishes successfully. Only one collection ever made (in 1991) of flowering material; flower and fruit production probably highly seasonal, or rare.
6. Pollination agents not known; the fruit is a drupe which is presumably eaten by birds.
7. No specific threats.
8. *Ex situ* conservation, and a thorough study of this species is needed, but collecting suitable quantities of fruit will be difficult.
9. Not in cultivation.

ARALIACEAE

Meryta brachypoda Harms.: H
1. Henderson, Tubuai, Raivavae (St John & Philipson, 1962; Hallé, 1980).
2. In tall *Pisonia/Nesoluma/Celtis* forest, *c.* 1·5 km inland from North West Beach. This forest is taller than most Henderson plateau forest, and is likely to be formed on the best developed soils of the island (S. Waldren & L. Scally, unpublished data).
3. Very rare and local. A single population known; less than half a dozen large plants present, and somewhat more juveniles. Endangered throughout its range (WCMC).
4. Caulescent shrub to 4 m.
5. Not seen flowering or fruiting, but some young plants present.
6. Fruits are probably dispersed by frugivorous birds; pollination probably by beetles or other small insects.
7. No specific threats.
8. *Ex situ* conservation needed. Introduction to other sites on Henderson feasible.
9. Not known in cultivation from any source.

LOGANIACEAE

Geniostoma hendersonense St John: H
1. Endemic to Henderson (St John & Philipson, 1962). Related species elsewhere in Polynesia.
2. In scrubby vegetation in more open sites, such as cliff slopes and the central *Timonius* thicket area. Apparently not very tolerant of shading.
3. Fairly common and widespread in suitable habitat. Population calculated to be about 120,000.
4. Shrub to about 3–4 m.
5. Flowers and fruits freely.
6. The flowers are foetid and probably attract flies. The fruit is taken by doves.
7. No specific threats.
8. No conservation measures needed.
9. Not in cultivation.

APOCYNACEAE

Cerbera manghas L.: P
1. Pitcairn; Austral, Society and Marquesas Islands, west to Australia and tropical Asia.
2. Probably *Homalium* woodland.
3. Collected only in 1901 and by the PISE; very rare in open secondary scrub. Population probably less than 250 individuals.
4. Tree.
5. No information available, no saplings noted.
6. May be moth-pollinated. Seeds may be dispersed by flotation on seawater.
7. Specific threats not known until population re-found.
8. Full survey needed as a preliminary.
9. Not in cultivation from Pitcairn. The seeds are highly toxic (Brown, 1935), and may yield medicinal compounds.

Alyxia scandens Roemer & Schultes: P
1. Pitcairn, Tuamotu and Society Islands west to Fiji (Brown, 1935).
2. The single record is unlocalised.
3. Collected once on Pitcairn by Rosalind Young, see St John (1987); undoubtedly very rare, numbers uncertain. Needs to be refound and compared with the Henderson *Alyxia* (see below).
4. A scrambling vine.
5. No information available.
6. Floral structure suggests lepidopteran pollination. Fruits probably dispersed by doves.
7. Very rare or extinct, but no information available until the taxon can be refound.
8. A full survey of Pitcairn is needed.
9. Not in cultivation.

Alyxia sp. nov.: H
1. Endemic to Henderson (see Fosberg *et al.* 1989); the taxon will be formally described elsewhere.
2. Plateau forests. A shrubby vine which reaches the tree canopy, often forming a tangled growth below the canopy with *Ixora fragrans*.
3. Widespread and common on Henderson, not threatened; population calculated to be about 10,000 individuals.
4. A scrambling vine, reaching the canopy.

5. Flowering freely, fruits much less often seen.
6. Floral structure suggests lepidopteran pollination. Fruits probably dispersed by fruit doves.
7. No threats on Henderson.
8. No specific conservation measures needed.
9. Not in cultivation; future visits should attempt to collect mature fruits for cultivation.

OLEACEAE

Jasminum didymum G. Forster: P

1. Pitcairn, west through Pacific to Australia.
2. Only known from the main crest. Possibly a Polynesian introduction, the flowers are used for *leis* in the Marquesas (Brown, 1935).
3. Undoubtedly rare on Pitcairn, collected once by St John in 1934; population size uncertain but probably less than 250. Not threatened over much of its range.
4. A vine.
5. No information available on regeneration.
6. Dispersal agents not known. The fragrant flowers are probably insect-pollinated.
7. Specific threats cannot be determined until the population is refound.
8. Needs to be refound and its status assessed. Could be grown by islanders as an ornamental.
9. Not in cultivation from Pitcairn.

SOLANACEAE

Solanum viride G. Forster *ex* Sprengel: O
(*Solanum tuamotuense* St John)

1. Oeno, Tuamotu archipelago and eastern Polynesia to Melanesia. Possibly introduced; the fruit is used as *lei* in the Austral Islands. St John's species is thought to be identical to *S. viride* (D. E. Symon, pers. comm.).
2. Occurs at the south of the island where the *Pisonia/Argusia* forest reaches the coast. Occurs in a narrow belt on the seaward side of this forest, associated with *Phymatosorus scolopendria.*
3. Very rare. A single population with no more than half a dozen mature plants; possibly a Polynesian introduction.
4. Erect herb to about 0·5 m.
5. Young fruits seen. The dense growth of *Phymatosorus* possibly limits seedling development, and may result in small plants being overlooked.
6. Probably insect-pollinated. Fruit probably dispersed by frugivorous birds, crabs or rats.
7. This area of Oeno appears to be under natural erosion threat, while sand deposition occurs at the northern end (cf. *Triumfetta procumbens*, above). If this hypothesis is correct, the future of *S. viride* on Oeno is doubtful, unless it can regenerate successfully in the dense *Phymatosorus* sward.
8. *Ex situ* conservation required, followed by reintroduction, possibly using stock raised from the Tuamotus should the species become extirpated from Oeno. A detailed appraisal of its status is needed.
9. Not known to be in cultivation from any source.

CONVOLVULACEAE

Ipomoea macrantha Roemer & Schultes: H, P

1. Pitcairn group to Old World tropics.
2. Mainly littoral. On Henderson it occurs amongst shrubs and low trees along the dune ridge, in the beach embayment forests, and on the cliff slopes at the northern end of the island. On Pitcairn known only from coastal scrub around Bounty Bay.
3. Common on Henderson and a prominent feature of dune ridge vegetation; very rare at Bounty Bay on Pitcairn, but a detailed survey might reveal more plants as suitable habitat exists elsewhere on the island. Probably at least 1000 individuals on Henderson; uncertain numbers on Pitcairn, but likely to be less than 1000.
4. Climbing (rarely prostrate) vine.
5. Flowers and fruits freely on Henderson, regeneration on Pitcairn uncertain.
6. Night-flowering, the corolla usually withered by mid morning, suggesting lepidopteran pollination. Seed dispersal unknown, probably by flotation.
7. No threats on Henderson; no direct threats to the small population seen on Pitcairn; storms and inadvertent human damage the most likely threats.
8. No specific conservation measures needed. A detailed survey of Pitcairn would accurately determine its status.
9. Not known in cultivation from the Pitcairn group.

Operculina turpethum (L.) S. Manso: H

1. Henderson, widespread in the Old World tropics and the Pacific, including the Tuamotu and Marquesas. First recorded on Henderson in 1991 by PISE.
2. Only detected in limestone crevices close to the southern cliffs, usually growing with *Phymatosorus scolopendria* and *Eugenia reinwardtiana* in unshaded conditions.
3. Rare and local. Three small populations found; the number of individuals is difficult to determine due to the trailing habit. Probably less than 250 individuals occur.
4. Prostrate vine.
5. Flowers and fruits freely, seedling establishment uncertain.
6. Flowers appear to be open during the day (cf. *I. macrantha*, where the flowers open at night), probably moth-pollinated. The fleshy fruits may be taken by various fruit eaters, but the plant grows in a harsh environment, and the density of fruit eaters may be low in this part of the island.
7. No specific threats.
8. A fuller understanding of the total distribution and identity of this taxon is required; it must be compared with *O. ventricosa.* Introduction to other parts of the island is feasible.
9. Seed germination low, seedling growth slow. Prone to red spider mite attack.

BORAGINACEAE

Argusia argentea (L. f.) Heine: H, O, D, P

1. All islands in the Pitcairn group. A widespread and common Indo-Pacific strand plant.
2. Occurs throughout the vegetated parts of Oeno and Ducie, and the commonest plant on these islands. On Henderson abundant on the North, East, and North West beaches, just behind the strand line and grading into swale forest. On Pitcairn restricted to cliff slopes.
3. Very common on Oeno and Ducie, locally abundant on Henderson; probably at least 10,000 plants on each island. Very rare on Pitcairn, a single small population known; total numbers uncertain but probably considerably fewer than 250 individuals.
4. A tree (reaching 10 m on Oeno) in favourable conditions, a shrub in more exposed locations.
5. Regenerates freely on Oeno, Ducie and Henderson.
6. Insect-pollinated, fruits dispersed by frugivorous birds and by seawater.
7. No specific threats; range of habitat probably limited on Pitcairn.
8. No specific conservation measures needed. The Pitcairn population should be monitored closely, and the plant encouraged to regenerate in the immediate vicinity of the existing population, but there is little value in introducing the species to other sites on Pitcairn.
9. No information.

RUBIACEAE

Coprosma rapensis F. Brown var. *benefica* (Oliver) Fosberg: P

1. Variety endemic to Pitcairn, typical variety from Rapa.
2. Collected from woodlands, and from cliffs at The Rope (St John, 1987).
3. Not found in 1991. St John (1987) lists six collections from

various parts of the island; probably widespread but very local. Population size uncertain.
4. A shrub.
5. Regeneration not known.
6. Dioecious and presumably outcrossed by insects. The fruit is a berry, suggesting bird dispersal.
7. Probably threatened by removal of native vegetation and invasion by exotic species.
8. Detailed survey needed, comparison of the ecology of Pitcairn and Rapa plants would be beneficial.
9. Probably not in cultivation.

Ixora fragrans (H. & A.) A. Gray: H
1. Possibly endemic to Henderson, but a taxonomic revision of the Pacific *Ixora* is needed: the same taxon probably occurs on Fiji, and possibly the Austral and Tuamotu Islands (Brown, 1935).
2. Common and locally dominant in the shrub layer of *Pisonia/Nesoluma/Xylosma* forest. In taller forest, it may form a very dense thicket.
3. Common in plateau forest, not threatened. Population calculated to be 150,000–200,000 plants.
4. A shrub to about 3 m.
5. Seeds freely, young saplings seen.
6. The fragrant flowers are probably moth-pollinated. Fruits taken by the endemic fruit dove.
7. No threats.
8. No conservation measures needed.
9. Not in cultivation. The flowers are fragrant although the inflorescence is few-flowered. Hybridisation with other *Ixora* may yield plants of some horticultural value; several *Ixora* spp. are widely grown in the tropics, and as glasshouse shrubs elsewhere.

ASTERACEAE

Bidens hendersonensis Sherff: H, O
(*Bidens hendersonensis* var. *subspathulata* Sherff)
1. Type variety and var. *subspathulata* Sherff endemic to Henderson, var. *oenoensis* Sherff endemic to Oeno. We do not distinguish the type variety and var. *subspathulata* (see Florence *et al.*, in press). Related species on Pitcairn and in the Marquesas.
2. On Henderson, found in gaps in the plateau forests, especially around *Timonius* scrub, such as on the species-poor fossil lagoonal patch reef areas in the centre of the island. On Oeno, found 'under *Messerschmidia* (=*Argusia argentea*) trees' (St John & Philipson, 1960).
3. Locally common on Henderson in suitable habitat, especially in the centre of the island; population calculated to be about 40,000 individuals. Not found on Oeno in 1991 despite a thorough search, possibly extinct.
4. A caulescent shrub or small tree to 4·5 m.
5. Sets abundant seed on Henderson, young plants observed. Plants possibly monocarpic, and therefore short-lived.
6. Achene has two stiff appendages, seeds probably dispersed by adhering to animals. Pollination probably by small flies and beetles; flowers emit a foetid odour.
7. No threats on Henderson. Natural vegetation changes may be responsible for the demise of the Oeno population. The plant may well reappear, if the species forms a seed bank.
8. No conservation measures needed on Henderson. On Oeno, the species should be thoroughly searched for during future botanical visits, and if possible the variety brought into cultivation.
9. Seed germinates poorly. Seedling growth is rapid, but prone to whitefly and red spider mite attack. Seems to be susceptible to dimethoate-based insecticides.

Bidens mathewsii Sherff: P
(*Campylotheca mathewsii* (Sherff) F. Brown)
1. Endemic to Pitcairn. Related species on Henderson, Oeno and in the Marquesas.
2. Known locations are from cliff tops at St Pauls and The Rope, from low shrubby cliff-top vegetation.
3. Probably very rare, with less than 50 individuals surviving. Only three collections made prior to PISE (St John, 1987).
4. A (caulescent?) shrub.
5. No information on regeneration.
6. Dispersal and pollination agents not known, but probably similar to *B. hendersonensis*.
7. No specific threats are yet known; natural and trampling erosion in native habitats likely. Only small populations are likely to exist.
8. Full survey of Pitcairn urgently needed. *Ex situ* conservation and reintroduction a priority.
9. Not in cultivation.

DISCUSSION

The main immediate threats to the flora of the Pitcairn islands inevitably results from the activities, albeit often inadvertent, of the Pitcairn islanders. The endangered taxa, with their recommended status, are given in Table 1. Mace and Stuart (1994) recommend that taxa with an area of occupancy less than 100 km^2 are given vulnerable status, under their criterion D2. The total land area of the Pitcairn group is less than 50 km^2, but it seems unnecessary to list all native taxa as vulnerable. We have therefore disregarded area of occupancy in assessing threat status for all non-endemic taxa. All endemic taxa have been listed as at least vulnerable in Table 1 because they occupy an area of less than 100 m^2. However, we do not feel that this necessarily reflects the extinction threat to these taxa. Because Pitcairn is an inhabited island of less than 10 km^2, we consider all its endemics to be vulnerable, despite their population sizes being largely unknown. Although Henderson has a land area of about 33 km^2 (Florence *et al.*, in press), its remoteness, elevation above sea level and inhospitable terrain are likely to ensure that endemics that are widespread on the island are unlikely to 'have a high risk of extinction in the medium-term future' (Mace & Stuart, 1994), and therefore are not vulnerable. Use of small area of occupancy for assessing vulnerable status is therefore unsatisfactory; some assessment of the stability of the area in question needs to be incorporated into the assessment criteria.

Threats have been assigned on an individual island basis; however, for non-endemic taxa all criteria involving limited area of occupancy have been ignored. The criterion most frequently used to assess threat categories given in Table 1 was estimated population size (criterion D; Mace & Stuart, 1994). It is clear from this table that the most serious threats face the flora of Pitcairn itself, the other islands all being afforded a great deal of protection by their isolation or inhospitable terrain, provided they remain uninhabited and rarely visited. Some additional species, which we consider to be introduced, or doubtful records, are listed in Table 2.

Oeno and Ducie have relatively depauperate floras (Table 3), in common with many other atolls (Melville, 1979; Renvoize 1979), and few specific conservation measures are appropriate. Oeno appears to be a relatively dynamic land surface, with erosional and

Table 2. Additional taxa recorded, but considered to be doubtful or introduced

Taxon	Remarks
Acrostichum aureum L. (Pteridaceae)	Pitcairn: collected once in 1834, and that specimen destroyed in Berlin. Doubtful.
Calophyllum inophyllum L. (Clusiaceae)	Pitcairn: one collection from Adamstown, by Fosberg in 1934 (see St John, 1987). Oeno: one plant seen near Pitcairners' camp. Probably a recent introduction to both islands.
Barringtonia asiatica (L.) Kurz. (Leycithidaceae)	Pitcairn: one old collection, also seen in 1934. Not seen by PISE; probably a Polynesian introduction.
Brassica juncea L. (Brassicaceae)	Collected from Oeno by Williams in 1956, described by St John and Philipson (1960) as adventive. Not found by PISE, presumed to be of temporary occurrence on Oeno.
Caesalpinia major (Medic.) Dandy & Exell (Caesalpinaceae)	Henderson: collected in 1987. We have not seen the specimen, but we consider all material examined on Henderson to be *C. bonduc* (L.) Roxb.

depositional processes occurring at different parts of the island. These processes are likely to affect the native flora, and future botanical studies here should pay particular attention to the status of *Solanum viride* and *Triumfetta procumbens*, the former rare and likely to be decreasing, the latter rare but probably capable of spreading. The only endemic of Oeno is the local variety of *Bidens hendersonensis*. Although we were unable to find this taxon despite extensive searches, and we must presume it to be extinct, it may still survive as a seed bank or as very few individuals. Future visits should continue to search for this taxon, and if found it should be brought into cultivation.

Oeno is visited by the Pitcairners for holidays and fishing; coconut planting is a local problem, and both Henderson and Oeno are potentially at risk from intentional or accidental introduction of exotic species. On Oeno, some exotic species (including *Araucaria heterophylla* and *Calophyllum inophyllum*) have already been introduced near to the Pitcairners' camp. Comparison of Admiralty charts, diagrams made in 1987 and our own observations, suggests that Oeno is highly dynamic, with sand deposition occurring at the northern end (certainly since 1987), and probable erosion at the south; these erosion and deposition processes may naturally affect some habitats detrimentally. The same is probably true of Ducie, but only two species of higher plants occur there at present, and both are widespread Indo-Pacific strand species. Ducie has rarely been visited by the Pitcairn islanders.

Approximately 14·3% of the native Henderson flora are thought to be endemic (Table 3); they occur mainly on the plateau in various forest types, most in healthy populations and are not threatened. The rarest of the endemic species is *Myrsine hosakae*, but the threats to *Santalum* are greater because of its potential commercial value. Other Henderson taxa with local or very restricted populations are also under no specific threat; these number some 17·5% of the native flora. Some occur as small localised populations (e.g. *Hernandia stokesii, Meryta brachypoda*) or isolated individuals which may be widespread (e.g. *Allophyllus rhomboidalis*). The inhospitable nature of the plateau forests mostly restricts casual visitors to the vicinity of the landing sites in the north of the island: few visitors are ever likely to venture very far, and a visit to the southern end of the island is a major undertaking requiring careful planning.

The most regular visitors to Henderson are the Pitcairn islanders who cut the timber of *Cordia subcordata* and *Thespesia populnea* for carving curios. This causes local disturbance to the beach embayment forests and at present both *Cordia* and *Thespesia* are harvested on a non-sustainable basis. Some of the embayment forests are also threatened by excessive coconut planting by Pitcairners and the species composition may have changed following timber extraction, but the islanders rarely seem to venture very far onto the plateau. During a survey of Henderson for an American airfield in 1966, large amounts of *Thespesia* were cut on the North Beach for the Pitcairners (M. Fraser, pers. comm.); this area seems to have been subse-

Table 3. Numbers of threatened (based on WCMC status) and endemic species for individual islands in the Pitcairn group[a]

Island	H	P	O	D
Total native taxa[b]	63	66	16	2
Total endemic[c]	9	9	1	0
Total threatened[d]	11	35	3	0
% endemic	14·3	13·6	6·3	0·0
% threatened or insufficiently known	17·5	53·0	18·8	0·0

[a]H, Henderson; P, Pitcairn; O, Oeno; D, Ducie.
[b]Does not include Polynesian and recent introductions.
[c]Endemic to Pitcairn group, and including endemic varieties.
[d]Based on WCMC status.

quently colonised by *Pandanus*. The airfield survey team also scattered *Thespesia* and *Cocos* fruit over the plateau area from a helicopter; thankfully their efforts seem to have been unsuccessful. The effects of Polynesian occupation of the island are probably limited to the vicinity of the beach habitation sites, leaving most of the plateau intact, although parts of the plateau above the North Beach and the slopes above the East Beach have been burnt for cultivation (Weisler, in press).

The best protection that Henderson could be offered would be to maintain the current situation, in addition to encouraging the Pitcairners to limit their plantings of coconut and other exotics; this also applies particularly to Oeno. Great care should be taken to prevent the accidental or deliberate introduction of exotic species; inadvertent introduction of some of the exotic Pitcairn species, such as *Syzygium jambos* and *Lantana camara*, could have very serious consequences for the native Henderson vegetation. Efforts should be made to extend the *ex situ* conservation of local Henderson and Oeno species, particularly the endemics. In 1991 we encountered difficulty in collecting seed of many Henderson species due to predation by the Henderson fruit dove.

The situation on Pitcairn is very different. Unfortunately, we were able to spend relatively little time there, but it was quite apparent that much of the native flora is seriously threatened with extinction. We consider that of a native flora of 66 taxa, nine are endemic to Pitcairn and 35 (53·0%) are threatened or insufficiently known; in our relatively short stay on Pitcairn, we failed to locate many of the rarer native taxa.

Pitcairn has a 200-year history of disturbance by the *Bounty* settlers, and was previously altered to an unknown extent by the Polynesian inhabitants. Being a small inhabited island (*c.* 4 × 2 km), there are various immediate threats to its vegetation. The most serious is probably the invasion of remnant forests by exotic species, especially *Syzygium jambos*, originally planted for fuel wood, but scarcely used today. *Lantana camara* is also a serious pest where forest cover has been removed, and *Sorghum sudanense* is invading grasslands and fern scrub. Areas of native forest are now rarely cleared for cultivation, but some damage to forests may occur due to track-widening activities. Grazing by goats is a potential threat, although at present their numbers are regularly controlled by the islanders. However, we are optimistic that much of the native flora can be saved *in situ* if appropriate measures are taken, as at least some of the rare species still occur in small but reasonably sized populations. This conservation effort needs to be undertaken immediately before further degradation and genetic erosion occurs, when much more effort will be required to achieve long-lasting success. The highly degraded state of, for example, St Helena (e.g. Cronk, 1989; Drucker & Pearce-Kelly, 1992) and Easter Island (Zizka, 1991), and the great efforts being put into conserving what remains of their floras, should signal the urgency needed to protect the native flora of Pitcairn while it is still possible to do so with a minimum of effort. The first essential requirement is a detailed and thorough study of the Pitcairn flora and vegetation communities, with special efforts to refind the rarer taxa.

Some of the rare Pitcairn taxa are already in cultivation, and these could be reintroduced to 'safe' habitats. Many of the rare Pitcairn plants are highly attractive (e.g. *Angiopteris chauliodonta*, *Cyathea medullaris*), and there are sites close to Adamstown where such species might be used in amenity plantings. The Pitcairn islanders are skilled gardeners and routinely grow a wide variety of both tropical and temperate crops. Given encouragement, there is no reason why they should not be able to grow many native Pitcairn species for conservation purposes. An additional problem on Pitcairn may be the lack of suitable dispersal agents; it is clear from the information about individual taxa that on Henderson the indiscriminate feeding of the Henderson fruit dove is an effective and important dispersal agent for the propagules of many species, the seeds of which are evacuated intact (Jones *et al.*, in press). Pitcairn lacks a native frugivorous bird; it might be possible to introduce endangered doves from other Pacific islands to assist with seed dispersal, but this might prove harmful to the islanders' crops, and may also aid the spread of certain exotic species. It might also be possible to introduce threatened plant taxa from elsewhere in the Pacific to Henderson and possibly Pitcairn, but such action must be taken with the greatest caution, and not before all efforts have been made to ascertain the likely effects of any translocated taxa on the existing ecosystems.

Although recent human activity is likely to be the major direct or indirect cause of the demise of many native vascular plants (e.g. via the introduction of exotic species), it is clear that without the commitment and co-operation of the islanders there can be little hope for future conservation efforts on Pitcairn. The island has seen a gradual decline in its human inhabitants from a maximum of over 200 to the present total of about 50. It is likely to become degraded by the spread and dominance of several of the exotic taxa mentioned above, and immediate efforts need to be made to control their spread. The islanders offer the best prospects for on-going control of invasive species, and for re-establishment of healthy populations of native taxa. It is therefore essential that efforts be made to promote a policy of sustainable development and conservation to ensure a good standard of living for the islanders coupled with adequate conservation of the native flora and fauna. At present (May 1995) there are several government positions on the island, including a forester, which are paid small salaries by the Island Administration. We suggest that the financing of a properly briefed Conservation Officer would be a significant advance in the conservation efforts. Such an officer could play a great role in preventing any inadvertent damage to high-interest sites on Pitcairn (such as the *Angiopteris/Trichomanes/Ctenitis* site, which is close to a main trackway and water course), in addition to providing on-site co-ordination and implementation

of conservation efforts, and bringing an extra salary into the island economy.

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