

Checklist of ferns and lycophytes from the Parque Estadual Turístico do Alto Ribeira, Iporanga, São Paulo, Brazil

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Abstract: We present the floristic survey of ferns and lycophytes from the “Parque Estadual Turístico do Alto Ribeira” (PETAR), a remnant of Atlantic Rain Forest of Southeastern Brazil, in São Paulo state. Besides a complete list of species, we also provide information on habit, geographic distribution, and conservation status. Among the 237 taxa, there are 235 species, one variety and one hybrid, distributed in 29 families and 74 genera. Ferns are represented by 223 taxa, whereas the lycophytes were represented by 14. The most representative families are Polypodiaceae (31 spp.), Pteridaceae (29 spp.) and Dryopteridaceae (28 spp.). The most diverse genera are *Thelypteris* (23 spp.), *Asplenium* (19 spp.), *Elaphoglossum* and *Blechnum* (10 spp. each). Noteworthy is the presence of *Ctenitis anniesii*, *Dicksonia sellowiana*, *Elaphoglossum iguapense*, *E. prestonii*, *E. strictum*, *Thelypteris concinna*, *T. araucariensis* and *T. hatschbachii*, all of them considered as endangered species in São Paulo state.

Key words: diversity; Atlantic Forest; floristic survey; conservation; PETAR

INTRODUCTION

Ferns and lycophytes are represented by approximately 13,600 species in the world, most of them occurring in tropical regions (Moran 2008). In Brazil there are approximately 1,200 species, and the greatest diversity is found in the Atlantic Rain Forest, which holds ~800 species (Prado and Sylvestre 2015). As for the State of São Paulo, 573 taxa have been recorded so far, which makes it one of the most diverse states of Brazil (Prado and Hirai 2011; Prado and Sylvestre 2015).

Despite the considerable number of studies already carried out in the state [e.g., Windisch (1992); Salino (1996); Salino and Joly (2001); Colli et al. (2003; 2004a, 2004b; 2007); Nóbrega and Prado (2008) in interior regions of semideciduous forest and Cerrado; and Athayde-Filho et al. (2003), Boldrin and Prado

(2007), Salino and Almeida (2008), Prado and Labiak (2009), Prado (2004a, 2004b, 2004c, 2004d, 2004e, 2004f, 2004g, 2004h, 2006a, 2006b) Prado and Hirai (2008, 2010a, 2010b), Prado et al. (2010); Hirai and Prado (2011; 2012) in rainforest], many places are still poorly known, which is the case for the southern region of São Paulo.

Therefore, the aim of this study was to present a checklist for the ferns and lycophytes in Parque Estadual Turístico do Alto Ribeira, one of the most important reserves of Atlantic Rain Forest in the southern part of São Paulo. We also provide information about the life forms and geographical distribution for each species.

MATERIAL AND METHODS

Study area

The Parque Estadual Turístico do Alto Ribeira – PETAR is located on the southeastern portion of São Paulo State, in a region locally called as the “Vale do Ribeira” (Figure 1). It covers an area of about 35,712 ha, representing one of the largest remnants of Atlantic Rain Forest of Brazil (Aidar et al. 2001; Ribeiro et al. 2009) (Figure 2A–D). The climate is characterized by a transition from the warm climate of low latitudes and mesothermic temperate latitudes of midlatitudes being classified as warm and super humid with no dry season (Nimer 1977; Karmann and Ferrari 2002). The annual temperature average ranges between 17–19°C, and the average rainfall is 1,800 mm/year (Gutjhar 1993). An important aspect of the geology of the PETAR is that about 40% of its area consists of carbonate soil, which confers a particularity to this region that is one of the few areas of the Atlantic Rain Forest with outcrop of limestone interspersed with outcrops of phyllite in the country (Aidar et al. 2001).

Data collection and analysis

Seven field trips were carried out, from September 2011 to August 2012. All specimens were deposited in

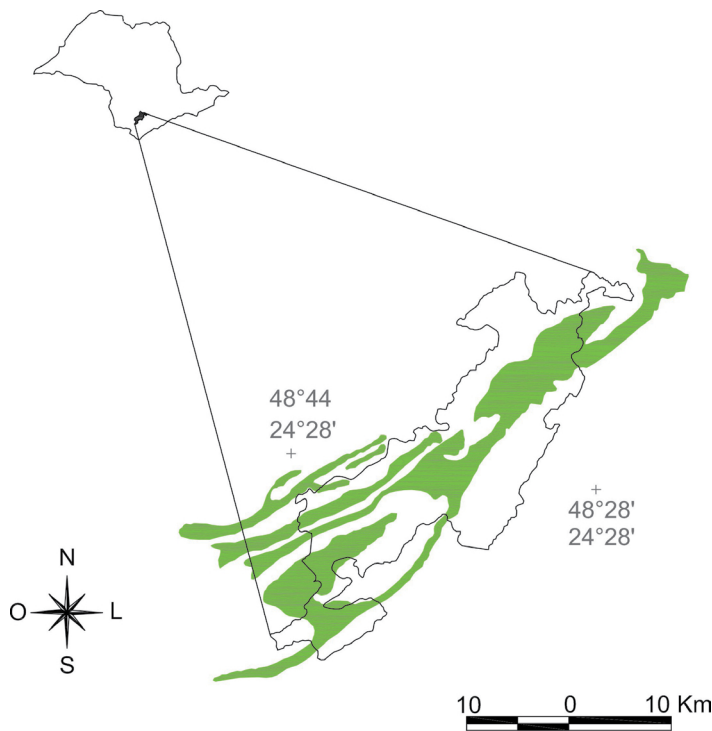


Figure 1: Location map of Parque Estadual Turístico do Alto Ribeira in state of São Paulo and the distribution of limestone soil in green.

the Herbarium UPCB. Duplicates, when available, were sent to the SP, UNIP, NY, UC and RB herbaria. We also conducted a survey of species from secondary data, using the online database available at the speciesLink (2012). Data on geographical distribution of species were obtained from specialized literature. Types of habits were treated as guilds of life forms, following Paciencia (2008). Species conservation status in the state of São Paulo was obtained from SMA (2004). The taxonomic treatment adopted for the ferns and Selaginellaceae follows Christenhusz et al. (2011), Christenhusz and Schneider (2011) and Rothfels et al. (2012) while for Lycopodiaceae was accepted the classification proposed by Øllgaard and Windisch (2014). The names of authors of taxa were abbreviated according to Pichi-Sermolli (1996).

RESULTS

We recorded 237 infrageneric taxa, of which 235 are species, one variety and one hybrid (Table 1). Of these, 223 are ferns and 14 belong to the lycophytes. Among the ferns the most representative family was Polypodiaceae with 31 species, followed by Pteridaceae (29 spp. each), Dryopteridaceae (28 spp.), Thelypteridaceae (25



Figure 2: Pictures of Parque Estadual Turístico do Alto Ribeira. **A:** general view of the park; **B:** limestone outcrops; **C:** view of the interior of the forest over limestone soil; **D:** River Betari, one of the most preserved riparian forests in PETAR.

spp.), Hymenophyllaceae (22 spp.) and Aspleniaceae (20 spp.). These families, altogether, correspond to 65.4% of the species found in the park. The lycophytes were represented by two families: Lycopodiaceae with 10 species and Selaginellaceae with four. The most diverse genera were *Thelypteris* (24 spp.), *Asplenium* (19 spp.), *Elaphoglossum* and *Blechnum* (10 spp. each), *Adiantum* and *Pteris* (9 spp. each).

The most common life form was terrestrial, with 125 species (52.7%) showing this kind of habitat preference, followed by epiphytes (58 spp., 24.4%), lithophytes (14 spp., 5.9%), arborescent (or tree ferns) (9 spp., 3.7%), hemiepiphytes (6 spp., 2.5%), scandents (3 spp., 1.2%), and 22 species (9.2%) presents two life forms.

Regarding geographical distribution of the species observed, 98 (41.3%) are Neotropical, 48 (20.2%) are endemic to South America, 39 are endemic to Brazil (16.4%), 31 are endemic to Southeastern and Southern Brazil (13.1%) and 21 are pantropical species (8.9%). Besides, eight species are considered threatened in state of São Paulo, all in vulnerable category.

DISCUSSION

The species richness found in this study corresponds to approximately 41.3% of the species recorded for the state of São Paulo by Prado and Hirai (2011), and it is one of the richest areas for ferns and lycophytes in Southeastern Brazil. Other surveys carried out in southeastern Brazilian rainforest have also found a high number of species, such as Paciencia (2008), which inventoried 216 species, Salino and Almeida (2008) (212 species), Souza et al. (2012) (209 species), Melo and Salino (2007) (174 species), and Matos et al. (2010) (182 species). Noteworthy is that all these studies were conducted in mountainous areas, which are considered to provide a wide variety of habitats that contribute to a high diversity of ferns and lycophytes (Moran 1995).

It is worth mentioning that *Asplenium mucronatum* C. Presl, *A. pteropus* Kaulf., *Elaphoglossum macrorrhizum* (Baker) C. Chr., *E. strictum* (Raddi) T. Moore, *Pecluma truncorum* (Lindm.) M. G. Price, *Polyphlebium angustatum* (Carmich.) Ebihara & Dubuisson, *Trichomanes anadromum* Rosenst. and *T. polypodioides* L. were found growing only on tree fern trunks, generally on species of Cyatheaceae. This specificity of some epiphytic species with the phorophyte was also noticed by Senna and Kazmirczak (1997), Moran et al. (2003), Schmitt and Windisch (2005) and Gasper and Sevegnani (2010).

Regarding the number of epiphytic species, our results show a lower percentage of epiphytic species when compared to other studies. For instance, Dittrich et al. (2005), Paciencia (2008), and Sylvestre (1997) have recorded 62.9%, 60.8%, and 48.7% of epiphytic species, respectively. On the other hand, studies that involved more than one type of phytophysiology

obtained results similar to those found in this study as is the case of works of Salino and Almeida (2008) with 30.6%, Melo and Salino (2007) with 23.2%, Salino et al. (2005) with 19.3% and Souza et al. (2012) with 15.5%. The moderate percentage of epiphytes obtained in this study may be related to the presence of large areas with limestone outcrops (Figure 2B–C) allied to the inland position of the park in relation to the Atlantic Ocean. Thus, the presence of these relatively dry environments may be less attractive for the attachment and growth of some epiphytes. The same pattern was found for some Semideciduous Forests, such as Windisch (1992), Salino (1996), Salino and Joly (2001), Melo and Salino (2002), Figueiredo and Salino (2005) and Nóbrega and Prado (2008).

Introduced species were also found. Those were mainly found in disturbed areas, and are represented by *Deparia petersenii* (Kunze) M. Kato, *Macrothelypteris torresiana* (Gaud.) Ching, *Pteris vittata* L. and *Thelypteris dentata* (Forssk.) E. P. St. John.

Eight species are considered endangered in São Paulo state, all in the category of vulnerable (SMA, 2004). Those are *Ctenitis anniesii* (Rosenst.) Copel., *Dicksonia sellowiana* Hook., *Elaphoglossum iguapense* Brade, *E. prestonii* (Fée) Brade, *E. strictum* (Raddi) T. Moore, *Thelypteris araucariensis* Ponce, *T. concinna* (Willd.) Ching and *T. hatschbachii* A.R. Sm. Among the endangered species that have small and restricted populations are *Elaphoglossum strictum* and *Thelypteris concinna*, both observed only once in the studied area.

ACKNOWLEDGEMENTS

We thank the following taxonomists for their help with the identification of some taxa: Claudine Mynssen (*Diplazium*), Fernando Matos (*Elaphoglossum*), Luciana Melo (*Elaphoglossum*) and Pedro Schwartsburd (*Hypolepis*). The first author thanks CAPES for the master's scholarship.

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Author contributions: FM, PL and MP collected the data; FM wrote the text; PL and MP reviewed the text, and FM, PL and MP have made the analysis.

Received: September 2013

Accepted: October 2015

Academic editor: Vinícius Dittrich

Table 1. Ferns and lycophytes found in the Parque Estadual Turístico do Alto Ribeira, Iporanga, state of São Paulo, Brazil, showing life forms, geographical distribution, conservation status and vouchers. Life forms: TR – terrestrial; EP – epiphyte; LT – lithophyte; AR – arborescent; HE – hemiepiphyte; SC – scandent. Geographical distribution: NEO – neotropical; ESA – endemic of South America; EBR – endemic of Brazil; ESS – endemic of Southeastern and Southern of Brazil; PAN – pantropical. Conservation status: LC – least concern; VU – vulnerable. *Voucher:* FFM – F.F. Mazziero; PUI – J.J. Puiggari; BRD – A.C. Brade; LTF – H. Leitão-Filho; SAR – D. Saridakis.

| Taxa | Life form | Geographical distribution | Conservation status | Voucher |
|---|-----------|---------------------------|---------------------|-------------------------------|
| Anemiaceae | | | | |
| <i>Anemia phyllitidis</i> (L.) Sw. | TR | NEO | LC | FFM 588, 644 |
| <i>Anemia raddiana</i> Link | TR/LT | EBR | LC | FFM 628, 992 |
| Aspleniaceae | | | | |
| <i>Asplenium abscissum</i> Willd. | TR/LT | NEO | LC | FFM 840, 967, 1152 |
| <i>Asplenium alatum</i> Humb. & Bonpl. ex Willd. | LT/EP | NEO | LC | FFM 979, 1063 |
| <i>Asplenium auriculatum</i> Sw. | TR | NEO | LC | FFM 1129 |
| <i>Asplenium auritum</i> Willd. | TR/EP | PAN | LC | FFM 602, 627 |
| <i>Asplenium brasiliense</i> Sw. | TR/LT | ESA | LC | FFM 842, 942 |
| <i>Asplenium cirrhatum</i> Rich. ex Willd. | TR | NEO | LC | FFM 853, 1061 |
| <i>Asplenium clausenii</i> Hieron. | LT | NEO | LC | FFM 913, 955, 966 |
| <i>Asplenium cristatum</i> Lam. | LT | NEO | LC | FFM 1041 |
| <i>Asplenium feei</i> Kunze ex Fée | EP | NEO | LC | FFM 1076 |
| <i>Asplenium flabellulatum</i> Kunze | TR | NEO | LC | PUI 812 |
| <i>Asplenium kunzeanum</i> Klotzsch ex Rosenst. | TR | EBR | LC | FFM 852, 866, 870, 1070, 1091 |
| <i>Asplenium mucronatum</i> C.Presl | EP | ESA | LC | FFM 603, 659, 963 |
| <i>Asplenium oligophyllum</i> Kaulf. | EP | ESA | LC | FFM 1140 |
| <i>Asplenium pseudonitidum</i> Raddi | TR/EP | ESS | LC | FFM 1079 |
| <i>Asplenium pteropus</i> Kaulf. | EP | NEO | LC | FFM 914, 915, 950, 1054, 1139 |
| <i>Asplenium raddianum</i> Gaudich. | TR/EP | ESA | LC | FFM 661, 1101 |
| <i>Asplenium scandicinum</i> Kaulf. | EP | ESA | LC | FFM 624, 626 |
| <i>Asplenium serra</i> Langsd. & Fisch. | TR | NEO | LC | FFM 838 |
| <i>Asplenium serratum</i> L. | EP | NEO | LC | FFM 587, 957 |
| <i>Hymenasplenium triquetrum</i> (N. Murak. & R.C.Moran) L.Regalado & Prada | LT | ESA | LC | FFM 584, 864, 1138 |

Continued

Table 1. Continued.

| Taxa | Life form | Geographical distribution | Conservation status | Voucher |
|--|-----------|---------------------------|---------------------|-------------------------------------|
| Athyriaceae | | | | |
| <i>Deparia petersenii</i> (Kunze) M. Kato | TR | PAN | LC | FFM 701 |
| <i>Diplazium ambiguum</i> Raddi | TR | ESA | LC | FFM 559, 850, 921, 1007 |
| <i>Diplazium asplenioides</i> (Kunze) C. Presl | TR | ESA | LC | FFM 696 |
| <i>Diplazium cristatum</i> (Desr.) Alston | TR | ESA | LC | FFM 695, 932, 1149 |
| <i>Diplazium plantaginifolium</i> (L.) Urb. | TR | NEO | LC | BRD 5161 |
| <i>Diplazium turgidum</i> Rosenst. | TR | EBR | LC | FFM 815, 922, 1150 |
| Blechnaceae | | | | |
| <i>Blechnum acutum</i> (Desv.) Mett. | HE | NEO | LC | FFM 612, 617 |
| <i>Blechnum brasiliense</i> Desv. | TR | NEO | LC | FFM 665 |
| <i>Blechnum x caudatum</i> Cav. | TR | NEO | LC | FFM 610 |
| <i>Blechnum cordatum</i> (Desv.) Hieron. | TR | ESA | LC | FFM 692 |
| <i>Blechnum divergens</i> (Kunze) Mett. | TR | NEO | LC | FFM 1111 |
| <i>Blechnum lehmannii</i> Hieron. | TR | NEO | LC | FFM 1131 |
| <i>Blechnum occidentale</i> L. | TR | NEO | LC | FFM 580, 691 |
| <i>Blechnum polypodioides</i> Raddi | TR/LT | NEO | LC | FFM 577, 653, 821, 1180 |
| <i>Blechnum sampaioanum</i> Brade | TR | ESS | LC | FFM 1097 1128 |
| <i>Blechnum schomburgkii</i> (Klotzsch) C. Chr. | TR | NEO | LC | FFM 1133 |
| <i>Salpichlaena volubilis</i> (Kaulf.) J. Sm. | SC | NEO | LC | FFM 648, 827 |
| <i>Telmatoblechnum serrulatum</i> (Rich.) Perrie, D.J. Ohlsen & Brownsey | TR | NEO | LC | FFM 843 |
| Cyatheaceae | | | | |
| <i>Alsophila setosa</i> Kaulf. | AR | ESA | LC | FFM 881 |
| <i>Alsophila sternbergii</i> (Sternb.) D.S. Conant | AR | EBR | LC | FFM 637 |
| <i>Cyathea atrovirens</i> (Langsd. & Fisch.) Domin | AR | ESA | LC | FFM 656, 860, 1103 |
| <i>Cyathea corcovadensis</i> (Raddi) Domin | AR | EBR | LC | FFM 686, 946 |
| <i>Cyathea delgadii</i> Sternb. | AR | NEO | LC | FFM 1109 |
| <i>Cyathea hirsuta</i> C. Presl | AR | ESS | LC | FFM 882, 986 |
| <i>Cyathea leucofolis</i> Domin | AR | ESS | LC | FFM 858 |
| <i>Cyathea phalerata</i> Mart. | AR | EBR | LC | FFM 636, 856 |
| Dennstaedtiaceae | | | | |
| <i>Dennstaedtia cicutaria</i> (Sw.) T. Moore | TR | NEO | LC | FFM 598, 1042, 1047, 1118 |
| <i>Dennstaedtia cornuta</i> (Kaulf.) Mett. | TR | NEO | LC | FFM 1102 |
| <i>Dennstaedtia dissecta</i> T. Moore | TR | NEO | LC | FFM 816, 990 |
| <i>Dennstaedtia globulifera</i> (Poir.) Hieron. | TR | NEO | LC | FFM 660 |
| <i>Dennstaedtia obtusifolia</i> (Willd.) T. Moore | TR | ESA | LC | FFM 1100, 1106 |
| <i>Hypolepis acantha</i> Schwartsb. | TR | EBR | LC | FFM 1117 |
| <i>Hypolepis mitis</i> Kunze ex Kuhn | TR | ESS | LC | FFM 909 |
| <i>Pteridium arachnoideum</i> (Kaulf.) Maxon | TR | NEO | LC | FFM 689 |
| Dicksoniaceae | | | | |
| <i>Dicksonia sellowiana</i> Hook. | AR | NEO | VU | FFM 684 |
| <i>Lophosoria quadripinnata</i> (J.F. Gmel.) C. Chr. | TR | NEO | LC | FFM 920, 1108 |
| Dryopteridaceae | | | | |
| <i>Ctenitis anniesii</i> (Rosenst.) Copel. | TR | EBR | VU | FFM 571, 1025 |
| <i>Ctenitis aspidioides</i> (C. Presl) Copel. | TR | ESS | LC | FFM 594, 595, 596, 697, 959 |
| <i>Ctenitis distans</i> (Brack.) Ching | TR | EBR | LC | FFM 563, 673, 674, 822, 975 |
| <i>Ctenitis falciculata</i> (Raddi) Ching | TR | ESA | LC | FFM 935, 1021 |
| <i>Ctenitis pedicellata</i> (Christ) Copel. | TR | ESS | LC | FFM 854, 944, 1022, 1029 |
| <i>Ctenitis submarginalis</i> (Langsd. & Fisch.) Ching | TR | NEO | LC | FFM 667, 1023 |
| <i>Elaphoglossum glabellum</i> J. Sm. | EP | NEO | LC | FFM 1171 |
| <i>Elaphoglossum glaziovii</i> (Fée) Brade | LT/EP | EBR | LC | FFM 865, 901, 923, 1067, 1113, 1157 |
| <i>Elaphoglossum iguapense</i> Brade | LT/EP | EBR | VU | FFM 836, 898, 1065, 1156 |
| <i>Elaphoglossum lingua</i> (C. Presl) Brack. | EP | EBR | LC | FFM 625, 885 |
| <i>Elaphoglossum luridum</i> (Fée) Christ | EP | NEO | LC | FFM 985, 1121 |
| <i>Elaphoglossum macrorhizum</i> (Baker) C. Chr. | EP | ESS | LC | FFM 1044, 1121 |
| <i>Elaphoglossum nigrescens</i> (Hook.) T. Moore ex Diels | EP | NEO | LC | FFM 924, 1161 |
| <i>Elaphoglossum prestonii</i> (Baker) J. Sm. | EP | ESS | VU | FFM 897 |
| <i>Elaphoglossum strictum</i> (Raddi) T. Moore | EP | EBR | VU | FFM 1159 |
| <i>Elaphoglossum vagans</i> (Mett.) Hieron. | EP | EBR | LC | FFM 1099, 1134 |
| <i>Lastreopsis amplissima</i> (C. Presl) Tindale | TR | ESA | LC | FFM 693, 1038, 1039 |
| <i>Lastreopsis effusa</i> (Sw.) Tindale | TR | NEO | LC | FFM 844, 939 |

Continued

Table 1. Continued.

| Taxa | Life form | Geographical distribution | Conservation status | Voucher |
|---|-----------|---------------------------|---------------------|-------------------------------|
| <i>Megalastrum albidum</i> R.C. Moran, J. Prado & Labiak | TR | ESS | LC | FFM 956 |
| <i>Megalastrum connexum</i> (Kaulf.) A.R. Sm. & R.C. Moran | TR | ESA | LC | FFM 554, 555, 557, 668, 934 |
| <i>Megalastrum umbrinum</i> (C. Chr.) A.R.Sm. & R.C.Moran | TR | ESA | LC | FFM 672, 916, 940 |
| <i>Mickelia scandens</i> (Raddi) R.C. Moran, Labiak & Sundue | HE | ESS | LC | FFM 643, 943 |
| <i>Olfersia cervina</i> (L.) Kunze | TR/LT | NEO | LC | FFM 845 |
| <i>Polybotrya cylindrica</i> Kaulf. | HE | EBR | LC | FFM 579, 647, 1020 |
| <i>Rumohra adiantiformis</i> (G. Forst.) Ching | TR/EP | PAN | LC | FFM 703 |
| <i>Stigmatopteris caudata</i> (Raddi) C. Chr. | TR | ESS | LC | FFM 973 |
| <i>Stigmatopteris heterocarpa</i> (Fée) Rosenst. | TR | ESS | LC | FFM 947, 969 |
| <i>Stigmatopteris tyucana</i> (Raddi) C. Chr. | TR | ESS | LC | FFM 984 |
| Gleicheniaceae | | | | |
| <i>Dicranopteris flexuosa</i> (Schrad.) Underw. | TR | NEO | LC | FFM 694 |
| <i>Gleichenella pectinata</i> (Willd.) Ching | TR | NEO | LC | FFM 650 |
| <i>Sticherus bifidus</i> (Willd.) Ching | TR | NEO | LC | FFM 994, 1093 |
| <i>Sticherus nigropaleaceus</i> (J.W. Sturm) J. Prado & Lellinger | TR | EBR | LC | FFM 651, 820 |
| <i>Sticherus squamosus</i> (Fée) J. Gonzales | TR | ESA | LC | FFM 819, 993, 1035 |
| Hemidictyaceae | | | | |
| <i>Hemidictyum marginatum</i> (L.) C. Presl | TR | NEO | LC | FFM 1050 |
| Hymenophyllaceae | | | | |
| <i>Abrodictyum rigidum</i> (Sw.) Ebihara & Dubuisson | TR | NEO | LC | FFM 983, 1087, 1120 |
| <i>Didymoglossum krausii</i> (Hook. & Grev.) C. Presl | LT | NEO | LC | FFM 583, 895, 905, 908, 1059 |
| <i>Hymenophyllum asplenioides</i> (Sw.) Sw. | EP | NEO | LC | FFM 1119, 1164 |
| <i>Hymenophyllum caudiculatum</i> Mart. | EP | ESA | LC | FFM 1026, 1166 |
| <i>Hymenophyllum elegans</i> Spreng. | LT | ESS | LC | FFM 987 |
| <i>Hymenophyllum hirsutum</i> (L.) Sw. | EP | NEO | LC | FFM 669, 886, 911, 1080, 1126 |
| <i>Hymenophyllum lineare</i> (Sw.) Sw. | EP | NEO | LC | PUI s.n. |
| <i>Hymenophyllum microcarpum</i> Desv. | LT | NEO | LC | FFM 891 |
| <i>Hymenophyllum polyanthos</i> (Sw.) Sw. | EP | PAN | LC | FFM 964, 1027, 1056 |
| <i>Hymenophyllum pulchellum</i> Schtdl. & Cham. | EP | NEO | LC | 1163 |
| <i>Polyphlebium angustatum</i> (Carmich.) Ebihara & Dubuisson | EP | NEO | LC | FFM 575, 605, 658, 970 |
| <i>Polyphlebium diaphanum</i> (Kunth.) Ebihara & Dubuisson | LT | EBR | LC | FFM 925 |
| <i>Polyphlebium hymenophylloides</i> (Bosch) Ebihara & Dubuisson | EP | NEO | LC | FFM 904 |
| <i>Polyphlebium pyxidiferum</i> (L.) Ebihara & Dubuisson | EP | PAN | LC | FFM 572, 896, 900, 1033, 1125 |
| <i>Trichomanes anadromum</i> Rosenst. | EP | NEO | LC | FFM 1086 |
| <i>Trichomanes cristatum</i> Kaulf. | TR | ESA | LC | FFM 951 |
| <i>Trichomanes elegans</i> Rich. | TR | NEO | LC | FFM 564, 565, 930 |
| <i>Trichomanes pellucens</i> Kunze | EP | ESA | LC | WIN 6080 |
| <i>Trichomanes pilosum</i> Raddi | LT | ESA | LC | PUI s.n. |
| <i>Trichomanes polypodioides</i> L. | EP | NEO | LC | FFM 639, 670, 1045 |
| <i>Vandenboschia radicans</i> (Sw.) Copel. | HE | PAN | LC | FFM 566, 573, 582, 933 |
| <i>Vandenboschia rupestris</i> (Raddi) Ebihara & K. Iwats. | HE | NEO | LC | FFM 604 |
| Hypodematiaceae | | | | |
| <i>Didymochlaena truncatula</i> (Sw.) J. Sm. | TR | PAN | LC | FFM 562 |
| Lindsaeaceae | | | | |
| <i>Lindsaea divaricata</i> Klotzsch | TR | NEO | LC | FFM 1052, 1075 |
| <i>Lindsaea lancea</i> (L.) Bedd. | TR | NEO | LC | FFM 657, 813, 876, 960 |
| <i>Lindsaea quadrangularis</i> Raddi | TR | ESA | LC | FFM 833, 927 |
| Lomariopsidaceae | | | | |
| <i>Lomariopsis marginata</i> (Schrad.) Kuhn | HE | EBR | LC | FFM 812, 948 |
| Lycopodiaceae | | | | |
| <i>Lycopodiella alopecuroides</i> (L.) Cranfill | TR | NEO | LC | FFM 1104 |
| <i>Lycopodium clavatum</i> L. | TR | PAN | LC | FFM 1107 |
| <i>Palhinhaea cernua</i> (L.) Franco & Vasc. | TR | PAN | LC | FFM 654, 991, 1046, 1107 |
| <i>Palhinhaea pendulina</i> (Hook.) Holub | TR | NEO | LC | WIN 6084 |
| <i>Phlegmariurus acerosus</i> (Sw.) B. Øllg. | EP | NEO | LC | FFM 599 |
| <i>Phlegmariurus comans</i> (Herter ex Nessel) B. Øllg. | EP | ESS | LC | FFM 1148 |
| <i>Phlegmariurus flexibilis</i> (Fée) B. Øllg. | EP | EBR | LC | FFM 1049 |
| <i>Phlegmariurus heterocarpon</i> (Fée) B. Øllg. | EP | ESA | LC | FFM 1048, 1141, 1158 |
| <i>Phlegmariurus reflexus</i> (Lam.) B. Øllg. | TR | NEO | LC | FFM 702, 996 |
| <i>Pseudolycopodiella meridionalis</i> (Underw. & F.E. Lloyd) Holub | TR | NEO | LC | FFM 1105 |

Continued

Table 1. Continued.

| Taxa | Life form | Geographical distribution | Conservation status | Voucher |
|--|-----------|---------------------------|---------------------|------------------------------|
| Lygodiaceae | | | | |
| <i>Lygodium venustum</i> Sw. | SC | PAN | LC | FFM 879 |
| <i>Lygodium volubile</i> Sw. | SC | NEO | LC | FFM 878, 1148 |
| Marattiaceae | | | | |
| <i>Danaea geniculata</i> Raddi | TR | EBR | LC | FFM 649, 936 |
| <i>Danaea moritziana</i> C.Presl | TR/LT | ESS | LC | FFM 893, 968, 971 |
| <i>Danaea nodosa</i> (L.) Sm. | TR | NEO | LC | FFM 622, 851 |
| <i>Eupodium kaulfussii</i> (J. Sm.) J. Sm. | TR | ESA | LC | FFM 688, 972 |
| <i>Marattia cicutifolia</i> Kaulf. | TR | EBR | LC | FFM 1110 |
| Nephrolepidaceae | | | | |
| <i>Nephrolepis cordifolia</i> (L.) C. Presl | EP | PAN | LC | FFM 1068, 1142 |
| <i>Nephrolepis pendula</i> (Raddi) J. Sm. | TR/EP | NEO | LC | FFM 613, 615 |
| <i>Nephrolepis rivularis</i> (Vahl) Mett. ex Krug | EP | NEO | LC | FFM 855 |
| Ophioglossaceae | | | | |
| <i>Cheiroglossa palmata</i> (L.) C. Presl | EP | NEO | LC | FFM 999 |
| Osmundaceae | | | | |
| <i>Osmunda regalis</i> L. | TR | PAN | LC | FFM 690, 1004 |
| <i>Osmundastrum cinnamomeum</i> (L.) C. Presl | TR | PAN | LC | LTF 4746 |
| Polypodiaceae | | | | |
| <i>Alansmia reclinata</i> (Brack.) Moguel & M. Kessler | EP | EBR | LC | FFM 1130 |
| <i>Campyloneurum acrocarpon</i> Fée | TR | ESA | LC | FFM 592, 962 |
| <i>Campyloneurum decurrens</i> (Raddi) C. Presl | LT | EBR | LC | FFM 919 |
| <i>Campyloneurum minus</i> Fée | EP/LT | ESA | LC | FFM 589, 883, 884, 982 |
| <i>Campyloneurum nitidum</i> (Kaulf.) C. Presl | TR/EP | ESA | LC | FFM 601, 611, 664, 977, 1037 |
| <i>Campyloneurum rigidum</i> J. Sm. | EP | ESS | LC | FFM 846, 981 |
| <i>Cochlidium punctatum</i> (Raddi) L.E. Bishop | EP | ESS | LC | FFM 1028 |
| <i>Cochlidium serrulatum</i> (Sw.) L.E. Bishop | EP | PAN | LC | FFM 1057, 1144 |
| <i>Leucotrichum schenckii</i> (Hieron.) Labiak | EP | ESS | LC | FFM 1123 |
| <i>Microgramma geminata</i> (Schrad.) R.M. Tryon & A.F. Tryon | EP | EBR | LC | FFM 1066 |
| <i>Microgramma percussa</i> (Cav.) de la Sota | EP | NEO | LC | FFM 606, 641, 642 |
| <i>Microgramma squamulosa</i> (Kaulf.) de la Sota | EP | ESA | LC | FFM 697 |
| <i>Microgramma tecta</i> (Kaulf.) Alston | EP | NEO | LC | FFM 608, 888, 1078 |
| <i>Microgramma vacciniifolia</i> (Langsd. & Fisch.) Copel. | EP | NEO | LC | FFM 1172 |
| <i>Moranopteris achilleifolia</i> (Kaulf.) R.Y. Hirai & J. Prado | EP/LT | EBR | LC | PUI 2345 |
| <i>Niphidium crassifolium</i> (L.) Lellinger | EP | NEO | LC | FFM 662 |
| <i>Pecluma chnoophora</i> (Kunze) Salino & Costa Assis | TR/EP | ESA | LC | FFM 585, 828, 1058 |
| <i>Pecluma pectinatiformis</i> (Lindm.) M.G. Price | EP | ESA | LC | FFM 953, 1083 |
| <i>Pecluma recurvata</i> (Kaulf.) M.G. Price | TR/EP | EBR | LC | FFM 621, 918 |
| <i>Pecluma robusta</i> (Fée) M. Kessler & A.R. Sm. | TR | ESA | LC | FFM 830, 1040, 1170 |
| <i>Pecluma truncorum</i> (Lindm.) M.G. Price | EP | EBR | LC | FFM 607, 917 |
| <i>Pleopeltis astrolepis</i> (Liebm.) E. Fourn. | EP | NEO | LC | FFM 574, 887, 1013 |
| <i>Pleopeltis furcata</i> (L.) J. Sm. | EP | ESS | LC | FFM 841, 849 |
| <i>Pleopeltis hirsutissima</i> (Raddi) de la Sota | EP | ESA | LC | FFM 567, 600, 640 |
| <i>Pleopeltis macrocarpa</i> (Bory ex. Willd.) Kaulf. | EP | NEO | LC | FFM 1006, 1031 |
| <i>Pleopeltis pleopeltidis</i> (Fée) de la Sota | EP | ESS | LC | FFM 1019, 1088 |
| <i>Pleopeltis pleopeltifolia</i> (Raddi) Alston | EP | ESA | LC | FFM 646, 989, 1032 |
| <i>Serpocaulon catharinae</i> (Langsd. & Fisch.) A.R. Sm. | LT/EP | EBR | LC | FFM 652, 814, 1084 |
| <i>Serpocaulon fraxinifolium</i> (Jacq.) A.R. Sm. | EP | NEO | LC | FFM 912, 1024, 1136 |
| <i>Serpocaulon latipes</i> (Langsd. & Fisch.) A.R. Sm. | EP/TR | EBR | LC | FFM 1114, 1155 |
| <i>Serpocaulon meniscifolium</i> (Langsd. & Fisch.) A.R. Sm. | LT | EBR | LC | FFM 1154 |
| Psilotaceae | | | | |
| <i>Psilotum nudum</i> (L.) P. Beauv. | EP | PAN | LC | SAR s.n. |
| Pteridaceae | | | | |
| <i>Adiantum abscissum</i> Schrad. | TR | EBR | LC | FFM 871 |
| <i>Adiantum curvatum</i> Kaulf. | LT | EBR | LC | FFM 826, 952, 978, 1073 |
| <i>Adiantum lorentzii</i> Hieron. | TR | ESA | LC | FFM 615, 616, 1036 |
| <i>Adiantum macrophyllum</i> Sw. | TR | NEO | LC | FFM 867 |
| <i>Adiantum mathewsianum</i> Hook. | LT | ESA | LC | FFM 825 |
| <i>Adiantum obliquum</i> Willd. | TR | NEO | LC | FFM 874 |
| <i>Adiantum pentadactylon</i> Langsd. & Fisch. | TR | ESS | LC | FFM 894, 1069 |

Continued

Table 1. Continued.

| Taxa | Life form | Geographical distribution | Conservation status | Voucher |
|--|-----------|---------------------------|---------------------|------------------------------------|
| <i>Adiantum raddianum</i> C. Presl | TR | NEO | LC | FFM 706, 1165 |
| <i>Adiantum terminatum</i> Kunze ex Miq. | TR | NEO | LC | FFM 829, 873, 1060 |
| <i>Doryopteris concolor</i> (Langsd. & Fisch.) Kuhn | TR | PAN | LC | PUI s.n. |
| <i>Doryopteris majestosa</i> Yesilyurt | TR | ESA | LC | FFM 1153 |
| <i>Doryopteris nobilis</i> (T. Moore) C. Chr. | TR/LT | EBR | LC | FFM 629 |
| <i>Doryopteris pentagona</i> Pic.Serm. | TR | ESA | LC | FFM 700, 941, 980 |
| <i>Doryopteris sagittifolia</i> (Raddi) J. Sm. | TR | ESA | LC | FFM 902 |
| <i>Pityrogramma calomelanos</i> (L.) Link | TR | NEO | LC | FFM 619 |
| <i>Pityrogramma trifoliata</i> (L.) R.M. Tryon | TR | NEO | LC | FFM 699 |
| <i>Polytaenium lineatum</i> (Sw.) J. Sm. | EP | NEO | LC | FFM 1130 |
| <i>Pteris altissima</i> Poir. | TR | NEO | LC | FFM 671, 1167 |
| <i>Pteris angustata</i> (Fée) C.V. Morton | TR | EBR | LC | FFM 1089 |
| <i>Pteris decurrens</i> C. Presl | TR | ESA | LC | FFM 945, 1090 |
| <i>Pteris deflexa</i> Link | TR | NEO | LC | FFM 880, 976, 1045 |
| <i>Pteris lechleri</i> Mett. | TR | ESA | LC | FFM 1115 |
| <i>Pteris plumula</i> Desv. | TR | NEO | LC | FFM 623 |
| <i>Pteris schwackeana</i> Christ | TR | EBR | LC | FFM 861 |
| <i>Pteris splendens</i> Kaulf. | TR | ESA | LC | FFM 1098 |
| <i>Pteris vittata</i> L. | TR | PAN | LC | FFM 698 |
| <i>Radiovittaria stipitata</i> (Kunze) E.H. Crane | EP | NEO | LC | FFM 590, 837, 899, 965, 1151 |
| <i>Vittaria graminifolia</i> Kaulf. | EP | NEO | LC | FFM 938, 1137 |
| <i>Vittaria lineata</i> (L.) Sm. | EP | NEO | LC | FFM 638, 832 |
| Saccolomataceae | | | | |
| <i>Saccoloma brasiliense</i> (C. Presl) Mett. | TR | ESS | LC | FFM 1135 |
| <i>Saccoloma elegans</i> Kaulf. | TR | NEO | LC | FFM 811, 926 |
| Schizaeaceae | | | | |
| <i>Schizaea elegans</i> (Vahl) Sw. | TR | NEO | LC | FFM 961 |
| Selaginellaceae | | | | |
| <i>Selaginella flexuosa</i> Spring | TR | NEO | LC | FFM 839, 877, 889, 929, 1014, 1071 |
| <i>Selaginella macrostachya</i> (Spring) Spring | TR | EBR | LC | FFM 890, 906, 907, 1072 |
| <i>Selaginella muscosa</i> Spring | TR | ESA | LC | FFM 875, 892, 910 |
| <i>Selaginella sulcata</i> (Desv. ex Poir.) Spring ex Mart. | TR | ESA | LC | FFM 824, 903, 1015, 1085 |
| Tectariaceae | | | | |
| <i>Tectaria incisa</i> Cav. | TR | NEO | LC | FFM 931 |
| <i>Tectaria pilosa</i> (Fée) R.C. Moran | TR | EBR | LC | FFM 1143 |
| Thelypteridaceae | | | | |
| <i>Macrothelypteris torresiana</i> (Gaudich.) Ching | TR | PAN | LC | FFM 569 |
| <i>Thelypteris amambayensis</i> (Christ) Ponce | TR | ESS | LC | FFM 614, 632, 633, 677, 998 |
| <i>Thelypteris araucariensis</i> Ponce | TR | ESS | VU | FFM 1009, 1018 |
| <i>Thelypteris cheilantoides</i> (Kunze) Proctor | TR | NEO | LC | FFM 680, 997, 1162 |
| <i>Thelypteris concinna</i> (Willd.) Ching | TR | NEO | VU | FFM 1011 |
| <i>Thelypteris conspersa</i> (Schrad.) A.R. Sm. | TR | NEO | LC | FFM 1001 |
| <i>Thelypteris decussata</i> var. <i>brasiliensis</i> (C. Chr.) A.R. Sm. | TR | ESA | LC | FFM 1010 |
| <i>Thelypteris dentata</i> (Forssk.) E.P. St. John | TR | PAN | LC | FFM 630, 834, 995, 1017 |
| <i>Thelypteris hatschbachii</i> A.R. Sm. | TR | ESS | VU | TOR 156 |
| <i>Thelypteris hispidula</i> (Decne.) C.F. Reed | LT | PAN | LC | FFM 834 |
| <i>Thelypteris interrupta</i> (Willd.) K. Iwats. | TR | PAN | LC | FFM 1062 |
| <i>Thelypteris ireneae</i> (Brade) Lellinger | TR | ESS | LC | FFM 1124 |
| <i>Thelypteris lugubris</i> (Mett.) R.M. Tryon & A.F. Tryon | TR | EBR | LC | FFM 954, 1146 |
| <i>Thelypteris maxoniana</i> A.R. Sm. | TR | ESA | LC | FFM 675, 831, 862 |
| <i>Thelypteris oligocarpa</i> (Humb. & Bonpl. ex Willd.) Ching | TR | NEO | LC | FFM 1016, 1082 |
| <i>Thelypteris opposita</i> (Vahl) Ching | TR | NEO | LC | FFM 620, 681 |
| <i>Thelypteris pachyrhachis</i> (Mett.) Ching | TR | NEO | LC | FFM 683, 817 |
| <i>Thelypteris patens</i> (Sw.) Small | TR | NEO | LC | FFM 678, 679, 1002 |
| <i>Thelypteris raddii</i> (Rosenst.) Ponce | TR | ESS | LC | FFM 681, 682, 818, 848, 872 |
| <i>Thelypteris regnelliana</i> (C. Chr.) Ponce | TR | ESS | LC | FFM 1122 |
| <i>Thelypteris rivularioides</i> (Fée) Abbiatti | TR | ESA | LC | FFM 1008, 1122 |
| <i>Thelypteris saxicola</i> (Sw.) C.F. Reed | LT | EBR | LC | FFM 853, 869, 1012 |
| <i>Thelypteris scabra</i> (C. Presl) Lellinger | TR | ESA | LC | FFM 556, 558, 570, 593 |
| <i>Thelypteris serrata</i> (Cav.) Alston | TR | NEO | LC | FFM 863, 1003, 1005 |
| <i>Thelypteris vivipara</i> (Raddi) C.F. Reed | TR | ESS | LC | FFM 928, 958, 868, 1064 |