

ABSTRACT

Quantifying the Structural Relationship of Leaf Mass and Petiole Width of Extant Ferns: Developing a Proxy for Fossil Applications

Casee R. Lemons, M.S.

Mentor: Daniel J. Peppe, Ph.D.

This study developed a biomechanical model of leaf trait relationships in fern leaves. A common plant relationship is positive covariance between petiole width (PW) and leaf mass (LM). When LM and PW are area-normalized, petiole width measurements can predict leaf mass per area (LMA). The leaf economics spectrum shows that LMA covaries with other key plant traits, including leaf life span, photosynthetic rates, and palatability to herbivores. These correlations make LMA predictions a powerful tool in paleoreconstruction.

Two hypotheses formed the basis of this study: (1) all levels of fern leaf hierarchy will hold the same allometric leaf trait relationships, and (2) previously established biomechanical plant models can be used as a paleoecological proxy for ferns. Results show that allometric relationships are not consistent within all levels of fern hierarchy, and a distinctly different model is needed to be used as a paleoecological proxy for ferns.

Quantifying the Structural Relationship of Leaf Mass and Petiole Width of Extant Ferns:
Developing a Proxy for Fossil Applications

by

Casee R. Lemons, B.S.

A Thesis

Approved by the Department of Geology

Steven G. Driese, Ph.D., Chairperson

Submitted to the Graduate Faculty of
Baylor University in Partial Fulfillment of the
Requirements for the Degree
of
Master of Science

Approved by the Thesis Committee

Steven G. Driese, Ph.D., Chairperson

Daniel J. Peppe, Ph.D.

Joseph D. White, Ph.D.

William C. Hockaday, Ph.D.

Walter C. Holmes, Ph.D.

Accepted by the Graduate School
May 2012

J. Larry Lyon, Ph.D., Dean

Copyright © 2012 by Casee R. Lemons

All rights reserved

TABLE OF CONTENTS

LIST OF FIGURES	vi
LIST OF TABLES	viii
LIST OF ABBREVIATIONS	viii
GLOSSARY	ix
ACKNOWLEDGMENTS	xi
DEDICATION	xiii
CHAPTER 1. INTRODUCTION	1
CHAPTER 2. MATERIALS AND METHODS	7
STATISTICAL ANALYSIS OF MODEL RESULTS	8
CHAPTER 3. RESULTS	13
IDENTIFYING THE BEST BIOMECHANICAL MODEL	13
THE APPLICATION OF MODEL 4 TO FERNS	14
CHAPTER 4. DISCUSSION	22
CHAPTER 5. SUMMARY AND FUTURE DIRECTIONS	28
APPENDICES	31
APPENDIX A. PHYLOGENETICS OF SAMPLED FERNS	32
APPENDIX B. GEOGRAPHIC ORIGINS OF SAMPLED FERNS	47
APPENDIX C. GROWTH FORMS AND MECHANICAL LEAF STRUCTURES OF SAMPLED FERNS	60
APPENDIX D. FERN DATA MEASUREMENTS	72
APPENDIX E. FERN DATA CALCULATIONS FOR CANTILEVER BEAM MODEL	84

APPENDIX F. FERN DATA CALCULATIONS FOR ORIGINAL MODEL PROPOSED BY ROYER ET AL. (2007)	89
BIBLIOGRAPHY	92

LIST OF FIGURES

1. Global geographic distribution of fern species. Each species is indicated by an open circle.	9
2. Phylogenetic distribution of calibration fern species, modified from Smith et al. (2006).	11
3. Bootstrapping all models for fern fronds (table 2).	17
4. Ferns grouped with original biomechanical model proposed by Royer et al. (2007) for herbaceous dicots, woody dicots, and broad-leaved gymnosperms.	18
5. Biomechanical models of leaves as cantilever beams.	19
6. Three of the five different growth form models of extant ferns	20
7. Selected phylogenetic orders fit to Model 4	21

LIST OF TABLES

1. Leaf economic traits of ferns are classified by growth habit and mechanical leaf form	10
2. Leaf trait measurements from hierarchal levels of fern pinnae applied to four biomechanical models	15
3. Leaf trait measurements of whole fronds are applied to four biomechanical models	15
4. Leaf trait measurements of whole fronds applied to Model D and stratified by mechanical leaf form.	16
5. Leaf trait measurements of whole fronds, applied to Model D and stratified by growth habit. Type V rheophytes (n=1) are not shown.	16
6. Leaf trait measurements of whole fronds, applied to Model D and stratified by phylogeny.	16
7. Table A.1. Phylogenetics of sampled ferns.	32
8. Table B.1. Geographic origins of sampled ferns	47
9. Table C.1. Growth forms and mechanical structures of sampled ferns	60
10. Table D.1. Fern data measurements	72
11. Table E. 1. Fern data calculations for cantilever beam model	84
12. Table F.1. Fern data calculations for original model proposed by Royer et al. (2007)	89

LIST OF ABBREVIATIONS

AQ	Queensland Herbarium
BAYLU	Baylor University Herbarium
LA	Leaf area
LL	Leaf lifespan
LM	Leaf mass
LMA	Leaf mass per dry area
PW	Petiole width
US	United States Herbarium
WAIK	University of Waikato Herbarium
WELT	Te Papa Herbarium

GLOSSARY

angiosperm. Flowering plant.

cantilever beam model. A biomechanical model proposed by Niklas (1999) which describes a plant leaf as functioning as a tapered, untapered, or evenly distributed cantilever beam.

dicotyledon (dicot). An flowering plant which grows two embryonic leaves (cotyledons) from its seed.

epiphytic. Growth habit characterized by one plant non-parasitically growing upon another plant, while gaining nutrients from the air and rain. A plant with this type of growth habit is called an *epiphyte*.

epipetric. Growth habit characterized by rooting upon rock substrates. A plant with this type of growth habit is called a *lithophyte*.

fern. Spore-bearing plant characterized by lateral root origin in the endodermis, usually mesarch protoxylem in shoots, and pseudoendospore, plasmoidal tapetum, and sperm cells with 30-1000 flagellae (Renzaglia et al., 200; Schnedier et al., 2002, Smith et al., 2006).

frond. Fern leaf.

gymnosperm. Plant which reproduces by cones and bracts.

herbaceous. Having little to no woody tissue and typically persisting no more than one growing season.

leaf. Portion of the plant composed of the petiole and leaf blade.

leaf area. The sum of the petiole area plus the area of the leaf blade, in two dimensions. This is approximately equal to one-half of the total surface area of the three dimensional leaf.

leaf blade. The photosynthetic portion of a leaf.

leaf economics spectrum. A series of intercorrelated leaf traits that are easily measurable within a leaf. The leaf economics spectrum represents a continual range of plant resource acquisition and nutrient retention.

monocotyledon (monocot). A flowering plant which grows one embryonic leaf (cotyledon) from its seed.

petiole. The portion of a leaf which provides mechanical and hydraulic support to the leaf blade. Mechanically, the petiole allows the leaf blade to extend upwards and outwards for photosynthesis. Hydraulically, the petiole transports water and nutrients from the root system to the leaf blade.

petiole width. The measurement taken of a petiole perpendicular to the linear axis of the petiole, at the basalmost point of attachment of leaf blade to petiole.

pinna. The primary leaf blade of a frond (plural: *pinnae*).

pinnule. The non-primary leaf blade of a frond.

prostrate. Growth habit characterized by leaves laying stretched out upon the ground and extending outwards.

rachis. The midrib of a compound leaf or frond.

rheophytic – Growth habit characterized by an aquatic environment, in which the plant lives in swift-flowing stream currents where few other organisms can survive. A plant with this type of growth habit is called a *rheophyte*.

rhizome. A continuously growing underground stem that extends adventitious roots and lateral shoots.

scandent. Growth habit characterized by climbing leaves.

tapered cantilever beam model. Biomechanical model of pinnately compound plant leaves in which the rachis is anchored at the base by the petiole and supports a series of leaf masses (Niklas, 1999).

terrestrial. Growth habit characterized by rooting under the soil surface and leaves extending vertically upwards. This is the most common type of fern growth habit.

tree fern. A (generally) large fern with a wood-like stem bearing several large palm-like fronds, occurring mainly in tropical climates. “Tree fern” is both the name of the plant type and its growth habit.

untapered cantilever beam model. Biomechanical model of simple and palmately compound leaves in which the petiole is anchored at end to the roots/rhizomes and supports a laminar mass at the other end (Niklas, 1999).

woody. A plant whose stem contains both primary and secondary xylem

ACKNOWLEDGMENTS

Support for this work was provided by several organizations. The author would like to formally acknowledge the support provided by:

1. *National Science Foundation*. This material is based upon work supported by the National Science Foundation under the East Asia and Pacific Summer Institute 2011. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.
2. *Australian Academy of Science*. This material is based upon work supported by the Australian Academy of Science. The Australian Academy of Science supports the collaboration of science between Australia and the United States of America. The Australian Academy of Science provided housing funds and collaboration with a research host in Australia.
3. *Australian Government Department of Innovation, Industry, Science and Research*. This material is based upon work supported by the Australian Government, in an effort to foster scientific research within Australia.
4. *Smithsonian Minority Awards Program*. This material is based upon work supported by the Smithsonian Minority Awards Program, through the Smithsonian Office of Fellowships and Internships. This program provided a research fellowship at the Smithsonian Institution Museum of Natural History, Department of Paleobiology.

5. *Baylor University Herbarium*. This material is based upon data collected from the Baylor University Herbarium, located in Waco, Texas, United States of America. Biological fern materials were provided for photographing, massing, and incising. All fern materials which were removed from protective backing were repaired.
6. *Queensland Herbarium (Department of Environment and Resource Management)*. This material is based upon data collected from the Queensland Herbarium, located in Brisbane, Queensland, Australia. Biological fern materials were provided for photographing, massing, and incising. All fern materials which were removed from protective backing were repaired.
7. *The Royal Botanic Gardens and Domain Trust (Office of Environment and Heritage, New South Wales Government)*. This material is based upon data collected from the Royal Botanic Gardens and Domain Trust, located in Sydney, New South Wales, Australia. Live plant materials were provided for data measurement.
8. *Te Papa Herbarium (Museum of New Zealand, Te Papa Tongarewa)*. This material is based upon data collected from the Te Papa Herbarium, located in Wellington, New Zealand. Biological fern materials were provided for photographing, massing, and incising. All fern materials which were removed from protective backing were repaired.
9. *United States National Herbarium*. This material is based upon data collected from the United States National Herbarium, housed at the Smithsonian Institution National Museum of Natural History, Department of Botany in Washington, District of Columbia, United States of America. Biological fern materials were

provided for photographing, massing, and incising. All fern materials which were removed from protective backing were repaired.

10. *University of Waikato Herbarium*. This material is based upon data collected from the University of Waikato Herbarium, located in Hamilton, New Zealand. Biological fern materials were provided for photographing, massing, and incising. All fern materials which were removed from protective backing were repaired.
11. *Dr. Daniel J. Peppe, Dr. Scott L. Wing, Dr. Ian J. Wright, Dr. Dana L. Royer, and Dr. Christopher H. Lusk*. Each scientific researcher actively collaborated upon this research study.

DEDICATION

To my parents, Fred and Patti Lemons

CHAPTER ONE

Introduction

A valuable tool for assessing the biotic and abiotic aspects of plant forms is the recognition of factors which control plant growth and function. One method of understanding the ecological strategies employed by plants is by analysis of leaf traits. Leaves share common characteristics regarding leaf form and function between plant groups that are related to the ecological strategies they employ (Reich et al. 1999; Wright et al. 2004, 2005). Leaf traits that reflect tradeoffs essential to plant survival are known as the leaf economics spectrum, on which plants fall along a resource use spectrum from “fast-return” to “slow-return” (Reich et al. 1997; Westoby et al. 2002; Diaz et al., 2004; Wright et al. 2004, 2005; Royer et al. 2007, 2010). Fast-return species typically exhibit a short leaf lifespan (<12 months), high carbon uptake rate, high photosynthetic and respiration rates, low leaf dry mass per area (LMA), high concentrations by mass of nitrogen and phosphorus, high palatability to herbivores, and fast growth rates (Reich et al. 1997; Westoby et al. 2002; Diaz et al., 2004; Wright et al. 2004, 2005; Royer et al. 2007, 2010). Conversely, plants at the “slow-return” end of the spectrum exhibit the opposite suite of traits. Slow-return species exhibit a long leaf lifespan (>12 months), low carbon uptake rate, low photosynthetic and respiration rates, high LMA, low concentrations by mass of nitrogen and phosphorus, low palatability to herbivores, and slow growth rates (Reich et al. 1997; Westoby et al. 2002; Diaz et al. 2004; Wright et al. 2004, 2005; Royer et al. 2007, 2010). The interrelationships among these leaf traits are

considered global and conserved across plant groups because they have been found to be independent of phylogeny in seed plants (Ackerly and Reich 1999).

Initial work on the leaf economic spectrum was primarily focused on seed plants (e.g. Wright et al. 2004). However, work that is more recent demonstrates that ferns also follow expected relationships along the leaf economics spectrum (Karst and Lechowicz 2007). Temperate deciduous ferns exhibited lower LMA, lower maximum photosynthetic rate, and lower foliar nitrogen than most seed plants (Karst and Lechowicz 2007). These observed trends amongst ferns were qualitatively but not quantitatively consistent with seed plants (e.g. Wright et al. 2004).

Royer et al. (2007, 2010) researched woody and herbaceous dicotyledonous angiosperms (dicots) and gymnosperms and found that petiole width is strongly correlated to LMA. Because LMA is a correlative trait in the leaf economics spectrum, the relationship between petiole width and LMA was used to develop a proxy for leaf life span that can be applied to fossil leaves (Royer et al. 2007, 2010). By first calibrating the relationship between petiole width and LMA, petiole width measurements were taken fossils and then used to estimate original LMA and its associated leaf economics traits (Royer et al. 2007, 2010).

The relationship between petiole width and LMA is best explained by the biomechanical structure and support structures of a typical plant leaf (e.g. Niklas 1999). Leaves must withstand pressures of their own weight, wind, and water. Thus, a leaf's support structure, its petiole, must be able to bend and twist without breaking. Petioles in a high wind (fluid) environment are typically less stiff than petioles in a calmer environment to allow for flexible bending without breakage. The morphological form of

a leaf is relatively flexible, allowing a plant to adapt to environmental conditions, such as physical stress, that are placed upon its leaves (Niklas 1996, 1999; Read and Stokes 1996; Royer et al. 2009a, 2009b; Anten 2010). For example, the stress a leaf endures is highest at the leaf surface, petiole surface, and leaf central edges (centroid axes). Thus, leaves add hydrostatic tissues (i.e., parenchyma and collenchyma) that fill with water to maintain rigidity. Alternatively, leaves can add dead, stiff tissues (i.e., sclerenchyma) that use overthickened cell walls for support within their petiole to support leaf laminar tissue (Niklas 1999, Brodribb et al. 2005, Pitterman et al. 2011). Consequently, the geometry, stiffness, length, and transverse shape of the petiole all work together to support the leaf and deflect wind resistance and will adapt to changes in environmental conditions. In this example, in response to constant wind stress, petioles will become shorter, wider, and less stiff, and vice versa for lack of stress (e.g. Niklas 1999).

Because petioles provide support for leaves, they can be modeled as biomechanical structures. Petioles can be modeled as a cantilever beam (Niklas 1992, 1999, Niinemets and Fleck 2002), as a vertical pole, or as the 8/3 model (Royer et al. 2007). When modeled as a cantilever beam, plants' leaves and petioles fall into one of three structural mechanical forms: (1) an untapered cantilever beam (petiole) supports a single laminar mass (simple and palmately compound leaves) at one end and is anchored (to rhizomes) at the other end; (2) a tapered cantilever beam (petiole) supports a hierarchal series of masses (pinnately compound leaves) and is anchored by rhizomes; and (3) a cantilever beam with a roughly uniform distribution load along its length (grass and pine leaves) (Niklas 1992, 1999). The cantilever beam can be modeled as petiole width increasing and cross-sectional area remaining constant as the plant grows (petiole width/leaf area) or as

the petiole scaling in width and area scaling with flexural rigidity (petiole width⁴/leaf area). In the vertical pole model, the cross-sectional area of the petiole increases as the plant grows, such as a leaf on a tree limb. The 8/3 model conceptualizes the cross-sectional area and petiole length increasing with plant growth, with elasticity co-optimization like animal legs (Royer et al. 2007).

When the relationships between petiole width and LMA (and in turn the leaf economics spectrum) are modeled with the appropriate biomechanical model, inferences about ecophysiological traits of any member of the plant group can be made, independent of phylogeny. This provides a strong tool in analyses of less accessible plants or environments.

The growth relationships between leaves and petioles have shown to be allometric and quantifiable within some plant groups (West et al. 1997, Enquist 2002, Niinemets et al. 2007, Arcand et al. 2008, Creese et al. 2011, Pitterman et al. 2011). In general, there is geometric scaling of leaves with plant size. Biomass investment lies in the lamina, midrib, or petiole, and the allocation of biomass investment is determined by mechanical form, function, and plant type (Niinemets et al. 2007). Larger leaves are generally associated with larger petioles (Niinemets et al. 2007), to transport maximum nutrients to the large biomass, and vice versa. Leaves in drier habits tend to have shorter petioles and fewer pinnae, for the most efficient distribution of plant resources. Through this association of nutrient transport, resource allocation, and optimal efficiency, a quantifiable relationship is expected between petiole width and leaf mass in ferns that model the function petiole play in fern vascular systems.

Photosynthetic rate, foliar nitrogen, and LMA are positively correlated in ferns and in seed plants (Wright et al. 2004, Karst and Lechowicz 2007). From a morphological perspective, a study of Hawaiian ferns confirms that geometric scaling relationships exist between frond organs and plant size. Specifically, fern petiole (stipe) diameters scale consistently with the whole leaf, leaf blade, pinnae lengths, and ultimate pinna width (Creese et al. 2011).

Fluid flow studies within ferns have recently come into light. Ferns have a vascular system, transporting water and mineral salts through tracheids. Watkins et al. (2010) showed a positive correlation between tracheid diameter and hydraulic conductivity in terrestrial ferns, but not epiphytic ferns. Epiphytic ferns actually showed the lowest leaf hydraulic conductivity and high sensitivity to cavitation (Watkins et al. 2010), in addition to being smaller than terrestrial ferns (Creese et al. 2011). Therefore epiphytes have shorter petiole lengths and reduced area relative to upland and mesic terrestrial ferns (Watkins et al. 2010).

Ferns are one of the most cosmopolitan, morphologically diverse, and evolutionarily ancient plant groups. A model of their leaf trait relationships would be valuable for a variety of modern and paleobiological applications. The assessment of ferns begins in the leaf economics spectrum. Because Karst and Lechowicz (2007) researched only temperate understory ferns, a more global study is needed to assess their determination that ferns have a generally lower LMA than angiosperms. To determine where ferns lie in the leaf economics spectrum, fern leaf traits must be quantitatively assessed. In this project, leaf mass, petiole width, and leaf area were measured in a variety of geographic locations and phylogenies. Data were subdivided into mechanical

structure, growth form, and phylogeny to identify the determinant factors for leaf trait relationships between petiole width and leaf area. Leaf mass and petiole width were area-normalized and fitted with a variety of mechanical models proposed by Niklas (1999) and Royer (2007). Niklas' (1999) biomechanical end-loaded cantilever beam model was most descriptive. This model includes only mechanical variables. Additional studies should be performed in the future to include hydraulic variables because ferns are vascular plants without true wood, making it essential that hydraulic conductivity within their tracheid system is included for a complete fern model. With future studies performed more extensively upon older fern lineages, this model of modern leaf traits could be developed to apply with higher confidence levels to fossilized leaves of varying ages.

CHAPTER TWO

Materials and Methods

This study used the traditional definition for ferns (Renzaglia et al., 2000; Schneider et al., 2002, Smith et al., 2006). One hundred seventy-four species from globally distributed sites were weighed and photographed (figure 1). Petiole width and leaf area (blade + petiole/petiolule) were measured digitally using ImageJ (<http://rsbweb.nih.gov/ij/>) following protocols described in Royer et al. (2007).

Undamaged, average-size mature fronds with an intact petiole/rachis attached to the pinna were preferentially chosen for measurement. Sporophyte fronds and pinnae (primary, secondary, and tertiary) were measured. Two fronds, or pinnae, per species were typically processed. For pinnae measurements, at least two pinnae or pinnules from each fern specimen were detached from the frond at the rachis and measured. Fern specimens used in this study came from herbaria (Baylor University Herbarium, Queensland Herbarium, Te Papa Herbarium, United States National Herbarium, and University of Waikato Herbarium) and from fresh specimens collected in central Texas.

Specimens used in this study were first divided into fronds and pinnae. Fronds were further subdivided based on: (1) growth form, (2) mechanical leaf structure, and (3) phylogeny (table 1, figure 2). Some fern species included more than one category of growth form due to natural variations in their growth forms. Phylogeny was based upon the classification scheme by Smith et al. (2006) (figure 2).

The observed relationships between LMA and (area-normalized) petiole width for fronds and pinnae were fit with four biomechanical models (Niklas 1999, Royer et al.

2007) (table 2). Models 1 and 4 assume that leaves act as end-loaded cantilever beams (Niklas 1999) and models 2 and 3 describe specific scaling relationships between petiole width and LMA (Royer et al. 2007).

Model 1 assumes that petiole width is proportional to petiole length, but petiole width is independent of petiole length. In this model, petiole shape remains constant and the leaf mass is proportional to flexural rigidity of the petiole (Niklas 1999). Model 4 was developed under the same principle, except that petiole length scales with flexural rigidity for angiosperm species and using predictive equations (Niklas 1999). Because complete petioles are often missing in herbarium specimens and are rarely found in fossilized specimens, Royer et al. (2007) adapted models 1 and 4 to allow for a lack of petiole length measures and instead incorporate petiole width. Model 2 represents a scaling relationship in which the cross-sectional area of the petiole is proportional to leaf mass, which models a leaf as having a vertical petiole supporting a singular laminar mass (Royer et al. 2007). Model 3 assumes that petiole length and petiole width are co-optimized to support the laminar mass and that they elastically vary, similar to animal legs (Royer et al. 2007).

Statistical Analysis of Model Results

Correlations between LMA and petiole width for fronds and pinnae were tested using each biomechanical model with single linear regression (PASW Statistic 18, SPSS Inc., Hong Kong) using the ordinary least squares regression module in the program SMATR (<http://bio.mq.edu.au/ecology/SMATR/support.html>, Warton et al. 2006) to test for slope and intercept differences between regression lines. SMATR is a statistical analysis program similar to ANCOVA but without a common error variance and with a

different test statistic (Warton et al. 2006). Bootstrapping of frond data was used to compare the four biomechanical models (figure 3). Bootstrapping compares the model's predicted y-value with the plant's actual measured y-value. A perfect model would exhibit a 1:1 ratio of actual to predicted values. Models closest to the 1:1 ratio (exhibited graphically as a $y=x$ line) are considered better than models farther from a 1:1 ratio, and a perfectly unfit model would display graphically as a horizontal line (figure 3).



Figure 1. Global geographic distribution of fern species. Each species is indicated by an open circle.

Table 1. Fern leaf economic traits are classified by growth forms and by mechanical leaf form

Classification scheme	Type	Number of measured fern species classifiable to the type	Description	Example
Mechanical leaf structure	A	40	The petiole acts as an untapered cantilever beam, anchored at one end by rhizomes and supporting a leaf mass at the other end	Simple, palmately compound, dichotomously branched
	B	51	The rachis acts as a tapered cantilever beam, anchored at one end by the petiole and supporting a series of masses at the other end	Pinnately compound
Growth form	I	30	Leaves extend aerially outwards and downwards	Epiphytic, epipetric, pendent
	II	2	Leaves climb outwards and outwards, not supporting themselves but using other surfaces for support	Climber, scrambler
	III	58	Erect leaves extend upwards	Terrestrial
	IV	4	Tree-like petioles support large branch-like leaves	Tree ferns
	V	1	Leaves extend out of deep, swift-flowing stream currents	Rheophytic

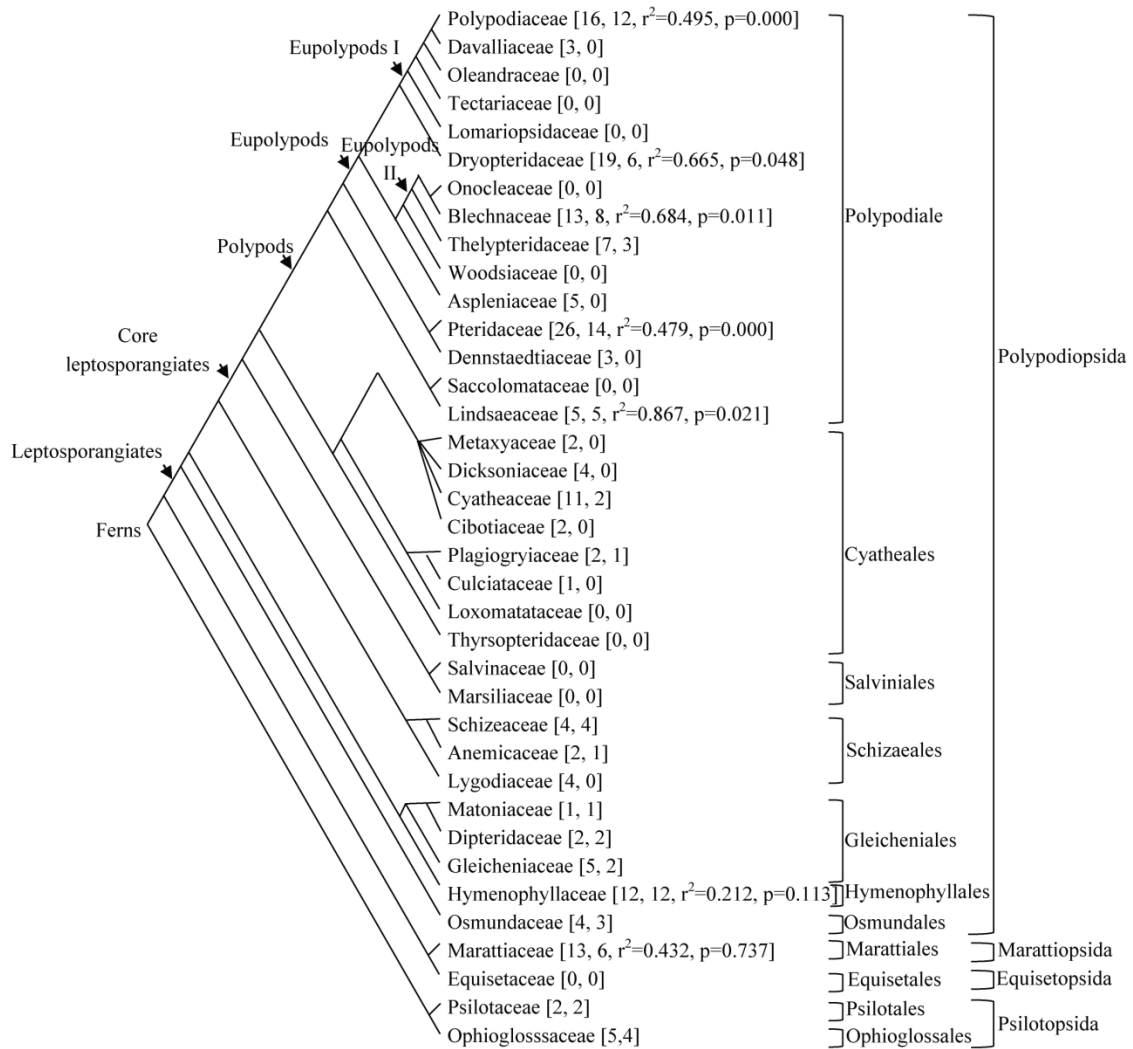


Figure 2. Phylogenetic distribution of calibration fern species, modified from Smith et al. (2006). The first number in the brackets is the total number of species within the fern family that was measured for calibration data. The second number in brackets is the number of species with frond measurements, used for final calibration. The correlation coefficient represents fit to Model 4, the end-loaded cantilever beam. The p-value represents significance of the regression line for Model 4.

CHAPTER THREE

Results

Identifying the Best Biomechanical Model

The relationship between petiole width and leaf mass for whole fronds and primary, secondary, and tertiary pinnae were fit to the four proposed biomechanical models (table 2). In general, the scaling relationships between petiole width and leaf mass were different for fronds and all levels of pinnae (table 2), except for in Model 3, when the slope of the regression lines of primary pinnae and fronds were not significantly different ($p=0.027$) and Model 4 when the slopes of the regression lines between primary pinnae and fronds ($p=0.029$) and secondary pinnae and fronds ($p=0.033$) were not significantly different. Interestingly, all of the biomechanical models fit the relationship secondary pinnae reasonably well (table 2). The relationship in tertiary pinnae was never significant (table 2). Although significant, the correlation for primary pinnae was weaker than that of fronds or secondary pinnae.

Due to consistently higher correlation within fronds and the leaf relationships being statistically different, fronds were chosen to be applied to the models separately (table 3). Regression lines are statistically distinct between Model 1 and Model 2 ($p=0.006$), Model 1 and Model 3 ($p=0.001$), Model 1 and Model 4 ($p=0.001$). Regression lines are not statistically distinct between Model 2 and Model 3 ($p=0.300$), Model 2 and Model 4 ($p=0.916$), and Model 3 and Model 4 ($p=0.188$). Bootstrapping shows that Model 4 does the best job predicting LMA in leaves, though the model itself is not statistically distinct from Model 2 or Model 3 using deleted residuals (figure 3).

Bootstrapping analyses confirm that Model 4 was the best choice of these models to apply to fern fronds.

The Application of Model 4 to Ferns

Leaf and petiole structures were analyzed for significance (table 4). Regression lines are not statistically distinct between Mechanical Structure A and Mechanical Structure B ($p=0.992$) for Model 4. Slopes are also not statistically distinct when between the segregated morphological leaf forms (Mechanical Structures A and B) versus the averages of species graphed with no distinction in morphological leaf structure ($p=0.954$).

Growth forms were analyzed for correlation and significance using Model 4 (table 5). Regression lines are not statistically distinct between Growth Forms I and II ($p=0.117$), Growth Forms I and III ($p=0.12$), and Growth Forms II and III ($p=0.487$). Type IV (tree fern) plants were not compared because only four species were measured with their entire petiole. Type V (rheophytic) plants were not compared because only one species was measured.

Phylogenetic groups were analyzed by least squares regression using Model 4. Only groups with 5 or more species were analyzed except for Cyatheaales ($n=4$) because Cyatheaales represents the tree fern growth form (Type IV) Hymenophyllales and Polypodiales were found to be somewhat indistinct ($p=0.126$), and regression lines are distinct between classes Polypodiopsida and Psilotopsida ($p=0.002$).

Table 2. Leaf trait measurements from hierarchal levels of fern pinnae applied to four biomechanical models

Model	Equation	Level	a	b	r ²	n	p
1	$\text{Log(LMA)} = a + \log[(\text{petiole width}) / (\text{leaf area})]$	Fron	1.9254	-0.0128	0.0006	90	0.824
		Primary Pinna	1.8257	0.0341	0.0042	114	0.494
		Secondary Pinna	1.7901	0.2682	0.2454	27	0.003
		Tertiary Pinna	2.0311	0.06	0.0103	8	0.829
2	$\text{Log(LMA)} = a + \log[(\text{petiole width})^2 / (\text{leaf area})]$	Fron	2.644	0.2261	0.1174	90	0.001
		Primary Pinna	2.232	0.1328	0.0639	114	0.007
		Secondary Pinna	2.5106	0.2344	0.2933	27	0.004
		Tertiary Pinna	1.9449	-0.0451	0.0052	8	0.866
3	$\text{Log(LMA)} = a + \log[(\text{petiole width})^{(8/3)} / (\text{leaf area})]$	Fron	3.5465	0.3143	0.2814	90	0.000
		Primary Pinna	2.6232	0.155	0.1117	114	0.000
		Secondary Pinna	2.7295	0.18	0.24	27	0.009
		Tertiary Pinna	0.0357	-0.1037	0.0357	8	0.685
4	$\text{Log(LMA)} = a + \log[(\text{petiole width})^4 / (\text{leaf area})]$	Fron	4.0367	0.2314	0.381	90	0.000
		Primary Pinna	3.0532	0.1316	0.1578	114	0.000
		Secondary Pinna	2.7484	0.1005	0.1506	27	0.046
		Tertiary Pinna	0.4611	-0.1825	0.138	8	0.412

Table 3. Leaf trait measurements of whole fronds applied to four biomechanical models

Model	Equation	Level	a	b	r ²	n	p
1	$\text{Log(LMA)} = a + \log[(\text{petiole width}) / (\text{leaf area})]$	Fron	1.9274	-0.0173	0.001	90	0.763
2	$\text{Log(LMA)} = a + \log[(\text{petiole width})^2 / (\text{leaf area})]$	Fron	2.6405	0.2243	0.1161	90	0.001
3	$\text{Log(LMA)} = a + \log[(\text{petiole width})^{(8/3)} / (\text{leaf area})]$	Fron	3.5462	0.3139	0.2833	90	0.000
4	$\text{Log(LMA)} = a + \log[(\text{petiole width})^4 / (\text{leaf area})]$	Fron	4.0477	0.2323	0.3887	90	0.000

Table 4. Leaf trait measurements of whole fronds applied to Model 4 and stratified by mechanical leaf form.

Model	Equation	Mechanical Leaf Structure	a	b	r ²	n	p
4	$\text{Log(LMA)} = a + \log[(\text{petiole width})^4 / (\text{leaf area})]$	A	4.0641	0.2312	0.3025	40	0.000
		B	4.0289	0.2322	0.4921	51	0.000
		A and B	4.0724	0.2348	0.4061	90	0.000
		No distinction	4.0477	0.2323	0.3887	91	0.000

Table 5. Leaf trait measurements of whole fronds, applied to Model 4 and stratified by growth form. Type V rheophytes (n=1) are not shown.

Model	Equation	Growth Form	a	b	r ²	n	p
4	$\text{Log(LMA)} = a + \log[(\text{petiole width})^4 / (\text{leaf area})]$	Type I	5.2976	0.3631	0.3575	30	0.000
		Type II	2.8818	0.1193	0.0615	12	0.437
		Type III	3.9883	0.2272	0.4218	59	0.000
		Type IV	3.3518	0.1529	0.5198	4	0.279

Table 6. Leaf trait measurements of whole fronds, applied to Model 4 and stratified by phylogeny.

Model	Equation	Phylogenetic Level	a	b	r ²	n	p
4	$\text{Log(LMA)} = a + \log[(\text{petiole width})^4 / (\text{leaf area})]$	(Class) Marattiopsida	2.5922	0.0657	0.0432	5	0.737
		(Class) Polypodiopsida	4.5815	0.2882	0.4474	79	0.000
		(Class) Psilotopsida	2.3808	0.0463	0.4542	6	0.142
		(Order) Marattiales	2.5922	0.0657	0.0432	5	0.737
		(Order) Cyatheaales	3.3289	0.1514	0.4545	4	0.326
		(Order) Gleicheniales	3.009	0.1057	0.2525	5	0.388
		(Order) Hymenophyllales	3.4645	0.1851	0.212	13	0.113
		(Order) Polypodiales	5.3386	0.3649	0.5365	49	0.000
		(Order) Schizaeales	1.5141	-0.069	0.1199	5	0.568
		(Order) Ophioglossales	2.3655	0.0443	0.1161	4	0.659

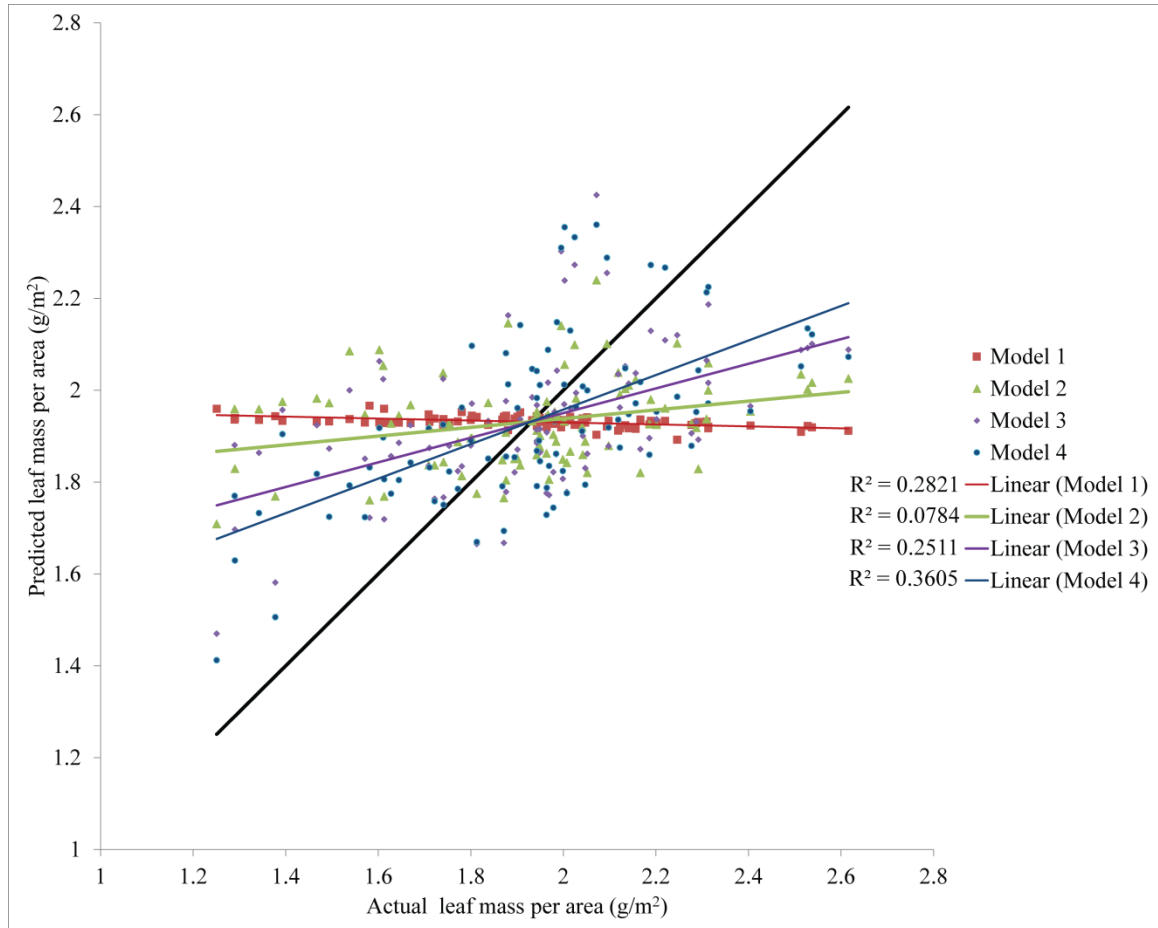


Figure 3. Bootstrapping all models for fern fronds (table 2). Model 1 ($p=0.000$), Model 2 ($p=0.008$), Model 3 ($p=0.000$), Model 4 ($p=0.000$). Model 1 is statistically distinct from Model 2 ($p=0.001$), Model 3 ($p=0.001$), and Model 4 ($p=0.001$). Model 2 and Model 3 are statistically distinct ($p=0.001$). No other regressions are distinct.

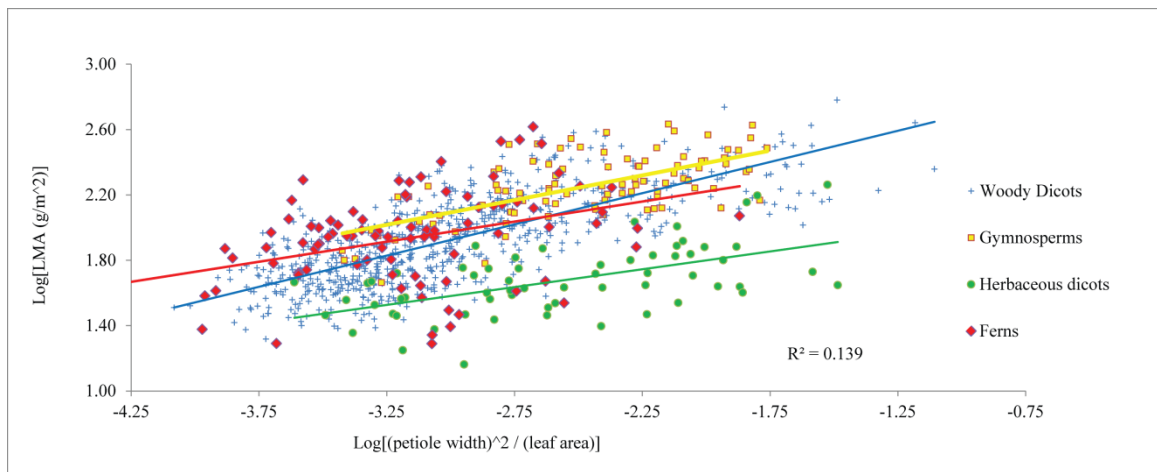


Figure 4. Ferns grouped with original biomechanical model proposed by Royer et al. (2007) for herbaceous dicots, woody dicots, and broad-leaved gymnosperms. Fern fronds are displayed in black. This original model of $(\text{petiole width})^2 / (\text{leaf area})$ expresses the petiole as a vertical pole atop which the laminar mass is attached. The low correlation ($r^2 = 0.1161$, $p = 0.001$) of ferns to this model shows that this is not an appropriate description for the leaves of ferns.

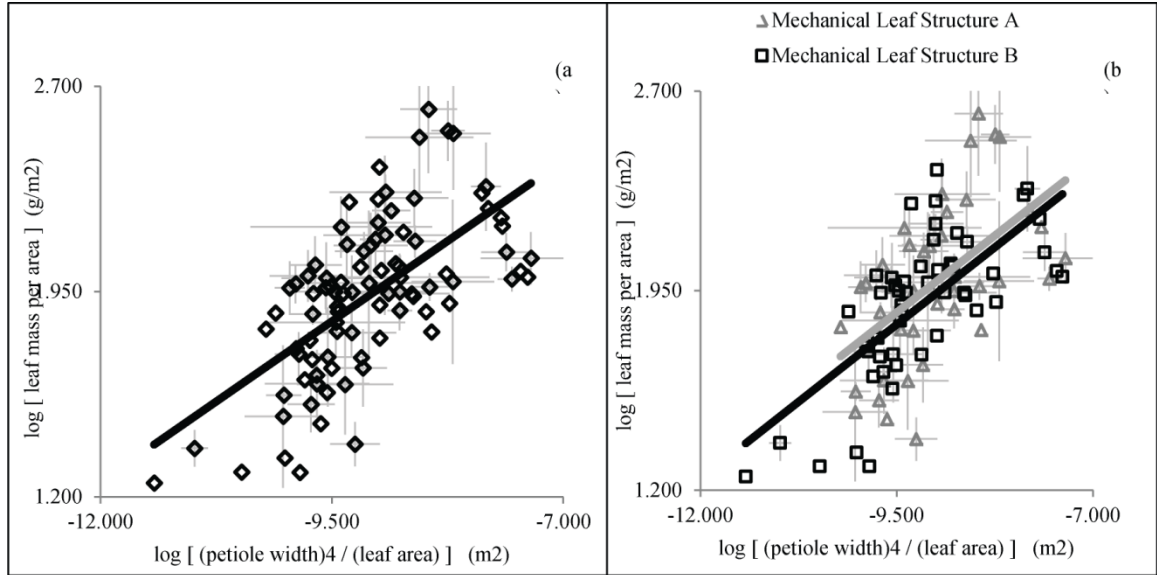


Figure 5. Biomechanical models of leaves as cantilever beams. (a) Petiole width to the fourth, normalized by area, models the petiole as an end-loaded cantilever beam (Niklas 1999, Royer 2007), in which the petiole is anchored on one end and supports a single mass of leaves or several masses of leaves on the other. This general proxy produces promising results, and explains approximately 41% of variation in the data ($r^2=0.4061$, $p=0.000$). In addition to the structural support of the leaf (modeled here), future inclusion of a hydraulic variable may yield better results in explaining the overall leaf structure. (b) Biomechanical models of untapered cantilever beam (Mechanical Leaf Structure A, $r^2=0.3025$, $p=0.000$) versus tapered cantilever beam (Mechanical Leaf Structure B, $r^2=0.4921$, $p=0.000$). Leaf Structures A and B have the same regression equation, only are separated visually by leaf form (i.e. pinnately compound versus palmately compound, dichotomously branched, and simple leaves). When leaves are modeled as either an untapered or tapered cantilever beam, the slope is nearly identical ($p = 0.980$). This indicates that the cantilever beam model is generally appropriate for all ferns, regardless of whether the leaves support a single leaf mass (untapered) or a series of leaf masses (tapered). Though both models do describe the biomechanical leaf form in the same way, the higher r^2 value seen from Mechanical Structure B shows that fern petioles are more accurately considered as tapered cantilever beams.

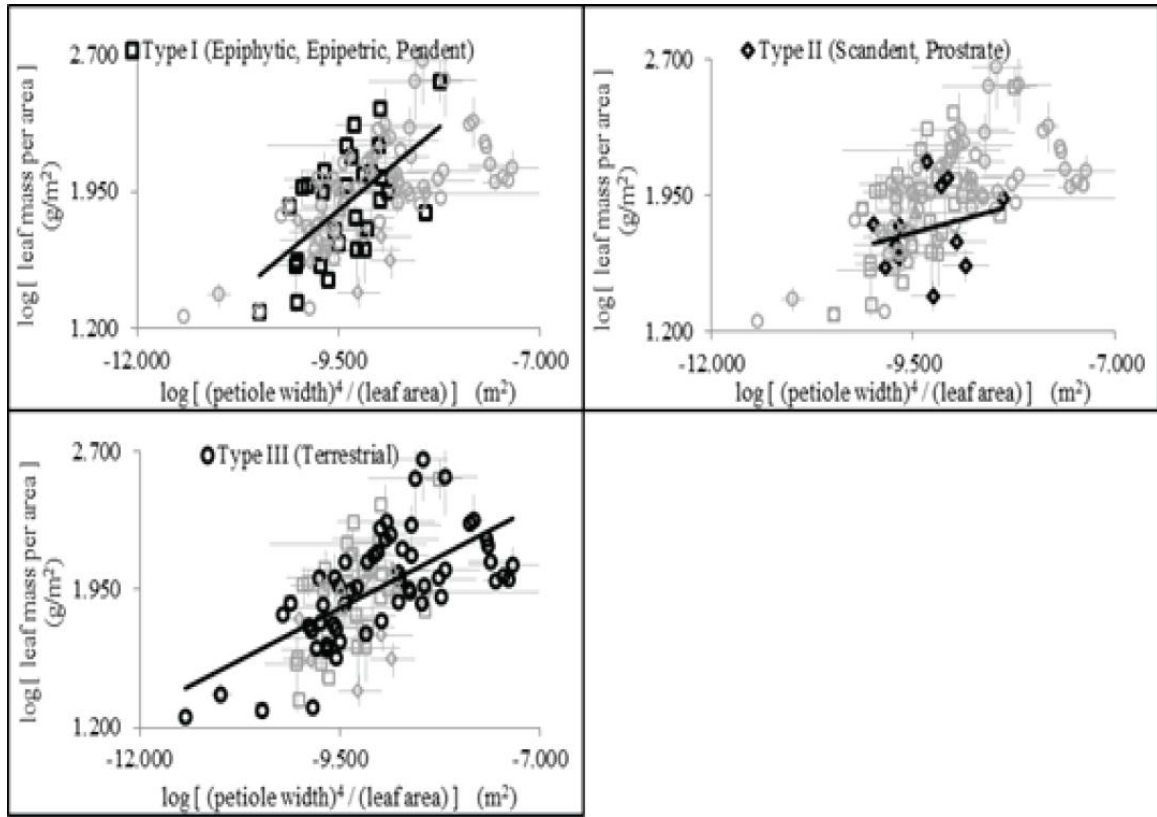


Figure 6. Three of the five different growth form models of extant ferns. Type I ($r^2=0.3575$, $p=0.000$), Type II ($r^2=0.0615$, $p=0.437$), Type III ($r^2=0.4218$, $p=0.000$). Type IV (tree ferns) and Type V (rheophytes) are not displayed because of their low sampling numbers.

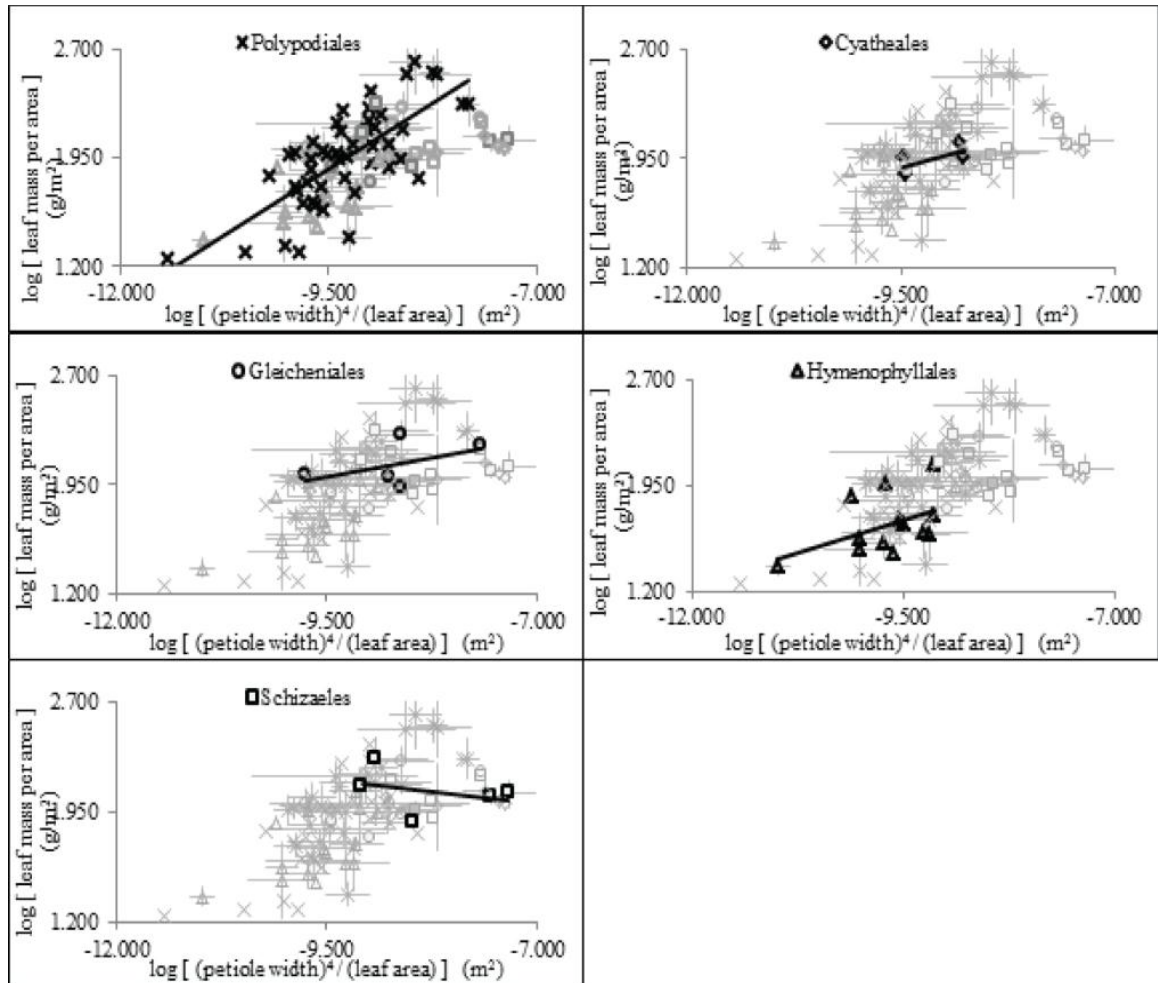


Figure 7. Selected phylogenetic orders fit to Model 4. Polypodiales ($r^2=0.5365$, $p=0.000$), Cyatheales ($r^2=0.4545$, $p=0.326$), Gleicheniales ($r^2=0.2525$, $p=0.388$), Hymenophyllales ($r^2=0.212$, $p=0.113$), Schizaeales ($r^2=0.1199$, $p=0.568$). Phylogenetic modeling is promising, but more sampling is needed of all the fern orders. The majority of sampling has been conducted in Polypodiales, which provides the strongest statistical data. However, older lineages should be sampled more in order to provide strong links of extant ferns to the fossil record.

CHAPTER FOUR

Discussion

The scaling relationships between fern fronds and fern pinnae were different and therefore I chose to apply fronds only to the end-loaded cantilever beam model (Model 4), which was determined to most accurately describe ferns. The different scaling relationships is interesting because some previous allometric studies indicate that geometric scaling exists in leaves, including fronds (Creese et al. 2011), but leaf size may be limited by structural demands for mechanical support (Niinemets et al. 2007). I hypothesize that the difference in scaling relationships between fronds and pinnae are due to a difference in function of the petiole versus petiolules, since past research studies have confirmed that allometric leaf relationships are quantifiable for some plant groups (West et al. 1997, Enquist 2002, Niinemets et al. 2007, Arcand et al. 2008, Creese et al. 2011, Pitterman et al. 2011).

Royer et al. (2007) proposed a simple scaling model of $(\text{petiole width})^2/(\text{leaf area})$ for herbaceous dicots, woody dicots, and broad-leaved gymnosperms. This model is significant for these plant groups and explains the petiole as being analogous to a vertical pole supporting a laminar mass on top. However, ferns show low correlation with Royer's vertical pole model (tables 2 and 3). The end-loaded cantilever beam model, proposed by Niklas (1999), portrays leaves as being anchored at one end and supporting laminar tissue at the other end. Both Models 1 and 4 are derivations of the end-loaded cantilever beam model, modified to include petiole width (Royer et al. 2007). Model 4, describing the petiole as scaling wider and flatter with decreasing flexural rigidity, does the best job of explaining all fern types, out of the models examined in this study.

Niklas (1999) suggested three different plant applications of his end-loaded cantilever beam model, of which are used in this study. The first, called Mechanical Structure A, describes an untapered petiole supporting a singular laminar mass. Simple, palmately compound, and dichotomously branched leaves were grouped within Mechanical Structure A. The second cantilever beam model is called Mechanical Structure B. This Model describes a tapered petiole supporting a series of laminar masses. Mechanical Structure B includes palmately compound leaves. The two cantilever beam models differentiate by leaf type only and each has the same bivariate format, as modified by Royer et al. (2007). The third model, that of a uniform distribution load, is applicable to Equisetales, but no Equisetales were measured for this study due to a lack of distinct petioles.

When leaves are modeled as either an untapered or tapered cantilever beam, the slope is nearly identical ($p = 0.992$). This indicates that the cantilever beam model is generally appropriate for all ferns, regardless of whether the leaves support a single leaf mass (untapered) or a series of leaf masses (tapered). Though both models do describe the biomechanical leaf form in the same way, the higher coefficient of determination seen from Mechanical Structure B shows that fern petioles are more accurately considered as tapered cantilever beams. Some fern species displayed both types of morphological leaf structure and were separated before averaging. Segregating by leaf form produced a higher correlation than not segregating, but the slopes are again nearly identical ($p=0.954$). This similar slope but still higher correlation produced by separating the frond structures indicates that morphological leaf form, whether a singular mass or a hierarchy of masses, is a primary determinant for leaf trait allometry.

In comparison with flowering plants and gymnosperms, ferns exhibit generally lower LMA (figure 4). This confirms the study by Karst and Lechowicz (2007) which showed that temperate deciduous ferns feature very low LMA relative to other plant groups, though the results from this study do indicate a larger range and variance than the Karst and Lechowicz (2007) study did.

Model 4 elucidates the fern growth forms, presumably due to the function of the petiole for each respective growth forms. Terrestrial ferns are described well by the cantilever beam Model 2 because the petiole acts as a structural support from the ground. The structural support must hold laminar tissue erect for photosynthesis, remain anchored to the ground by rhizomes, and remain flexible within physical environmental conditions. The larger the laminar mass, the less flexible the petiole becomes. Lower correlation in hanging leaves and lowest correlation in climber and scrambler leaves also confirm the cantilever beam model, as increasingly less biomechanical support is required for aurally extensive leaves. Hanging leaves support themselves to the extent that they extend outward and downward for exposure to sunlight, and thus their petiole provides a higher degree of structural support than climber leaves. Because epiphytic, epipetric, and pendent leaves do not always raise themselves vertically, they require less structural support from the petiole than do terrestrial leaves. Thus, it is reasonable that hanging leaves exhibit a higher correlation to the structurally oriented model than climber leaves, but lower correlation than terrestrial leaves.

Climbers and scrambler leaves do not support themselves, but use external structures for support and leaf placement (Cornelissen et al. 2003). Because the main petiole of climber fronds do not act as a support at all for the remainder of pinnae

attached to the vine, the petioles of the pinnae are instead what is seen correlated in “Type II,” figure 4, in addition to the frond petioles for scrambler leaves. The pinnae of climber ferns are the most self-supporting leaves within the frond, and thus act most like the fronds of other fern types. The correlation of Type II ferns to the cantilever model is quite low, as is expected. Since climber and scrambler leaves support themselves to a minimal extent, a structural-mechanical model is not expected to be an accurate description of their petiole. I suggest that hydraulics dominate Type II leaf trait relationships, rather than mechanics.

The correlation of tree ferns (Type IV) and rheophytic ferns (Type V) is not graphically displayed but is shown in table 5. Though tree ferns typically have wood-like petioles and are mechanically dominated, not enough ($n = 4$ species) whole fronds were measured to yield significant results, and thus it is unclear if the relationship between petiole width and LMA in tree ferns is well explained by the cantilever beam biomechanical model. The rheophytic ferns, which must exhibit extraordinary mechanical support abilities to withstand the force of water and hold itself erect in swift-flowing streams, are rare in all parts of the world. Only one rheophytic plant was measured and thus the result is not displayed in figure 3.

Area-normalized petiole width and leaf mass exhibit correlation when the petiole is modeled as an end-loaded cantilever beam. The general model presented here includes structural variables only. The correlation coefficient is expected to increase if hydraulic variables were added to the biomechanical model. Hydraulics have an important role in supporting fern structure (Watkins et al. 2010). Part of the Watkins et al. (2010) study showed that epiphytic ferns (Type I) have lower hydraulic conductivity and higher

sensitivity to cavitation than terrestrial ferns (Type III), and as a result exhibit shorter petiole lengths. Model 4 assumes that petiole length and petiole width are proportional, and so this supposition of proportionality must hold for all types of growth forms. This is in direct conflict with the observation that epiphytic petioles are generally shorter than terrestrial petioles. Interestingly, terrestrial and epiphytic ferns have both the highest correlations and significance to Model 4. Studies have not been performed on the hydraulic relationships within climber ferns, scrambler ferns, tree ferns, and rheophytic ferns so comparison of external results to this modeling technique is not currently possible.

Phylogenetic analyses showed some agreement with Model 4. Families, classes, and orders with greater than five species (except for tree fern Cyatheales, $n=4$) were fit to the biomechanical model. Polypodiopsida, Polypodiales, and all applicable families within Polypodiales were well correlated with Model 4, and results were significant (figure 2). Outside of the order Polypodiales, classes and orders either did not have high correlation coefficients or were not significant, or both. These results have interesting implications for the organization of the phylogenetic groupings proposed by Smith et al. (2006). By fitting ferns with the general biomechanical model, the correlation coefficient is expected to increase as fern species become more closely related. As clades become composed of more similar species, their genetic and morphological relationships should also be closer to identical (i.e. the correlation coefficient will increase with tighter genetic links). The lowest correlation coefficients should belong to classes, with the highest correlation coefficients amongst species. Data analyses support this hypothesis for the families within the Cenozoic-originated order Polypodiales, class Polypodiopsida (figure

2), suggesting that Smith et al.'s (2006) phylogenetic organization of Polypodiales is appropriate. However, older classes and orders did not show correlation or significance, suggesting that the current phylogenetic organization is perhaps not warranted, or that a higher number of species should be examined. Future studies in the research would include investigating alternate fern phylogenies, such as the phylogeny proposed by Schuettpelz and Pryer (2007), which is based on molecular DNA analyses.

At its current state, the Model 4 can be applied as a proxy for Cenozoic fossilized fern leaves with some confidence, based on the good fit of Model 4 with taxa within the Cenozoic lineage Polypodiopsida. The predicted LMA and the corresponding life history attributes can help provide valuable information on the fossil leaf's original environmental and ecological conditions. Although it is possible to apply this biomechanical model to other fern lineages, the poor fit within lineages outside the Polypodiopsida argue against applying the model to more ancient fern groups. Furthermore, at this time, any use of this biomechanical model derived in this study as a paleoecological proxy is best done in conjunction with other paleoreconstruction tools.

CHAPTER FIVE

Summary and Future Directions

The purpose of this study was to observe, describe, and characterize the leaf trait relationships of extant ferns and develop a usable paleoecological proxy for fossil ferns. Data show that allometric scaling relationships are different amongst all hierarchical levels of leaves, and biomechanical models used for other plant groups are not applicable to ferns. Fern fronds are most accurately described as behaving like an end-loaded cantilever beam. The general cantilever beam model may be applied to all ferns as a functional explanation of their leaf trait relationships, though the model should be applied to whole fronds instead of lone pinnae. Dividing the data into subgroups of growth form, mechanical leaf structure, and phylogeny clarified the factors controlling their leaf trait relationships. Niklas' (1999) tapered and untapered cantilever beam models both described the data with similar relationships between area-normalized petiole width and LMA. The untapered cantilever beam model ($r^2=0.4921$, $p=0.000$) had a higher correlation coefficient than the tapered cantilever beam model ($r^2=0.3025$, $p=0.000$) but was not more statistically significant. This indicates that fern frond petioles are better described as linear axes anchored by rhizomes and supporting a singular or singularly grouped laminar tissue mass, though both descriptions are accurate. Though modeling the ferns as end-loaded cantilever beams does not correlate with previous models of other plant groups, the complex hierarchical nature of leaf organization of fronds distinguishes them from the simpler, smaller laminar masses of herbaceous dicots, woody dicots, and gymnosperms.

Growth forms data showed a trend of increasing model fit with increasing self-support within the fronds. This is attributed to increased need of biomechanical support within the petiole in order to support the laminar tissue enough to hold upright for maximum photosynthetic benefit. Tracheid hydraulic conductance within the petiole is directly related to tracheid width and petiole length (Watkins et al. 2010). In addition to the biomechanical support, which is exhibited by the cantilever beam model, fern petioles are supported by hydraulic turgor. Combining the mechanical model with a hydraulics model may fully describe the leaf trait relationships seen here, so future analyses should probably include additional parameters. Incorporation of hydraulics into the preexisting models for gymnosperms, herbaceous dicots, and woody dicots may also improve the correlation coefficient of those models, as well.

It is possible that if hydraulic variables were factored into the cantilever beam model then a higher variance in data would be accounted for.

Grouping the ferns by phylogeny is promising. Polypodiopsida showed high correlations with the cantilever beam model, probably due to the highest number of sampled specimens. Polypodiopsida showed increasing correlation as species became more closely related, confirming the phylogenetic organization proposed by Smith et al. (2006). Though other orders showed lower correlations and significance, it is probable that their fit would increase increasing if more specimens were sampled, or if the classification scheme was reassessed.

The biomechanical leaf model of ferns shows strong potential for use as a proxy for interpreting the life history attributes of fern fossil leaves. With added phylogenetic sampling, the model could be applied with confidence to a variety of fern fossils.

Alternatively, if the data were reorganized for new analyses with an alternate fern phylogeny, perhaps stronger correlations would emerge.

This model may be applied to fossils at its current state if used in conjunction with other paleobotanical data. In support of paleoreconstruction efforts, this model could prove valuable in describing the life history attributes of ferns within their environment.

APPENDICES

APPENDIX A

Phylogenetics of Sampled Ferns

Specimen ID#	Class	Order	Family	Genus	Species
US 3508153.1	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	angustifolia
US 3508153.2	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	angustifolia
US 3508153.3	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	angustifolia
US 3508155.1	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	angustifolia
US 3508155.2	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	angustifolia
US 3508155.3	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	angustifolia
US 1719542.1	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	crassipes
US 1719542.2	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	crassipes
US 1719542.3	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	crassipes
US 3555210.1	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	crassipes
US 3555210.2	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	crassipes
US 3555210.3	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	crassipes
US 2906136.1	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	evecta
US 2906136.2	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	evecta
US 2906136.3	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	evecta
US 691112.1	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	evecta
US 691112.2	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	evecta
US 691112.3	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	evecta
US 3481303.1	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	palmiformis
US 3481303.2	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	palmiformis
US 3569615.1	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	palmiformis
US 3569615.2	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	palmiformis
US 3569615.3	Marattiopsida	Marattiales	Marattiaceae	Angiopteris	palmiformis
US 652133.1	Marattiopsida	Marattiales	Marattiaceae	Christensenia	aesculifolia
US 652133.2	Marattiopsida	Marattiales	Marattiaceae	Christensenia	aesculifolia
US 1262739.1	Marattiopsida	Marattiales	Marattiaceae	Christensenia	lobbiana
US 1262739.2	Marattiopsida	Marattiales	Marattiaceae	Christensenia	lobbiana
US 1718247	Marattiopsida	Marattiales	Marattiaceae	Christensenia	lobbiana
US 902770	Marattiopsida	Marattiales	Marattiaceae	Christensenia	lobbiana
US 1493831.1	Marattiopsida	Marattiales	Marattiaceae	Danaea	elliptica
US 1493831.2	Marattiopsida	Marattiales	Marattiaceae	Danaea	elliptica
US 1493831.3	Marattiopsida	Marattiales	Marattiaceae	Danaea	elliptica
US 2018157.1	Marattiopsida	Marattiales	Marattiaceae	Danaea	elliptica
US 2018157.2	Marattiopsida	Marattiales	Marattiaceae	Danaea	elliptica
US 2018157.3	Marattiopsida	Marattiales	Marattiaceae	Danaea	elliptica
US 2356343.1	Marattiopsida	Marattiales	Marattiaceae	Danaea	moritziana
US 2356343.2	Marattiopsida	Marattiales	Marattiaceae	Danaea	moritziana
US 2356343.3	Marattiopsida	Marattiales	Marattiaceae	Danaea	moritziana
US 2776145.1	Marattiopsida	Marattiales	Marattiaceae	Danaea	moritziana
US 2776145.2	Marattiopsida	Marattiales	Marattiaceae	Danaea	moritziana
US 2776145.3	Marattiopsida	Marattiales	Marattiaceae	Danaea	moritziana
US 3057554.1	Marattiopsida	Marattiales	Marattiaceae	Danaea	nodosa
US 3057554.2	Marattiopsida	Marattiales	Marattiaceae	Danaea	nodosa
US 3057554.3	Marattiopsida	Marattiales	Marattiaceae	Danaea	nodosa
US 464884.1	Marattiopsida	Marattiales	Marattiaceae	Danaea	nodosa
US 464884.2	Marattiopsida	Marattiales	Marattiaceae	Danaea	nodosa
AQ 170026.1	Marattiopsida	Marattiales	Marattiaceae	Marattia	attenuata
AQ 170026.2	Marattiopsida	Marattiales	Marattiaceae	Marattia	attenuata

AQ 170027.1	Marattiopsida	Marattiales	Marattiaceae	Marattia	attenuata
AQ 170027.2	Marattiopsida	Marattiales	Marattiaceae	Marattia	attenuata
US 2137259.1	Marattiopsida	Marattiales	Marattiaceae	Marattia	excavata
US 2137259.2	Marattiopsida	Marattiales	Marattiaceae	Marattia	excavata
US 2137259.3	Marattiopsida	Marattiales	Marattiaceae	Marattia	excavata
US 2137259.4	Marattiopsida	Marattiales	Marattiaceae	Marattia	excavata
US 2137259.5	Marattiopsida	Marattiales	Marattiaceae	Marattia	excavata
US 2356345.1	Marattiopsida	Marattiales	Marattiaceae	Marattia	excavata
US 2356345.3	Marattiopsida	Marattiales	Marattiaceae	Marattia	excavata
US 2356345.4	Marattiopsida	Marattiales	Marattiaceae	Marattia	excavata
US 1745454.1	Marattiopsida	Marattiales	Marattiaceae	Marattia	laxa
US 1745454.2	Marattiopsida	Marattiales	Marattiaceae	Marattia	laxa
US 1745454.3	Marattiopsida	Marattiales	Marattiaceae	Marattia	laxa
US 2201678.1	Marattiopsida	Marattiales	Marattiaceae	Marattia	laxa
US 2201678.2	Marattiopsida	Marattiales	Marattiaceae	Marattia	laxa
US 2201678.3	Marattiopsida	Marattiales	Marattiaceae	Marattia	laxa
AQ 545289.1	Marattiopsida	Marattiales	Marattiaceae	Marattia	oreades
AQ 545289.2	Marattiopsida	Marattiales	Marattiaceae	Marattia	oreades
AQ 699133.1	Marattiopsida	Marattiales	Marattiaceae	Marattia	oreades
AQ 699133.2	Marattiopsida	Marattiales	Marattiaceae	Marattia	oreades
US 1792976.1	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	regale
US 1792976.2	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	regale
US 1793133.1	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	regale
US 1793133.2	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	regale
US 1793133.3	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	regale
US 2254822.1	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	schiedei
US 2254822.2	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	schiedei
US 2254822.3	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	schiedei
US 2416108.1	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	schiedei
US 2416108.2	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	schiedei
US 2416108.3	Polypodiopsida	Cyatheales	Cibotiaceae	Cibotium	schiedei
US 2356593.1	Polypodiopsida	Cyatheales	Culcitaceae	Culcita	coniifolia
US 2356593.2	Polypodiopsida	Cyatheales	Culcitaceae	Culcita	coniifolia
US 2356593.3	Polypodiopsida	Cyatheales	Culcitaceae	Culcita	coniifolia
US 2356593.4	Polypodiopsida	Cyatheales	Culcitaceae	Culcita	coniifolia
US 2356593.5	Polypodiopsida	Cyatheales	Culcitaceae	Culcita	coniifolia
US 3479458.1	Polypodiopsida	Cyatheales	Culcitaceae	Culcita	coniifolia
US 3479458.2	Polypodiopsida	Cyatheales	Culcitaceae	Culcita	coniifolia
US 3479458.4	Polypodiopsida	Cyatheales	Culcitaceae	Culcita	coniifolia
US 3479458.5	Polypodiopsida	Cyatheales	Culcitaceae	Culcita	coniifolia
US 2080747.1	Polypodiopsida	Cyatheales	Cyatheaceae	Alsophila	camarooniana
US 2080747.2	Polypodiopsida	Cyatheales	Cyatheaceae	Alsophila	camarooniana
US 2080747.3	Polypodiopsida	Cyatheales	Cyatheaceae	Alsophila	camarooniana
US 2018846.1	Polypodiopsida	Cyatheales	Cyatheaceae	Alsophila	capensis
US 2018846.2	Polypodiopsida	Cyatheales	Cyatheaceae	Alsophila	capensis
US 2018846.3	Polypodiopsida	Cyatheales	Cyatheaceae	Alsophila	capensis
US 2293755.1	Polypodiopsida	Cyatheales	Cyatheaceae	Alsophila	capensis
US 2293755.2	Polypodiopsida	Cyatheales	Cyatheaceae	Alsophila	capensis
US 2293755.3	Polypodiopsida	Cyatheales	Cyatheaceae	Alsophila	capensis
US 2293755.4	Polypodiopsida	Cyatheales	Cyatheaceae	Alsophila	capensis
AQ 145934.1	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	aeneifolia
AQ 145934.2	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	aeneifolia
AQ 145935.1	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	aeneifolia
AQ 145935.2	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	aeneifolia
AQ 368795.1	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	albifrons
AQ 368795.2	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	albifrons
AQ 420699.1	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	albifrons

AQ 420699.2	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	albifrons
AQ 146482.1	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	archboldii
AQ 146482.2	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	archboldii
AQ 146567.1	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	archboldii
AQ 146567.2	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	archboldii
AQ 145952.1	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	atrox
AQ 145952.2	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	atrox
AQ 295730.1	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	atrox
AQ 295730.2	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	atrox
AQ 433795.1	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	australis
AQ 433795.2	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	australis
AQ 566333.1	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	australis
AQ 566333.2	Polypodiopsida	Cyatheales	Cyatheaceae	Cyathea	australis
US 1915638.1	Polypodiopsida	Cyatheales	Cyatheaceae	Hymenophyllopsis	ctenitoides
US 547448.1	Polypodiopsida	Cyatheales	Cyatheaceae	Hymenophyllopsis	ctenitoides
US 547448.2	Polypodiopsida	Cyatheales	Cyatheaceae	Hymenophyllopsis	ctenitoides
US 547448.3	Polypodiopsida	Cyatheales	Cyatheaceae	Hymenophyllopsis	ctenitoides
US 1915630.1	Polypodiopsida	Cyatheales	Cyatheaceae	Hymenophyllopsis	hymenophylloides
US 1915630.2	Polypodiopsida	Cyatheales	Cyatheaceae	Hymenophyllopsis	hymenophylloides
US 1915630.3	Polypodiopsida	Cyatheales	Cyatheaceae	Hymenophyllopsis	hymenophylloides
US 2295026.1	Polypodiopsida	Cyatheales	Cyatheaceae	Hymenophyllopsis	hymenophylloides
US 2295026.2	Polypodiopsida	Cyatheales	Cyatheaceae	Hymenophyllopsis	hymenophylloides
US 2295026.3	Polypodiopsida	Cyatheales	Cyatheaceae	Hymenophyllopsis	hymenophylloides
US 2018506.1	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	lepifera
US 2018506.2	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	lepifera
US 2018506.3	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	lepifera
US 2136211.1	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	lepifera
US 2136211.2	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	lepifera
US 2136211.3	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	lepifera
US 2257875.1	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	propinqua
US 2257875.2	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	propinqua
US 2257919.1	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	propinqua
US 2257919.2	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	propinqua
US 2257919.3	Polypodiopsida	Cyatheales	Cyatheaceae	Sphaeropteris	propinqua
US 1918390.1	Polypodiopsida	Cyatheales	Dicksoniaceae	Calochlaena	straminea
US 1918390.2	Polypodiopsida	Cyatheales	Dicksoniaceae	Calochlaena	straminea
US 2927546.1	Polypodiopsida	Cyatheales	Dicksoniaceae	Calochlaena	straminea
US 2927546.2	Polypodiopsida	Cyatheales	Dicksoniaceae	Calochlaena	straminea
US 2927546.3	Polypodiopsida	Cyatheales	Dicksoniaceae	Calochlaena	straminea
US 2927546.4	Polypodiopsida	Cyatheales	Dicksoniaceae	Calochlaena	straminea
US 2017091.1	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	giganta
US 2017091.2	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	giganta
US 2137257.1	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	giganta
US 2137257.2	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	giganta
US 1616029.1	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	karsteniana
US 1616029.2	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	karsteniana
US 1616029.3	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	karsteniana
US 1616029.4	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	karsteniana
US 1744662.1	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	karsteniana
US 1744662.2	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	karsteniana
US 1744662.3	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	karsteniana
US 1744662.4	Polypodiopsida	Cyatheales	Dicksoniaceae	Dicksonia	karsteniana
US 2255557.1	Polypodiopsida	Cyatheales	Dicksoniaceae	Lophosoria	quadripinnata
US 2255557.2	Polypodiopsida	Cyatheales	Dicksoniaceae	Lophosoria	quadripinnata
US 3319867.1	Polypodiopsida	Cyatheales	Dicksoniaceae	Lophosoria	quadripinnata
US 3319867.2	Polypodiopsida	Cyatheales	Dicksoniaceae	Lophosoria	quadripinnata
WAIK 3396.1	Polypodiopsida	Cyatheales	Loxomataceae	Loxoma	cunninghamii

WAIK 3396.2	Polypodiopsida	Cyatheales	Loxomataceae	Loxoma	cunninghamii
WAIK 6600C.1	Polypodiopsida	Cyatheales	Loxomataceae	Loxoma	cunninghamii
WAIK 6600C.2	Polypodiopsida	Cyatheales	Loxomataceae	Loxoma	cunninghamii
US 1915023.1	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	lanosa
US 1915023.2	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	lanosa
US 1915023.3	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	lanosa
US 3240286.1	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	lanosa
US 3240286.2	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	lanosa
US 3240286.3	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	lanosa
US 1853275.1	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	rostratum
US 1853275.2	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	rostratum
US 1853275.3	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	rostratum
US 2153946.1	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	rostratum
US 2153946.2	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	rostratum
US 2153946.3	Polypodiopsida	Cyatheales	Metaxyaceae	Metaxya	rostratum
US 2201505.1	Polypodiopsida	Cyatheales	Plagiogyriaceae	Plagiogyria	adnata
US 2201505.2	Polypodiopsida	Cyatheales	Plagiogyriaceae	Plagiogyria	adnata
US 2649281.1	Polypodiopsida	Cyatheales	Plagiogyriaceae	Plagiogyria	adnata
US 1211894.1	Polypodiopsida	Cyatheales	Plagiogyriaceae	Plagiogyria	euphlebia
US 1211894.2	Polypodiopsida	Cyatheales	Plagiogyriaceae	Plagiogyria	euphlebia
US 1211894.3	Polypodiopsida	Cyatheales	Plagiogyriaceae	Plagiogyria	euphlebia
US 1507505.1	Polypodiopsida	Cyatheales	Plagiogyriaceae	Plagiogyria	euphlebia
US 1507505.2	Polypodiopsida	Cyatheales	Plagiogyriaceae	Plagiogyria	euphlebia
US 1507505.3	Polypodiopsida	Cyatheales	Plagiogyriaceae	Plagiogyria	euphlebia
US 2255044.1	Polypodiopsida	Gleicheniales	Dipteridaceae	Cheiropleura	bicuspis
US 2255044.2	Polypodiopsida	Gleicheniales	Dipteridaceae	Cheiropleura	bicuspis
US 2255044.3	Polypodiopsida	Gleicheniales	Dipteridaceae	Cheiropleura	bicuspis
US 2255285.1	Polypodiopsida	Gleicheniales	Dipteridaceae	Cheiropleura	bicuspis
US 2255285.2	Polypodiopsida	Gleicheniales	Dipteridaceae	Cheiropleura	bicuspis
US 2255285.3	Polypodiopsida	Gleicheniales	Dipteridaceae	Cheiropleura	bicuspis
US 1053780	Polypodiopsida	Gleicheniales	Dipteridaceae	Dipteris	conjugata
US 2416106.1	Polypodiopsida	Gleicheniales	Dipteridaceae	Dipteris	conjugata
US 2416106.2	Polypodiopsida	Gleicheniales	Dipteridaceae	Dipteris	conjugata
US 456677.1	Polypodiopsida	Gleicheniales	Dipteridaceae	Dipteris	conjugata
US 456677.2	Polypodiopsida	Gleicheniales	Dipteridaceae	Dipteris	conjugata
US 456677.3	Polypodiopsida	Gleicheniales	Dipteridaceae	Dipteris	conjugata
US 3381720.1	Polypodiopsida	Gleicheniales	Glecheniaceae	Dicranopteris	flexuosa
US 3381720.2	Polypodiopsida	Gleicheniales	Glecheniaceae	Dicranopteris	flexuosa
US3033944.1	Polypodiopsida	Gleicheniales	Glecheniaceae	Dicranopteris	flexuosa
US3033944.2	Polypodiopsida	Gleicheniales	Glecheniaceae	Dicranopteris	flexuosa
US 2084111.1	Polypodiopsida	Gleicheniales	Glecheniaceae	Dicranopteris	linearis
US 2084111.2	Polypodiopsida	Gleicheniales	Glecheniaceae	Dicranopteris	linearis
US 3005599.1	Polypodiopsida	Gleicheniales	Glecheniaceae	Dicranopteris	linearis
US 3005599.2	Polypodiopsida	Gleicheniales	Glecheniaceae	Dicranopteris	linearis
US 1915124.1	Polypodiopsida	Gleicheniales	Glecheniaceae	Diplopterygium	bancroftii
US 1915124.2	Polypodiopsida	Gleicheniales	Glecheniaceae	Diplopterygium	bancroftii
US 1915124.3	Polypodiopsida	Gleicheniales	Glecheniaceae	Diplopterygium	bancroftii
US 2359241.1	Polypodiopsida	Gleicheniales	Glecheniaceae	Diplopterygium	bancroftii
US 2359241.2	Polypodiopsida	Gleicheniales	Glecheniaceae	Diplopterygium	bancroftii
US 2359241.3	Polypodiopsida	Gleicheniales	Glecheniaceae	Diplopterygium	bancroftii
WELT 35562A.1	Polypodiopsida	Gleicheniales	Glecheniaceae	Sticherus	cunninghamii
WELT 35562A.2	Polypodiopsida	Gleicheniales	Glecheniaceae	Sticherus	cunninghamii
WELT 35562B.1	Polypodiopsida	Gleicheniales	Glecheniaceae	Sticherus	cunninghamii
WELT 35562B.2	Polypodiopsida	Gleicheniales	Glecheniaceae	Sticherus	cunninghamii
WELT P5410d.1	Polypodiopsida	Gleicheniales	Glecheniaceae	Sticherus	flabellatus
WELT P5410d.2	Polypodiopsida	Gleicheniales	Glecheniaceae	Sticherus	flabellatus
US 2293548.1	Polypodiopsida	Gleicheniales	Matoniaceae	Matonia	foxworthyi

AQ 609934.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	barnardianum
AQ 609934.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	barnardianum
AQ 646908.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	barnardianum
AQ 646908.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	barnardianum
AQ 002599.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	bipunctatum
AQ 002599.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	bipunctatum
AQ 733693.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	bipunctatum
AQ 733693.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	bipunctatum
AQ 396088.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	brevipes
AQ 396088.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	brevipes
AQ 396088.3	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	brevipes
AQ 309822.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	christii
AQ 610044.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	saxifragoides
AQ 610044.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	saxifragoides
AQ 718506.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	saxifragoides
AQ 718506.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Crepidomanes	saxifragoides
WAIK 14591.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	atrovirens
WAIK 14591.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	atrovirens
WAIK 9537.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	atrovirens
WAIK 9537.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	atrovirens
WAIK 18034.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	demissum
WAIK 18464.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	ferrugineum
WAIK 18464.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	ferrugineum
WAIK 688.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	ferrugineum
WAIK 688.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	ferrugineum
WAIK 16249.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	flabellatum
WAIK 17589.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	flabellatum
WAIK 15079.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	lyallii
WAIK 15079.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	lyallii
WAIK 16239.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	lyallii
WAIK 16239.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Hymenophyllum	lyallii
Sylva1375	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	angustatum
Sylva1375	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	angustatum
Sylva1375	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	angustatum
Sylva1375	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	angustatum
Sylva1375	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	angustatum
WAIK 8241.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	endlicherianum
WAIK 8241.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	endlicherianum
WAIK 8867.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	endlicherianum
WAIK 8867.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	endlicherianum
WAIK 15204.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	reniforme
WAIK 15204.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	reniforme
WAIK 7.1	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	reniforme
WAIK 7.2	Polypodiopsida	Hymenophyllales	Hymenophyllaceae	Trichomanes	reniforme
Welt.Perrie 003.1	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	hymenophylloides
Welt.Perrie 003.2	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	hymenophylloides
Welt.Perrie 003.3	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	hymenophylloides
Welt.Perrie 004.1	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	hymenophylloides
Welt.Perrie 004.2	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	hymenophylloides
Welt.Perrie 004.3	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	hymenophylloides
Welt.Perrie 001.2	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	superba
Welt.Perrie 001.3	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	superba
Welt.Perrie 002.1	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	superba
Welt.Perrie 002.2	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	superba
Welt.Perrie 002.3	Polypodiopsida	Osmundales	Osmundaceae	Leptopteris	superba
768.1	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	cinnamomea
768.2	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	cinnamomea

768.2	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	cinnamomea
768.2	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	cinnamomea
Holmes12954	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	cinnamomea
Pace s.n.	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	cinnamomea
Pace s.n.	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	cinnamomea
Singhurst2000	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	cinnamomea
Singhurst2000	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	cinnamomea
SinghurstBridges12415	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	regalis
SinghurstBridges12415	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	regalis
SinghurstBridges15836	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	regalis
SinghurstBridges15836	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	regalis
WAIK 5663.1	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	regalis
WAIK 5663.2	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	regalis
WAIK 8663.1	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	regalis
WAIK 8663.2	Polypodiopsida	Osmundales	Osmundaceae	Osmunda	regalis
WAIK 19513.1	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	dimorphum
WAIK 19513.2	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	dimorphum
WAIK 19697.1	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	dimorphum
WAIK 19697.2	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	dimorphum
WAIK 12919.1	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	flabellifolium
WAIK 12919.2	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	flabellifolium
WAIK 14564.2	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	flabellifolium
WAIK 20197.1	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	flaccidum
WAIK 20197.2	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	flaccidum
WAIK 8852.1	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	flaccidum
WAIK 8852.2	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	flaccidum
WAIK 19523.1	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	oblongifolium
WAIK 19523.2	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	oblongifolium
WAIK 9476.1	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	oblongifolium
WAIK 9476.2	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	oblongifolium
WAIK 15164.1	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	obtusatum
WAIK 15164.2	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	obtusatum
WAIK 4711.1	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	obtusatum
WAIK 4711.2	Polypodiopsida	Polypodiales	Aspleniaceae	Asplenium	obtusatum
WAIK 1447.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	banksii
WAIK 1447.2	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	banksii
WAIK 9848.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	banksii
WAIK 9848.2	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	banksii
WAIK 18405.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	chambersii
WAIK 18405.2	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	chambersii
WAIK 5193.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	chambersii
WAIK 5193.2	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	chambersii
WAIK 6052.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	filiforme
WAIK 6052.2	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	filiforme
WAIK 8540.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	filiforme
WAIK 8540.2	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	filiforme
WAIK 18036.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	membranaceum
WAIK 18036.2	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	membranaceum
WAIK 7361.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	membranaceum
WAIK 7361.2	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	membranaceum
17496.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	serrulatum
17496.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	serrulatum
17496.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	serrulatum
WAIK 19019.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	novae-zealandiae
WAIK 19019.2	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	novae-zealandiae
WAIK 6321.1	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	novae-zealandiae

WAIK 6321.2	Polypodiopsida	Polypodiales	Blechnaceae	Blechnum	novae-zealandiae
AQ 745369.1	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	aspera
AQ 745369.2	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	aspera
AQ 815637.1	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	aspera
AQ 815637.2	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	aspera
AQ 145800.1	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	australis
AQ 145800.2	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	australis
AQ 768558.1	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	australis
AQ 768558.2	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	australis
AQ 145793.1	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	breckenridgeii
AQ 145793.2	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	breckenridgeii
AQ 439692.1	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	breckenridgeii
AQ 439692.2	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	breckenridgeii
AQ 545770.1	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	caudata
AQ 545770.2	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	caudata
AQ 558352.1	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	caudata
AQ 558352.2	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	caudata
AQ 614776.1	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	heterophylla
AQ 614776.2	Polypodiopsida	Polypodiales	Blechnaceae	Doodia	heterophylla
Holmes8942	Polypodiopsida	Polypodiales	Blechnaceae	Woodwardia	areolata
Leidolf1026	Polypodiopsida	Polypodiales	Blechnaceae	Woodwardia	areolata
SinghurstAdamsFitch15304	Polypodiopsida	Polypodiales	Blechnaceae	Woodwardia	areolata
Kral91486	Polypodiopsida	Polypodiales	Blechnaceae	Woodwardia	virginica
SinghurstBridges15934	Polypodiopsida	Polypodiales	Blechnaceae	woodwardia	virginica
SinghurstBridges15934	Polypodiopsida	Polypodiales	Blechnaceae	woodwardia	virginica
AQ 815249.1	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	denticulata
AQ 815249.2	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	denticulata
AQ 020001.1	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	denticulata
AQ 020001.2	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	denticulata
AQ 020001.3	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	denticulata
AQ 020031.1	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	denticulata
AQ 020031.2	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	denticulata
AQ 020066.1	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	pyxidata
AQ 020066.2	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	pyxidata
AQ 629805.1	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	pyxidata
AQ 629805.2	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	pyxidata
AQ 020094.1	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	solida
AQ 020094.2	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	solida
AQ 520103.1	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	solida
AQ 520103.2	Polypodiopsida	Polypodiales	Davalliaceae	Davallia	solida
WELT P020989.1	Polypodiopsida	Polypodiales	Dennstaedtiaceae	Leptolepia	novae-zealandiae
WELT P020989.2	Polypodiopsida	Polypodiales	Dennstaedtiaceae	Leptolepia	novae-zealandiae
Welt.Perrie 005.2	Polypodiopsida	Polypodiales	Dennstaedtiaceae	Leptolepia	novae-zealandiae
Welt.Perrie 005.3	Polypodiopsida	Polypodiales	Dennstaedtiaceae	Leptolepia	novae-zealandiae
AQ 614340.1	Polypodiopsida	Polypodiales	Dennstaedtiaceae	Microlepia	speluncae
AQ 614340.2	Polypodiopsida	Polypodiales	Dennstaedtiaceae	Microlepia	speluncae
WAIK 2892.1	Polypodiopsida	Polypodiales	Dennstaedtiaceae	Paesia	scaberula
WAIK 2892.2	Polypodiopsida	Polypodiales	Dennstaedtiaceae	Paesia	scaberula
WAIK 8555.1	Polypodiopsida	Polypodiales	Dennstaedtiaceae	Paesia	scaberula
WAIK 8555.2	Polypodiopsida	Polypodiales	Dennstaedtiaceae	Paesia	scaberula
AQ 644968.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Arachniodes	aristata
AQ 644968.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Arachniodes	aristata
AQ 764817.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Arachniodes	aristata
AQ 764817.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Arachniodes	aristata
AQ 549197.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Coveniella	poecilophlebia
AQ 549197.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Coveniella	poecilophlebia
AQ 671629.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Coveniella	poecilophlebia

AQ 671629.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Coveniella	poecilophlebia
14294	Polypodiopsida	Polypodiales	Dryopteridaceae	Cyrtomium	falcatum
14294	Polypodiopsida	Polypodiales	Dryopteridaceae	Cyrtomium	falcatum
14294	Polypodiopsida	Polypodiales	Dryopteridaceae	Cyrtomium	falcatum
17692	Polypodiopsida	Polypodiales	Dryopteridaceae	Cyrtomium	falcatum
17692	Polypodiopsida	Polypodiales	Dryopteridaceae	Cyrtomium	falcatum
17692	Polypodiopsida	Polypodiales	Dryopteridaceae	Cyrtomium	falcatum
WELT P020570.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Cyrtomium	falcatum
WELT P020570.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Cyrtomium	falcatum
Hurst s.n.	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	fragilis
Hurst s.n.	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	fragilis
WELT P022306.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	fragilis
WELT P022306.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	fragilis
Dunton s.n.	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	protrusa
Dunton s.n.	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	protrusa
Dunton s.n.	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	protrusa
Dunton s.n.	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	protrusa
Dunton s.n.	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	protrusa
WELT P020856.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	tasmanica
WELT P8992.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	tasmanica
WELT P8992.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Cystopteris	tasmanica
WAIK 6311.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Dryopteris	affinis
WAIK 6311.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Dryopteris	affinis
WAIK 9312.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Dryopteris	affinis
WAIK 9312.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Dryopteris	affinis
WELT P10260.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Dryopteris	filix-mas
WELT P10260.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Dryopteris	filix-mas
WELT P20870b.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Dryopteris	filix-mas
WELT P20870b.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Dryopteris	filix-mas
Clements154	Polypodiopsida	Polypodiales	Dryopteridaceae	Gymnocarpium	dryopteris
Clements154	Polypodiopsida	Polypodiales	Dryopteridaceae	Gymnocarpium	dryopteris
AQ 546214.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	decomposita
AQ 546214.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	decomposita
AQ 768544.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	decomposita
AQ 768544.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	decomposita
AQ 727574.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	marginans
AQ 727574.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	marginans
AQ 841043.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	marginans
AQ 841043.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	marginans
AQ 641506.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	microsora
AQ 641506.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	microsora
AQ 743968.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	microsora
AQ 743968.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	microsora
AQ 546266.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	munita
AQ 546266.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	munita
AQ 841042.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	munita
AQ 841042.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	munita
AQ 841042.3	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	munita
AQ 616938.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	rufescens
AQ 616938.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	rufescens
AQ 770638.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	rufescens
AQ 770638.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Lastreopsis	rufescens
AQ 506712.3	Polypodiopsida	Polypodiales	Dryopteridaceae	Oenotrichia	tripinnata
AQ 506712.4	Polypodiopsida	Polypodiales	Dryopteridaceae	Oenotrichia	tripinnata
76200	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	acrostichoides
76200	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	acrostichoides
76200	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	acrostichoides

AQ 391394.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	acrostichoides
AQ 391394.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	acrostichoides
AQ 438062.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	fallax
AQ 438062.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	fallax
AQ 631268.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	fallax
AQ 631268.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	fallax
AQ 501581.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	formosum
AQ 501581.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	formosum
AQ 501581.3	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	formosum
AQ 501581.4	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	formosum
AQ 546271.1	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	formosum
AQ 546271.2	Polypodiopsida	Polypodiales	Dryopteridaceae	Polystichum	formosum
Crosthwaite159	Polypodiopsida	Polypodiales	Dryopteridaceae	woodsia	obtusa
Crosthwaite159	Polypodiopsida	Polypodiales	Dryopteridaceae	woodsia	obtusa
Holmes8108	Polypodiopsida	Polypodiales	Dryopteridaceae	Woodsia	obtusa
Sanchez3225	Polypodiopsida	Polypodiales	Dryopteridaceae	Woodsia	obtusa
Sanchez3225	Polypodiopsida	Polypodiales	Dryopteridaceae	Woodsia	obtusa
AQ 722804.1	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	brachypoda
AQ 722804.2	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	brachypoda
AQ 596891.1	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	ensifolia
AQ 596891.2	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	ensifolia
AQ 815191.1	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	ensifolia
AQ 815191.2	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	ensifolia
AQ 671766.1	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	microphylla
AQ 671766.2	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	microphylla
AQ 766644.1	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	microphylla
AQ 766644.2	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	microphylla
AQ 766644.3	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	microphylla
AQ 149072.1	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	obtusa
AQ 149072.2	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	obtusa
AQ 617250.1	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	obtusa
AQ 617250.2	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	obtusa
Welt.Perrie 007.1	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	trichomanoides
Welt.Perrie 007.2	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	trichomanoides
Welt.Perrie 007.3	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	trichomanoides
Welt.Perrie 008.1	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	trichomanoides
Welt.Perrie 008.2	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	trichomanoides
Welt.Perrie 008.3	Polypodiopsida	Polypodiales	Lindsaceae	Lindsaea	trichomanoides
Holmes11057	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	japonicum
Holmes11057	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	japonicum
Holmes6297	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	japonicum
Holmes6297	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	japonicum
Holmes6297	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	japonicum
AQ 771681.1	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	microphyllum
AQ 771681.2	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	microphyllum
AQ 783085.1	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	microphyllum
AQ 783085.2	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	microphyllum
Leonard2804	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	palmatum
Leonard2804	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	palmatum
Thomas153691	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	palmatum
Thomas153691	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	palmatum
AQ 613080.1	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	reticulatum
AQ 613080.2	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	reticulatum
AQ 748655.1	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	reticulatum
AQ 748655.2	Polypodiopsida	Polypodiales	Lygodiaceae	Lygodium	reticulatum
WAIK 14358.1	Polypodiopsida	Polypodiales	Polypodiaceae	Anarthropteris	lanceolata
WAIK 14358.2	Polypodiopsida	Polypodiales	Polypodiaceae	Anarthropteris	lanceolata

WAIK 8242.1	Polypodiopsida	Polypodiales	Polypodiaceae	Anarthropteris	lanceolata
WAIK 8242.2	Polypodiopsida	Polypodiales	Polypodiaceae	Anarthropteris	lanceolata
AQ 171589.1	Polypodiopsida	Polypodiales	Polypodiaceae	Crypsinus	enervis
AQ 171589.2	Polypodiopsida	Polypodiales	Polypodiaceae	Crypsinus	enervis
AQ 171590.1	Polypodiopsida	Polypodiales	Polypodiaceae	Crypsinus	enervis
AQ 171590.2	Polypodiopsida	Polypodiales	Polypodiaceae	Crypsinus	enervis
AQ 497577.1	Polypodiopsida	Polypodiales	Polypodiaceae	Crypsinus	simplicissimus
AQ 497577.2	Polypodiopsida	Polypodiales	Polypodiaceae	Crypsinus	simplicissimus
AQ 569155.1	Polypodiopsida	Polypodiales	Polypodiaceae	Crypsinus	simplicissimus
AQ 569155.2	Polypodiopsida	Polypodiales	Polypodiaceae	Crypsinus	simplicissimus
WELT P021280.1	Polypodiopsida	Polypodiales	Polypodiaceae	Ctenopteris	heterophylla
WELT P021280.2	Polypodiopsida	Polypodiales	Polypodiaceae	Ctenopteris	heterophylla
Welt.Perrie 006.1	Polypodiopsida	Polypodiales	Polypodiaceae	Ctenopteris	heterophylla
Welt.Perrie 006.2	Polypodiopsida	Polypodiales	Polypodiaceae	Ctenopteris	heterophylla
Welt.Perrie 006.3	Polypodiopsida	Polypodiales	Polypodiaceae	Ctenopteris	heterophylla
AQ 590070.1	Polypodiopsida	Polypodiales	Polypodiaceae	Dictymia	brownii
AQ 590070.2	Polypodiopsida	Polypodiales	Polypodiaceae	Dictymia	brownii
AQ 647177.1	Polypodiopsida	Polypodiales	Polypodiaceae	Dictymia	brownii
AQ 647177.2	Polypodiopsida	Polypodiales	Polypodiaceae	Dictymia	brownii
AQ 391440.1	Polypodiopsida	Polypodiales	Polypodiaceae	Drymoglossum	heterophyllum
AQ 391440.2	Polypodiopsida	Polypodiales	Polypodiaceae	Drymoglossum	heterophyllum
AQ 391440.3	Polypodiopsida	Polypodiales	Polypodiaceae	Drymoglossum	heterophyllum
AQ 369998	Polypodiopsida	Polypodiales	Polypodiaceae	Drynaria	quercifolia
AQ 399903	Polypodiopsida	Polypodiales	Polypodiaceae	Drynaria	quercifolia
AQ 171736	Polypodiopsida	Polypodiales	Polypodiaceae	Drynaria	rigidula
AQ 330151.1	Polypodiopsida	Polypodiales	Polypodiaceae	Drynaria	rigidula
AQ 330151.2	Polypodiopsida	Polypodiales	Polypodiaceae	Drynaria	rigidula
AQ 613078.1	Polypodiopsida	Polypodiales	Polypodiaceae	Drynaria	rigidula
AQ 613078.2	Polypodiopsida	Polypodiales	Polypodiaceae	Drynaria	rigidula
AQ 175557	Polypodiopsida	Polypodiales	Polypodiaceae	Drynaria	sparsisora
AQ 172758.1	Polypodiopsida	Polypodiales	Polypodiaceae	Goniophlebium	percussum
AQ 172758.2	Polypodiopsida	Polypodiales	Polypodiaceae	Goniophlebium	percussum
AQ 772815.1	Polypodiopsida	Polypodiales	Polypodiaceae	Goniophlebium	percussum
AQ 772815.2	Polypodiopsida	Polypodiales	Polypodiaceae	Goniophlebium	percussum
AQ 599462.1	Polypodiopsida	Polypodiales	Polypodiaceae	Goniophlebium	subauriculatum
AQ 599462.2	Polypodiopsida	Polypodiales	Polypodiaceae	Goniophlebium	subauriculatum
AQ 746511.1	Polypodiopsida	Polypodiales	Polypodiaceae	Goniophlebium	subauriculatum
WELT P021009.1	Polypodiopsida	Polypodiales	Polypodiaceae	Loxogramme	dictyopteris
WELT P021009.2	Polypodiopsida	Polypodiales	Polypodiaceae	Loxogramme	dictyopteris
WELT P18317.1	Polypodiopsida	Polypodiales	Polypodiaceae	Loxogramme	dictyopteris
WELT P18317.2	Polypodiopsida	Polypodiales	Polypodiaceae	Loxogramme	dictyopteris
AQ 609021.1	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	confluens
AQ 609021.2	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	confluens
AQ 724157.1	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	confluens
AQ 724157.2	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	confluens
AQ 172719.1	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	lanceolata
AQ 172719.2	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	lanceolata
AQ 482588.1	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	lanceolata
AQ 482588.2	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	lanceolata
AQ 172619.1	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	longifolia
AQ 172619.2	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	longifolia
AQ 599470.1	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	longifolia
AQ 599470.2	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	longifolia
AQ 591610.1	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	rupestris
AQ 591610.2	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	rupestris
AQ 815709.1	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	rupestris
AQ 815709.2	Polypodiopsida	Polypodiales	Polypodiaceae	Pyrrosia	rupestris

AQ 172986.1	Polypodiopsida	Polypodiales	Pteridaceae	Acrostichum	aureum
AQ 172986.2	Polypodiopsida	Polypodiales	Pteridaceae	Acrostichum	aureum
AQ 446117.1	Polypodiopsida	Polypodiales	Pteridaceae	Acrostichum	aureum
AQ 446117.2	Polypodiopsida	Polypodiales	Pteridaceae	Acrostichum	aureum
AQ 625223.1	Polypodiopsida	Polypodiales	Pteridaceae	Acrostichum	speciosum
AQ 625223.2	Polypodiopsida	Polypodiales	Pteridaceae	Acrostichum	speciosum
AQ 830151.1	Polypodiopsida	Polypodiales	Pteridaceae	Acrostichum	speciosum
AQ 830151.2	Polypodiopsida	Polypodiales	Pteridaceae	Acrostichum	speciosum
Hansen4737	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	capillus-veneris
Hansen4737	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	capillus-veneris
Hansen4737	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	capillus-veneris
Hansen4737	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	capillus-veneris
Ruth1003	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	capillus-veneris
Ruth1003	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	capillus-veneris
Redfearn23590	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	pedatum
Redfearn23590	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	pedatum
Redfearn23590	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	pedatum
Schwartz54	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	pedatum
Schwartz54	Polypodiopsida	Polypodiales	Pteridaceae	Adiantum	pedatum
6232.1	Polypodiopsida	Polypodiales	Pteridaceae	Argyroschosma	dealbata
6232.2	Polypodiopsida	Polypodiales	Pteridaceae	Argyroschosma	dealbata
6232.2	Polypodiopsida	Polypodiales	Pteridaceae	Argyroschosma	dealbata
6232.2	Polypodiopsida	Polypodiales	Pteridaceae	Argyroschosma	dealbata
5723	Polypodiopsida	Polypodiales	Pteridaceae	Astrolepis	integerrima
5860	Polypodiopsida	Polypodiales	Pteridaceae	Astrolepis	integerrima
5860	Polypodiopsida	Polypodiales	Pteridaceae	Astrolepis	integerrima
5860	Polypodiopsida	Polypodiales	Pteridaceae	Astrolepis	integerrima
WELT P020377.1	Polypodiopsida	Polypodiales	Pteridaceae	Cheilanthes	distans
WELT P020377.2	Polypodiopsida	Polypodiales	Pteridaceae	Cheilanthes	distans
WELT P17575.1	Polypodiopsida	Polypodiales	Pteridaceae	Cheilanthes	distans
WELT P17575.2	Polypodiopsida	Polypodiales	Pteridaceae	Cheilanthes	distans
WELT P002918.2	Polypodiopsida	Polypodiales	Pteridaceae	Cheilanthes	sieberi
WELT P022918.1	Polypodiopsida	Polypodiales	Pteridaceae	Cheilanthes	sieberi
Pace744.1	Polypodiopsida	Polypodiales	Pteridaceae	Cryptogramma	acrostichoides
Pace744.2	Polypodiopsida	Polypodiales	Pteridaceae	Cryptogramma	acrostichoides
Pace744.3	Polypodiopsida	Polypodiales	Pteridaceae	Cryptogramma	acrostichoides
Holmes4469	Polypodiopsida	Polypodiales	Pteridaceae	Eriosorus	flexuosus
Holmes4469	Polypodiopsida	Polypodiales	Pteridaceae	Eriosorus	flexuosus
Holmes4469	Polypodiopsida	Polypodiales	Pteridaceae	Eriosorus	flexuosus
Holmes4469	Polypodiopsida	Polypodiales	Pteridaceae	Eriosorus	flexuosus
4710.1	Polypodiopsida	Polypodiales	Pteridaceae	Notholaena	copelandii
4710.1	Polypodiopsida	Polypodiales	Pteridaceae	Notholaena	copelandii
4710.1	Polypodiopsida	Polypodiales	Pteridaceae	Notholaena	copelandii
4710.2	Polypodiopsida	Polypodiales	Pteridaceae	Notholaena	copelandii
AQ 610223.1	Polypodiopsida	Polypodiales	Pteridaceae	Paraceterach	muelleri
AQ 610223.2	Polypodiopsida	Polypodiales	Pteridaceae	Paraceterach	muelleri
AQ 815694.1	Polypodiopsida	Polypodiales	Pteridaceae	Paraceterach	muelleri
AQ 815694.2	Polypodiopsida	Polypodiales	Pteridaceae	Paraceterach	muelleri
AQ 368781.1	Polypodiopsida	Polypodiales	Pteridaceae	Paraceterach	reynoldsii
AQ 368781.2	Polypodiopsida	Polypodiales	Pteridaceae	Paraceterach	reynoldsii
AQ 780974.1	Polypodiopsida	Polypodiales	Pteridaceae	Paraceterach	reynoldsii
5547	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	atropurpurea
5547	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	atropurpurea
5547	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	atropurpurea
5547.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	atropurpurea
5547.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	atropurpurea
5547.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	atropurpurea

5547.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	atropurpurea
6235	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	atropurpurea
AQ 538828.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	calidrupium
AQ 538828.2	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	calidrupium
AQ 782483.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	calidrupium
AQ 782483.2	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	calidrupium
AQ 782483.3	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	calidrupium
AQ 530947.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	falcata
AQ 530947.2	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	falcata
AQ 698779.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	falcata
AQ 698779.2	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	falcata
AQ 558360.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	nana
AQ 558360.2	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	nana
AQ 576544.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	nana
AQ 576544.2	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	nana
AQ 749159.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	paradoxa
AQ 749159.2	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	paradoxa
AQ 768542.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	paradoxa
AQ 768542.2	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	paradoxa
8045	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	ternifolia
8045	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	ternifolia
8045	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	ternifolia
8045	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	ternifolia
8045	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	ternifolia
17783	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	ternifolia
17783	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	ternifolia
17783	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	ternifolia
AQ 778098.1	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	viridis
AQ 778098.2	Polypodiopsida	Polypodiales	Pteridaceae	Pellaea	viridis
AQ 737255.1	Polypodiopsida	Polypodiales	Pteridaceae	Pityrogramma	calomelanos
AQ 737255.2	Polypodiopsida	Polypodiales	Pteridaceae	Pityrogramma	calomelanos
AQ 368854.1	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	ensiformis
AQ 368854.2	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	ensiformis
AQ 617594.2	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	ensiformis
AQ 677522.1	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	pacifica
AQ 677522.2	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	pacifica
AQ 791739.1	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	pacifica
AQ 791739.2	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	pacifica
AQ 472164.1	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	tremula
AQ 472164.2	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	tremula
AQ 821266.1	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	tremula
AQ 821266.2	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	tremula
AQ 173350.1	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	tripartita
AQ 173350.2	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	tripartita
AQ 619580.1	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	tripartita
AQ 619580.2	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	tripartita
AQ 673372.1	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	vittata
AQ 673372.2	Polypodiopsida	Polypodiales	Pteridaceae	Pteris	vittata
WAIK 16041.1	Polypodiopsida	Polypodiales	Thelypteridaceae	Cyclosorus	interruptus
WAIK 16041.2	Polypodiopsida	Polypodiales	Thelypteridaceae	Cyclosorus	interruptus
WAIK 8021.1	Polypodiopsida	Polypodiales	Thelypteridaceae	Cyclosorus	interruptus
WAIK 8021.2	Polypodiopsida	Polypodiales	Thelypteridaceae	Cyclosorus	interruptus
AQ 596884.1	Polypodiopsida	Polypodiales	Thelypteridaceae	Macrothelypteris	polypodiodes
AQ 596884.2	Polypodiopsida	Polypodiales	Thelypteridaceae	Macrothelypteris	polypodiodes
AQ 647160.1	Polypodiopsida	Polypodiales	Thelypteridaceae	Macrothelypteris	polypodiodes
AQ 647160.2	Polypodiopsida	Polypodiales	Thelypteridaceae	Macrothelypteris	polypodiodes
AQ 375683.1	Polypodiopsida	Polypodiales	Thelypteridaceae	Macrothelypteris	torresiana

AQ 375683.2	Polypodiopsida	Polypodiales	Thelypteridaceae	Macrothelypteris	torresiana
AQ 548303.1	Polypodiopsida	Polypodiales	Thelypteridaceae	Macrothelypteris	torresiana
AQ 548303.2	Polypodiopsida	Polypodiales	Thelypteridaceae	Macrothelypteris	torresiana
WAIK 18056.1	Polypodiopsida	Polypodiales	Thelypteridaceae	Pneumatopteris	pennigera
WAIK 18056.2	Polypodiopsida	Polypodiales	Thelypteridaceae	Pneumatopteris	pennigera
WAIK 3016.1	Polypodiopsida	Polypodiales	Thelypteridaceae	Pneumatopteris	pennigera
WAIK 3016.2	Polypodiopsida	Polypodiales	Thelypteridaceae	Pneumatopteris	pennigera
AQ 619389.1	Polypodiopsida	Polypodiales	Thelypteridaceae	Pronephrium	triphyllum
AQ 619389.2	Polypodiopsida	Polypodiales	Thelypteridaceae	Pronephrium	triphyllum
AQ 755358.1	Polypodiopsida	Polypodiales	Thelypteridaceae	Pronephrium	triphyllum
AQ 755358.2	Polypodiopsida	Polypodiales	Thelypteridaceae	Pronephrium	triphyllum
18784	Polypodiopsida	Polypodiales	Thelypteridaceae	Thelypteris	hispidula
18784	Polypodiopsida	Polypodiales	Thelypteridaceae	Thelypteris	hispidula
18784	Polypodiopsida	Polypodiales	Thelypteridaceae	Thelypteris	hispidula
18787	Polypodiopsida	Polypodiales	Thelypteridaceae	Thelypteris	hispidula
18787	Polypodiopsida	Polypodiales	Thelypteridaceae	Thelypteris	hispidula
18787	Polypodiopsida	Polypodiales	Thelypteridaceae	Thelypteris	hispidula
92939	Polypodiopsida	Polypodiales	Thelypteridaceae	Thelypteris	kunthii
92939	Polypodiopsida	Polypodiales	Thelypteridaceae	Thelypteris	kunthii
92939	Polypodiopsida	Polypodiales	Thelypteridaceae	Thelypteris	kunthii
5154.1	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	mexicana
5154.1	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	mexicana
5154.2	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	mexicana
5154.2	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	mexicana
13053A	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	mexicana
13053A	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	mexicana
OdiaBarbosa44	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	phyllitidis
OdiaBarbosa44	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	phyllitidis
OdiaBarbosa44	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	phyllitidis
US 530603.1	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	phyllitidis
US 530603.2	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	phyllitidis
US 530603.3	Polypodiopsida	Schizaeles	Anemiaceae	Anemia	phyllitidis
US 2864640.1	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	pennula
US 2864640.2	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	pennula
US 2948915.1	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	pennula
US 2948915.2	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	pennula
US 2948915.3	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	pennula
US 3278375.1	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	pennula
US 3278375.2	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	pennula
US 2136600.1	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	subtrijuga
US 2136600.2	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	subtrijuga
US 2136600.3	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	subtrijuga
US 2136866.1	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	subtrijuga
US 2136866.2	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	subtrijuga
US 2136866.3	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	subtrijuga
US 3538573.1	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	subtrijuga
US 3538573.2	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	subtrijuga
US 3538573.3	Polypodiopsida	Schizaeles	Schizaeaceae	Actinostachys	subtrijuga
US 1915248.1	Polypodiopsida	Schizaeles	Schizaeaceae	Schizaea	elegans
US 1915248.2	Polypodiopsida	Schizaeles	Schizaeaceae	Schizaea	elegans
US 1915248.3	Polypodiopsida	Schizaeles	Schizaeaceae	Schizaea	elegans
US 1915248.4	Polypodiopsida	Schizaeles	Schizaeaceae	Schizaea	elegans
US 3252569.1	Polypodiopsida	Schizaeles	Schizaeaceae	Schizaea	elegans
US 3252569.2	Polypodiopsida	Schizaeles	Schizaeaceae	Schizaea	elegans
US 3252569.3	Polypodiopsida	Schizaeles	Schizaeaceae	Schizaea	elegans
US 3252569.4	Polypodiopsida	Schizaeles	Schizaeaceae	Schizaea	elegans
US 3038920.1	Polypodiopsida	Schizaeles	Schizaeaceae	Schizaea	fluminensis

US 1681420.1	Psilotopsida	Ophioglossales	Ophioglossaceae	Helminthostachys	zeylanica
US 1681420.2	Psilotopsida	Ophioglossales	Ophioglossaceae	Helminthostachys	zeylanica
US 1918496.1	Psilotopsida	Ophioglossales	Ophioglossaceae	Helminthostachys	zeylanica
US 1918496.2	Psilotopsida	Ophioglossales	Ophioglossaceae	Helminthostachys	zeylanica
US 1919620.1	Psilotopsida	Psilotales	Psilotaceae	Tmesipteris	gracilis
US 1919620.2	Psilotopsida	Psilotales	Psilotaceae	Tmesipteris	gracilis
US 3346968.1	Psilotopsida	Psilotales	Psilotaceae	Tmesipteris	gracilis
US 3346968.2	Psilotopsida	Psilotales	Psilotaceae	Tmesipteris	gracilis
US 3346968.3	Psilotopsida	Psilotales	Psilotaceae	Tmesipteris	gracilis
US 3227408.1	Psilotopsida	Psilotales	Psilotaceae	Tmesipteris	norfolkiensis
US 3227408.2	Psilotopsida	Psilotales	Psilotaceae	Tmesipteris	norfolkiensis
US 3227408.3	Psilotopsida	Psilotales	Psilotaceae	Tmesipteris	norfolkiensis

APPENDIX B

Geographic Origins of Sampled Ferns

Specimen ID#	Genus	Species	Country	Ecological Region or State	Ecological District or County
AQ 446117.1	Acrostichum	aureum	Guam	Mt. Almagosa	Pagachao Creek
AQ 172986.1	Acrostichum	aureum	New Guinea	Morobe	Wau
AQ 172986.2	Acrostichum	aureum	New Guinea	Morobe	Wau
AQ 830151.1	Acrostichum	speciosum	Australia	Queensland	Cook
AQ 830151.2	Acrostichum	speciosum	Australia	Queensland	Cook
AQ 625223.1	Acrostichum	speciosum	Australia	Queensland	South Kennedy
AQ 625223.2	Acrostichum	speciosum	Australia	Queensland	South Kennedy
US 2948915.1	Actinostachys	pennula	Brazil	Amazonas	Port Camanausd
US 2948915.2	Actinostachys	pennula	Brazil	Amazonas	Port Camanausd
US 2948915.3	Actinostachys	pennula	Brazil	Amazonas	Port Camanausd
US 2864640.1	Actinostachys	pennula	Brazil	Missao Cururu	Lago dos Ciganos
US 2864640.2	Actinostachys	pennula	Brazil	Missao Cururu	Lago dos Ciganos
US 3278375.1	Actinostachys	pennula	Brazil	Tonantins	Vla Velha, Rio Tanantins
US 3278375.2	Actinostachys	pennula	Brazil	Tonantins	Vla Velha, Rio Tanantins
US 2136600.1	Actinostachys	subtrijuga	Colombia	Rio Kananari	Cerro Isibukuri
US 2136600.2	Actinostachys	subtrijuga	Colombia	Rio Kananari	Cerro Isibukuri
US 2136600.3	Actinostachys	subtrijuga	Colombia	Rio Kananari	Cerro Isibukuri
US 2136866.1	Actinostachys	subtrijuga	Colombia	Rio Negro	San Felipe
US 2136866.2	Actinostachys	subtrijuga	Colombia	Rio Negro	San Felipe
US 2136866.3	Actinostachys	subtrijuga	Colombia	Rio Negro	San Felipe
US 3538573.1	Actinostachys	subtrijuga	Venezuela	Amazonas	Rio Negro
US 3538573.2	Actinostachys	subtrijuga	Venezuela	Amazonas	Rio Negro
US 3538573.3	Actinostachys	subtrijuga	Venezuela	Amazonas	Rio Negro
Hansen4737	Adiantum	capillus-veneris	United States	Texas	Kimble County
Hansen4737	Adiantum	capillus-veneris	United States	Texas	Kimble County
Hansen4737	Adiantum	capillus-veneris	United States	Texas	Kimble County
Hansen4737	Adiantum	capillus-veneris	United States	Texas	Kimble County
Ruth1003	Adiantum	capillus-veneris	United States	Texas	Tarrant County
Ruth1003	Adiantum	capillus-veneris	United States	Texas	Tarrant County
Redfearn23590	Adiantum	pedatum	United States	Arkansas	Newton County
Redfearn23590	Adiantum	pedatum	United States	Arkansas	Newton County
Redfearn23590	Adiantum	pedatum	United States	Arkansas	Newton County
Schwartz54	Adiantum	pedatum	United States	Oregon	Multnomah County
Schwartz54	Adiantum	pedatum	United States	Oregon	Multnomah County
US 2080747.2	Alsophila	camarooniana	Liberia	Bilipia	
US 2080747.1	Alsophila	camarooniana	Liberia	Bilipia	
US 2080747.3	Alsophila	camarooniana	Liberia	Bilipia	
US 2018846.1	Alsophila	capensis	South Africa	Cape Province	Plattenberg Bay
US 2018846.2	Alsophila	capensis	South Africa	Cape Province	Plattenberg Bay
US 2018846.3	Alsophila	capensis	South Africa	Cape Province	Plattenberg Bay
US 2293755.1	Alsophila	capensis	South Africa	Swaziland	King Forest, Havelock
US 2293755.2	Alsophila	capensis	South Africa	Swaziland	King Forest, Havelock
US 2293755.3	Alsophila	capensis	South Africa	Swaziland	King Forest, Havelock
US 2293755.4	Alsophila	capensis	South Africa	Swaziland	King Forest, Havelock
WAIK 14358.1	Anarthropteris	lanceolata	New Zealand	Tainui	Region
WAIK 14358.2	Anarthropteris	lanceolata	New Zealand	Tainui	Region
WAIK 8242.1	Anarthropteris	lanceolata	New Zealand	Waikato	Maungatautari
WAIK 8242.2	Anarthropteris	lanceolata	New Zealand	Waikato	Maungatautari
13053A	Anemia	mexicana	United States	Texas	Bandera County
13053A	Anemia	mexicana	United States	Texas	Bandera County
5154.1	Anemia	mexicana	United States	Texas	Bexar County
5154.1	Anemia	mexicana	United States	Texas	Bexar County
5154.2	Anemia	mexicana	United States	Texas	Bexar County
5154.2	Anemia	mexicana	United States	Texas	Bexar County

US 530603.1	Anemia	phyllitidis	Brazil	Rio Grande du Sol	Cruz
US 530603.2	Anemia	phyllitidis	Brazil	Rio Grande du Sol	Cruz
US 530603.3	Anemia	phyllitidis	Brazil	Rio Grande du Sol	Cruz
OdiaBarbosa44	Anemia	phyllitidis	Brazil	Rio Grande du Sol	Rio de Turvo
OdiaBarbosa44	Anemia	phyllitidis	Brazil	Rio Grande du Sol	Rio de Turvo
OdiaBarbosa44	Anemia	phyllitidis	Brazil	Rio Grande du Sol	Rio de Turvo
US 3508155.1	Angiopteris	angustifolia	Philippines	Laguna	Los Banos
US 3508155.2	Angiopteris	angustifolia	Philippines	Laguna	Los Banos
US 3508155.3	Angiopteris	angustifolia	Philippines	Laguna	Los Banos
US 3508153.1	Angiopteris	angustifolia	Philippines	Laguna	Nueva Vizcaya
US 3508153.2	Angiopteris	angustifolia	Philippines	Laguna	Nueva Vizcaya
US 3508153.3	Angiopteris	angustifolia	Philippines	Laguna	Nueva Vizcaya
US 1719542.1	Angiopteris	crassipes	China	NE-Yunnan	
US 1719542.2	Angiopteris	crassipes	China	NE-Yunnan	
US 1719542.3	Angiopteris	crassipes	China	NE-Yunnan	
US 3555210.1	Angiopteris	crassipes	Vietnam	Huong Son	Nga Doi
US 3555210.2	Angiopteris	crassipes	Vietnam	Huong Son	Nga Doi
US 3555210.3	Angiopteris	crassipes	Vietnam	Huong Son	Nga Doi
US 2906136.1	Angiopteris	evecta	Bawean Island	N of E. Java	summit of Mt. Besar
US 2906136.2	Angiopteris	evecta	Bawean Island	N of E. Java	summit of Mt. Besar
US 2906136.3	Angiopteris	evecta	Bawean Island	N of E. Java	summit of Mt. Besar
US 691112.1	Angiopteris	evecta	no record		
US 691112.2	Angiopteris	evecta	no record		
US 691112.3	Angiopteris	evecta	no record		
US 3481303.1	Angiopteris	palmiformis	Philippines	Bohol	Sierra Bullones
US 3481303.2	Angiopteris	palmiformis	Philippines	Bohol	Sierra Bullones
US 3569615.1	Angiopteris	palmiformis	Philippines	Kalinga	Balbalan
US 3569615.2	Angiopteris	palmiformis	Philippines	Kalinga	Balbalan
US 3569615.3	Angiopteris	palmiformis	Philippines	Kalinga	Balbalan
AQ 644968.1	Arachniodes	aristata	Australia	Queensland	Cook
AQ 644968.2	Arachniodes	aristata	Australia	Queensland	Cook
AQ 764817.1	Arachniodes	aristata	Australia	Queensland	North Kennedy
AQ 764817.2	Arachniodes	aristata	Australia	Queensland	North Kennedy
6232.1	Argyrochosma	dealbata	United States	Texas	Lampasas County
6232.2	Argyrochosma	dealbata	United States	Texas	Lampasas County
6232.2	Argyrochosma	dealbata	United States	Texas	Lampasas County
6232.2	Argyrochosma	dealbata	United States	Texas	Lampasas County
WAIK 19697.1	Asplenium	dimorphum	New Zealand	Egmont	Egmont
WAIK 19697.2	Asplenium	dimorphum	New Zealand	Egmont	Egmont
WAIK 19513.1	Asplenium	dimorphum	New Zealand	Fiord	Preservation
WAIK 19513.2	Asplenium	dimorphum	New Zealand	Fiord	Preservation
WAIK 14564.2	Asplenium	flabellifolium	New Zealand	Eastern Wairarapa	Eastern Wairarapa
WAIK 12919.1	Asplenium	flabellifolium	New Zealand	Rangitikei	Rangitikei
WAIK 12919.2	Asplenium	flabellifolium	New Zealand	Rangitikei	Rangitikei
WAIK 8852.1	Asplenium	flaccidum	New Zealand	Tainui	Kawhia
WAIK 8852.2	Asplenium	flaccidum	New Zealand	Tainui	Kawhia
WAIK 20197.1	Asplenium	flaccidum	New Zealand	Waikato	Waipa
WAIK 20197.2	Asplenium	flaccidum	New Zealand	Waikato	Waipa
WAIK 9476.1	Asplenium	oblongifolium	New Zealand	Tainui	Raglan
WAIK 9476.2	Asplenium	oblongifolium	New Zealand	Tainui	Raglan
WAIK 19523.1	Asplenium	oblongifolium	New Zealand	Waikato	Hapukohia
WAIK 19523.2	Asplenium	oblongifolium	New Zealand	Waikato	Hapukohia
WAIK 15164.1	Asplenium	obtusatum	New Zealand	Coromandel	Mercury Islands
WAIK 15164.2	Asplenium	obtusatum	New Zealand	Coromandel	Mercury Islands
WAIK 4711.1	Asplenium	obtusatum	New Zealand	Otago Coast	Dunedin
WAIK 4711.2	Asplenium	obtusatum	New Zealand	Otago Coast	Dunedin
5723	Astrolepis	integerrima	United States	Texas	Coke County
5723	Astrolepis	integerrima	United States	Texas	Coke County
5723	Astrolepis	integerrima	United States	Texas	Coke County
5860	Astrolepis	integerrima	United States	Texas	Kerr County
5860	Astrolepis	integerrima	United States	Texas	Kerr County
5860	Astrolepis	integerrima	United States	Texas	Kerr County
WAIK 9848.1	Blechnum	banksii	New Zealand	Tainui	Herangi
WAIK 9848.2	Blechnum	banksii	New Zealand	Tainui	Herangi
WAIK 1447.1	Blechnum	banksii	New Zealand	Tainui	Kawhia
WAIK 1447.2	Blechnum	banksii	New Zealand	Tainui	Kawhia
WAIK 18405.1	Blechnum	chambersii	New Zealand	Waikato	Hamilton
WAIK 18405.2	Blechnum	chambersii	New Zealand	Waikato	Hamilton
WAIK 5193.1	Blechnum	chambersii	New Zealand	Western Northland	Maungataniwha
WAIK 5193.2	Blechnum	chambersii	New Zealand	Western Northland	Maungataniwha
WAIK 6052.1	Blechnum	filiforme	New Zealand	Tainui	Raglan

WAIK 6052.2	Blechnum	filiforme	New Zealand	Tainui	Raglan
WAIK 8540.1	Blechnum	filiforme	New Zealand	Waikato	Meremere
WAIK 8540.2	Blechnum	filiforme	New Zealand	Waikato	Meremere
WAIK 7361.1	Blechnum	membranaceum	New Zealand	Waikato	Hamilton
WAIK 7361.2	Blechnum	membranaceum	New Zealand	Waikato	Hamilton
WAIK 18036.1	Blechnum	membranaceum	New Zealand	Waikato	Mangatautari
WAIK 18036.2	Blechnum	membranaceum	New Zealand	Waikato	Mangatautari
17496.1	Blechnum	serrulatum	Belize		
17496.1	Blechnum	serrulatum	Belize		
17496.1	Blechnum	serrulatum	Belize		
WAIK 6321.1	Blechnum	novae-zealandiae	New Zealand	Tainui	Kawhia
WAIK 6321.2	Blechnum	novae-zealandiae	New Zealand	Tainui	Kawhia
WAIK 19019.1	Blechnum	novae-zealandiae	New Zealand	Waikato	Hamilton
WAIK 19019.2	Blechnum	novae-zealandiae	New Zealand	Waikato	Hamilton
US 2415484.1	Botrychium	bitermatum	United States	Ohio	Jackson County
US 2415484.2	Botrychium	bitermatum	United States	Ohio	Jackson County
US 2415484.3	Botrychium	bitermatum	United States	Ohio	Jackson County
US 2415484.4	Botrychium	bitermatum	United States	Ohio	Jackson County
US 2415484.5	Botrychium	bitermatum	United States	Ohio	Jackson County
US 2415484.6	Botrychium	bitermatum	United States	Ohio	Jackson County
311.1A	Botrychium	bitermatum	United States	Texas	Anderson County
311.1b	Botrychium	bitermatum	United States	Texas	Anderson County
311.1c	Botrychium	bitermatum	United States	Texas	Anderson County
311.1D	Botrychium	bitermatum	United States	Texas	Anderson County
311.1e	Botrychium	bitermatum	United States	Texas	Anderson County
US 674866.1	Botrychium	dissectum	United States	New York	Floyd
US 674866.2	Botrychium	dissectum	United States	New York	Floyd
US 674866.3	Botrychium	dissectum	United States	New York	Floyd
US 674866.4	Botrychium	dissectum	United States	New York	Floyd
US 674866.5	Botrychium	dissectum	United States	New York	Floyd
US 674866.6	Botrychium	dissectum	United States	New York	Floyd
US 674866.7	Botrychium	dissectum	United States	New York	Floyd
US 674866.8	Botrychium	dissectum	United States	New York	Floyd
US 674844.2	Botrychium	dissectum	United States	New York	Oneida County
US 674844.3	Botrychium	dissectum	United States	New York	Oneida County
US 674844.4	Botrychium	dissectum	United States	New York	Oneida County
US 674844.5	Botrychium	dissectum	United States	New York	Oneida County
US 510789.1	Botrychium	jenmanii	United States	Alabama	Mobile County
US 510789.2	Botrychium	jenmanii	United States	Alabama	Mobile County
US 510789.3	Botrychium	jenmanii	United States	Alabama	Mobile County
US 510789.4	Botrychium	jenmanii	United States	Alabama	Mobile County
US 1631813.1	Botrychium	jenmanii	United States	Georgia	Clarke County
US 1631813.2	Botrychium	jenmanii	United States	Georgia	Clarke County
US 1631813.3	Botrychium	jenmanii	United States	Georgia	Clarke County
US 1631813.6	Botrychium	jenmanii	United States	Georgia	Clarke County
US 1631813.7	Botrychium	jenmanii	United States	Georgia	Clarke County
Holmes 7602.1	Botrychium	lunarioides	United States	Texas	Anderson County
Holmes 7602.1	Botrychium	lunarioides	United States	Texas	Anderson County
Holmes 7602.2	Botrychium	lunarioides	United States	Texas	Anderson County
Holmes 7602.2	Botrychium	lunarioides	United States	Texas	Anderson County
Singhurst 4806	Botrychium	lunarioides	United States	Texas	Bastrop County
Singhurst 4806	Botrychium	lunarioides	United States	Texas	Bastrop County
Singhurst 4805	Botrychium	lunarioides	United States	Texas	Bowie County
Singhurst 4805	Botrychium	lunarioides	United States	Texas	Bowie County
Singhurst 4802	Botrychium	lunarioides	United States	Texas	Cass County
Singhurst 4802	Botrychium	lunarioides	United States	Texas	Cass County
409	Botrychium	lunarioides	United States	Texas	Freestone County
409	Botrychium	lunarioides	United States	Texas	Freestone County
Zygo 208	Botrychium	lunarioides	United States	Texas	Freestone County
Zygo 208	Botrychium	lunarioides	United States	Texas	Freestone County
10767.1	Botrychium	lunarioides	United States	Texas	Houston County
10767.1	Botrychium	lunarioides	United States	Texas	Houston County
10767.2	Botrychium	lunarioides	United States	Texas	Houston County
10767.2	Botrychium	lunarioides	United States	Texas	Houston County
Holmes 9410	Botrychium	lunarioides	United States	Texas	Marion County
Holmes 9410	Botrychium	lunarioides	United States	Texas	Marion County
US 2927546.1	Calochlaena	straminea	New Guinea		Mt. Riu
US 2927546.2	Calochlaena	straminea	New Guinea		Mt. Riu
US 2927546.3	Calochlaena	straminea	New Guinea		Mt. Riu
US 2927546.4	Calochlaena	straminea	New Guinea		Mt. Riu
US 1918390.1	Calochlaena	straminea	Pacific Islands	Manus Island	Bulihat

US 1918390.2	Calochlaena	straminea	Pacific Islands	Manus Island	Bulihat
WELT P17575.1	Cheilanthes	distans	New Zealand	Auckland	Colville
WELT P17575.2	Cheilanthes	distans	New Zealand	Auckland	Colville
WELT P020377.1	Cheilanthes	distans	New Zealand	Banks	Herbert
WELT P020377.2	Cheilanthes	distans	New Zealand	Banks	Herbert
WELT P002918.2	Cheilanthes	sieberi	New Zealand	Lakes	Wanaka
WELT P022918.1	Cheilanthes	sieberi	New Zealand	Lakes	Wanaka
US 2255285.1	Cheiropleura	bicuspis	Japan	Ryuku Islands	Henochi (Benochi)
US 2255285.2	Cheiropleura	bicuspis	Japan	Ryuku Islands	Henochi (Benochi)
US 2255285.3	Cheiropleura	bicuspis	Japan	Ryuku Islands	Henochi (Benochi)
US 2255044.1	Cheiropleura	bicuspis	Japan	Ryuku Islands	Toguchi Village, Motobu Peninsula
US 2255044.2	Cheiropleura	bicuspis	Japan	Ryuku Islands	Toguchi Village, Motobu Peninsula
US 2255044.3	Cheiropleura	bicuspis	Japan	Ryuku Islands	Toguchi Village, Motobu Peninsula
US 652133.1	Christensenia	aesculifolia	Indonesia	West Java	Mount Salak
US 652133.2	Christensenia	aesculifolia	Indonesia	West Java	Mount Salak
US 1262739.1	Christensenia	lobbiana	Philippines	Jamindan Capiz	Panay
US 1262739.2	Christensenia	lobbiana	Philippines	Jamindan Capiz	Panay
US 902770	Christensenia	lobbiana	Philippines	Laguna	Mt. Maquiling
US 1718247	Christensenia	lobbiana	Philippines	Mindanao Island	San Ramon
US 1793133.1	Cibotium	regale	Guatemala	Volcan Tajumulco	
US 1793133.2	Cibotium	regale	Guatemala	Volcan Tajumulco	
US 1793133.3	Cibotium	regale	Guatemala	Volcan Tajumulco	
US 1792976.1	Cibotium	regale	Guatemala	Zacapa	Sierra de la Minas
US 1792976.2	Cibotium	regale	Guatemala	Zacapa	Sierra de la Minas
US 2416108.1	Cibotium	schiedei	California	Los Angeles	Santa Monica Canyon
US 2416108.2	Cibotium	schiedei	California	Los Angeles	Santa Monica Canyon
US 2416108.3	Cibotium	schiedei	California	Los Angeles	Santa Monica Canyon
US 2254822.1	Cibotium	schiedei	United States	Pennsylvania	Longwood Garden Greenhouse
US 2254822.2	Cibotium	schiedei	United States	Pennsylvania	Longwood Garden Greenhouse
US 2254822.3	Cibotium	schiedei	United States	Pennsylvania	Longwood Garden Greenhouse
AQ 671629.1	Coveniella	poecilophlebia	Australia	Queensland	Cook
AQ 671629.2	Coveniella	poecilophlebia	Australia	Queensland	Cook
AQ 549197.1	Coveniella	poecilophlebia	Australia	Queensland	North Kennedy
AQ 549197.2	Coveniella	poecilophlebia	Australia	Queensland	North Kennedy
AQ 609934.1	Crepidomanes	barnardianum	Australia	Queensland	Cook
AQ 609934.2	Crepidomanes	barnardianum	Australia	Queensland	Cook
AQ 646908.1	Crepidomanes	barnardianum	Australia	Queensland	North Kennedy
AQ 646908.2	Crepidomanes	barnardianum	Australia	Queensland	North Kennedy
AQ 002599.1	Crepidomanes	bipunctatum	Australia	Queensland	Cook
AQ 002599.2	Crepidomanes	bipunctatum	Australia	Queensland	Cook
AQ 733693.1	Crepidomanes	bipunctatum	Australia	Queensland	North Kennedy
AQ 733693.2	Crepidomanes	bipunctatum	Australia	Queensland	North Kennedy
AQ 396088.1	Crepidomanes	brevipes	Guam	Agat	Mt. Lamlam
AQ 396088.2	Crepidomanes	brevipes	Guam	Agat	Mt. Lamlam
AQ 396088.3	Crepidomanes	brevipes	Guam	Agat	Mt. Lamlam
AQ 309822.2	Crepidomanes	christii	Malaysia	Pahang	Singer Merahoh
AQ 610044.1	Crepidomanes	saxifragoides	Australia	Queensland	Cook
AQ 610044.2	Crepidomanes	saxifragoides	Australia	Queensland	Cook
AQ 718506.1	Crepidomanes	saxifragoides	Australia	Queensland	North Kennedy
AQ 718506.2	Crepidomanes	saxifragoides	Australia	Queensland	North Kennedy
AQ 171589.1	Crypsinus	enervis	New Guinea	Central	Mafulu
AQ 171589.2	Crypsinus	enervis	New Guinea	Central	Mafulu
AQ 171590.1	Crypsinus	enervis	New Guinea		Deva Deva
AQ 171590.2	Crypsinus	enervis	New Guinea		Deva Deva
AQ 569155.1	Crypsinus	simplicissimus	Australia	Queensland	Cook
AQ 569155.2	Crypsinus	simplicissimus	Australia	Queensland	Cook
AQ 497577.1	Crypsinus	simplicissimus	Australia	Queensland	North Kennedy
AQ 497577.2	Crypsinus	simplicissimus	Australia	Queensland	North Kennedy
Pace744.1	Cryptogramma	acrostichoides	United States	Colorado	Boulder County
Pace744.2	Cryptogramma	acrostichoides	United States	Colorado	Boulder County
Pace744.3	Cryptogramma	acrostichoides	United States	Colorado	Boulder County
WELT P021280.1	Ctenopteris	heterophylla	New Zealand	Auckland	Manukau
WELT P021280.2	Ctenopteris	heterophylla	New Zealand	Auckland	Manukau
Welt.Perrie 006.1	Ctenopteris	heterophylla	New Zealand	Manawatu Gorge	South Manawatu Gorge

Welt.Perrie 006.2	Ctenopteris	heterophylla	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 006.3	Ctenopteris	heterophylla	New Zealand	Manawatu Gorge	South Manawatu Gorge
US 2356593.1	Culcita	coniifolia	Costa Rica	La Chonta	Interamerican Hwy
US 2356593.2	Culcita	coniifolia	Costa Rica	La Chonta	Interamerican Hwy
US 2356593.3	Culcita	coniifolia	Costa Rica	La Chonta	Interamerican Hwy
US 2356593.4	Culcita	coniifolia	Costa Rica	La Chonta	Interamerican Hwy
US 2356593.5	Culcita	coniifolia	Costa Rica	La Chonta	Interamerican Hwy
US 3479458.1	Culcita	coniifolia	Dominican Republic	Cordillera Central	Province La Vega
US 3479458.2	Culcita	coniifolia	Dominican Republic	Cordillera Central	Province La Vega
US 3479458.4	Culcita	coniifolia	Dominican Republic	Cordillera Central	Province La Vega
US 3479458.5	Culcita	coniifolia	Dominican Republic	Cordillera Central	Province La Vega
AQ 145934.1	Cyathea	aeneifolia	New Guinea	South Highland	Tari
AQ 145934.2	Cyathea	aeneifolia	New Guinea	South Highland	Tari
AQ 145935.1	Cyathea	aeneifolia	New Guinea	Western Highlands	Toomba
AQ 145935.2	Cyathea	aeneifolia	New Guinea	Western Highlands	Toomba
AQ 368795.1	Cyathea	albifrons	New Caledonia	Montagne des Sources reserve	Noumea
AQ 368795.2	Cyathea	albifrons	New Caledonia	Montagne des Sources reserve	Noumea
AQ 420699.1	Cyathea	albifrons	New Caledonia	Voh	Mt. Koniambo
AQ 420699.2	Cyathea	albifrons	New Caledonia	Voh	Mt. Koniambo
AQ 146482.1	Cyathea	archboldii	New Guinea	Bougainville	Kupei
AQ 146482.2	Cyathea	archboldii	New Guinea	Bougainville	Kupei
AQ 146567.1	Cyathea	archboldii	New Guinea	Morobe	Wau
AQ 146567.2	Cyathea	archboldii	New Guinea	Morobe	Wau
AQ 145952.1	Cyathea	atrox	New Guinea	Eastern Highlands	Goroka
AQ 145952.2	Cyathea	atrox	New Guinea	Eastern Highlands	Goroka
AQ 295730.1	Cyathea	atrox	New Guinea	Western Highlands	Mt. Hagen
AQ 295730.2	Cyathea	atrox	New Guinea	Western Highlands	Mt. Hagen
AQ 566333.1	Cyathea	australis	Australia	Queensland	Moreton
AQ 566333.2	Cyathea	australis	Australia	Queensland	Moreton
AQ 433795.1	Cyathea	australis	Australia	Queensland	Port Curtis
AQ 433795.2	Cyathea	australis	Australia	Queensland	Port Curtis
WAIK 16041.1	Cyclosorus	interruptus	New Zealand	Northern Volcanic Plateau	Tauranga
WAIK 16041.2	Cyclosorus	interruptus	New Zealand	Northern Volcanic Plateau	Tauranga
WAIK 8021.1	Cyclosorus	interruptus	New Zealand	Tainui	Kawhia
WAIK 8021.2	Cyclosorus	interruptus	New Zealand	Tainui	Kawhia
WELT P020570.1	Cyrtomium	falcatum	New Zealand	Auckland	Inner Gulf Islands
WELT P020570.2	Cyrtomium	falcatum	New Zealand	Auckland	Inner Gulf Islands
14294	Cyrtomium	falcatum	United States	Texas	Houston County
14294	Cyrtomium	falcatum	United States	Texas	Houston County
14294	Cyrtomium	falcatum	United States	Texas	Houston County
17692	Cyrtomium	falcatum	United States	Texas	Houston County
17692	Cyrtomium	falcatum	United States	Texas	Houston County
17692	Cyrtomium	falcatum	United States	Texas	Houston County
WELT P022306.1	Cystopteris	fragilis	New Zealand	Auckland	Manukau
WELT P022306.2	Cystopteris	fragilis	New Zealand	Auckland	Manukau
Hurst s.n.	Cystopteris	fragilis	United States	Indiana	Tippecanoe County
Hurst s.n.	Cystopteris	fragilis	United States	Indiana	Tippecanoe County
Dunton s.n.	Cystopteris	protrusa	United States	North Carolina	McDowell County
Dunton s.n.	Cystopteris	protrusa	United States	North Carolina	McDowell County
Dunton s.n.	Cystopteris	protrusa	United States	North Carolina	McDowell County
Dunton s.n.	Cystopteris	protrusa	United States	North Carolina	McDowell County
Dunton s.n.	Cystopteris	protrusa	United States	North Carolina	McDowell County
WELT P020856.1	Cystopteris	tasmanica	New Zealand	Canterbury Plains	High Plains
WELT P8992.1	Cystopteris	tasmanica	New Zealand	Inland Marlborough	Waihopai
WELT P8992.2	Cystopteris	tasmanica	New Zealand	Inland Marlborough	Waihopai
US 1493831.1	Danaea	elliptica	Belize	El Cayo	
US 1493831.2	Danaea	elliptica	Belize	El Cayo	
US 1493831.3	Danaea	elliptica	Belize	El Cayo	
US 2018157.1	Danaea	elliptica	Guatemala	Sierra de los Cuchumatanes	between Ixcán and Rio Ixcán
US 2018157.2	Danaea	elliptica	Guatemala	Sierra de los Cuchumatanes	between Ixcán and Rio Ixcán
US 2018157.3	Danaea	elliptica	Guatemala	Sierra de los Cuchumatanes	between Ixcán and Rio Ixcán
US 2356343.1	Danaea	moritziana	Costa Rica	Cartago	Cervantes
US 2356343.2	Danaea	moritziana	Costa Rica	Cartago	Cervantes
US 2356343.3	Danaea	moritziana	Costa Rica	Cartago	Cervantes

US 2776145.1	Danaea	moritziana	Costa Rica	Heredia	Rio Vueltas
US 2776145.2	Danaea	moritziana	Costa Rica	Heredia	Rio Vueltas
US 2776145.3	Danaea	moritziana	Costa Rica	Heredia	Rio Vueltas
US 464884.1	Danaea	nodosa	Mexico	Chiapas	
US 464884.2	Danaea	nodosa	Mexico	Chiapas	
US 3057554.1	Danaea	nodosa	Mexico	Oaxaca	Rio de la Trucha
US 3057554.2	Danaea	nodosa	Mexico	Oaxaca	Rio de la Trucha
US 3057554.3	Danaea	nodosa	Mexico	Oaxaca	Rio de la Trucha
AQ 815249.1	Davallia	denticulata	Australia	Queensland	Cook
AQ 815249.2	Davallia	denticulata	Australia	Queensland	Cook
AQ 020001.1	Davallia	denticulata	Australia	Queensland	Cook
AQ 020001.2	Davallia	denticulata	Australia	Queensland	Cook
AQ 020001.3	Davallia	denticulata	Australia	Queensland	Cook
AQ 020031.1	Davallia	denticulata	Australia	Queensland	North Kennedy
AQ 020031.2	Davallia	denticulata	Australia	Queensland	North Kennedy
AQ 020066.1	Davallia	pyxidata	Australia	Queensland	Cook
AQ 020066.2	Davallia	pyxidata	Australia	Queensland	Cook
AQ 629805.1	Davallia	pyxidata	Australia	Queensland	North Kennedy
AQ 629805.2	Davallia	pyxidata	Australia	Queensland	North Kennedy
AQ 020094.1	Davallia	solida	Australia	Queensland	Cook
AQ 020094.2	Davallia	solida	Australia	Queensland	Cook
AQ 520103.1	Davallia	solida	Australia	Queensland	Moreton
AQ 520103.2	Davallia	solida	Australia	Queensland	Moreton
US 2137257.1	Dicksonia	giganta	El Salvador	Los Esesmiles	cloud forest
US 2137257.2	Dicksonia	giganta	El Salvador	Los Esesmiles	cloud forest
US 2017091.1	Dicksonia	giganta	Honduras	Cerro de Uyuca	cloud forest
US 2017091.2	Dicksonia	giganta	Honduras	Cerro de Uyuca	cloud forest
US 1744662.3	Dicksonia	karsteniana	Colombia	Aguadila	
US 1744662.4	Dicksonia	karsteniana	Colombia	Aguadila	
US 1744662.1	Dicksonia	karsteniana	Colombia	Aguadila	
US 1744662.2	Dicksonia	karsteniana	Colombia	Aguadila	
US 1616029.1	Dicksonia	karsteniana	Ecuador	Western Cordillera	Mt. Chimborazo
US 1616029.2	Dicksonia	karsteniana	Ecuador	Western Cordillera	Mt. Chimborazo
US 1616029.3	Dicksonia	karsteniana	Ecuador	Western Cordillera	Mt. Chimborazo
US 1616029.4	Dicksonia	karsteniana	Ecuador	Western Cordillera	Mt. Chimborazo
US 3381720.1	Dicranopteris	flexuosa	Puerto Rico	Arecibo	Rio Abajo State Forest
US 3381720.2	Dicranopteris	flexuosa	Puerto Rico	Arecibo	Rio Abajo State Forest
US3033944.1	Dicranopteris	flexuosa	Puerto Rico	Sierra de Luquillo	Caribbean National Forest
US3033944.2	Dicranopteris	flexuosa	Puerto Rico	Sierra de Luquillo	Caribbean National Forest
US 2084111.1	Dicranopteris	linearis	India	Assam	Morau
US 2084111.2	Dicranopteris	linearis	India	Assam	Morau
US 3005599.1	Dicranopteris	linearis	India	Madras	Billigirirangan Hills
US 3005599.2	Dicranopteris	linearis	India	Madras	Billigirirangan Hills
AQ 590070.1	Dictymia	brownii	Australia	Queensland	Cook
AQ 590070.2	Dictymia	brownii	Australia	Queensland	Cook
AQ 647177.1	Dictymia	brownii	Australia	Queensland	North Kennedy
AQ 647177.2	Dictymia	brownii	Australia	Queensland	North Kennedy
US 1915124.1	Diplopterygium	bancroftii	Venezuela	Bolivar	Mt. Roraima
US 1915124.2	Diplopterygium	bancroftii	Venezuela	Bolivar	Mt. Roraima
US 1915124.3	Diplopterygium	bancroftii	Venezuela	Bolivar	Mt. Roraima
US 2359241.1	Diplopterygium	bancroftii	Venezuela	Bolivar	Sarven-tepui
US 2359241.2	Diplopterygium	bancroftii	Venezuela	Bolivar	Sarven-tepui
US 2359241.3	Diplopterygium	bancroftii	Venezuela	Bolivar	Sarven-tepui
US 456677.1	Dipteris	conjugata	China	Meng-tsze	
US 456677.2	Dipteris	conjugata	China	Meng-tsze	
US 456677.3	Dipteris	conjugata	China	Meng-tsze	
US 1053780	Dipteris	conjugata	Japan	Kinrung Formosa	Suihenkyoku
US 2416106.1	Dipteris	conjugata	Perak	Malaya	Maxwells Hill
US 2416106.2	Dipteris	conjugata	Perak	Malaya	Maxwells Hill
AQ 815637.1	Doodia	aspera	Australia	Queensland	Cook
AQ 815637.2	Doodia	aspera	Australia	Queensland	Cook
AQ 745369.1	Doodia	aspera	Australia	Queensland	Wide Bay
AQ 745369.2	Doodia	aspera	Australia	Queensland	Wide Bay
AQ 768558.1	Doodia	australis	Australia	Queensland	Leichhardt
AQ 768558.2	Doodia	australis	Australia	Queensland	Leichhardt
AQ 145800.1	Doodia	australis	Australia	Queensland	Moreton
AQ 145800.2	Doodia	australis	Australia	Queensland	Moreton
AQ 439692.1	Doodia	breckenridgei	Fiji	Nadarivatu	Mt. Victoria

AQ 439692.2	Doodia	breckenridgeii	Fiji	Nadarivatu	Mt. Victoria
AQ 145793.1	Doodia	breckenridgeii	Fiji	Nausori Highlands	Namosi Creek
AQ 145793.2	Doodia	breckenridgeii	Fiji	Nausori Highlands	Namosi Creek
AQ 558352.1	Doodia	caudata	Australia	Queensland	Cook
AQ 558352.2	Doodia	caudata	Australia	Queensland	Cook
AQ 545770.1	Doodia	caudata	Australia	Queensland	North Kennedy
AQ 545770.2	Doodia	caudata	Australia	Queensland	North Kennedy
AQ 614776.1	Doodia	heterophylla	Australia	Queensland	Moreton
AQ 614776.2	Doodia	heterophylla	Australia	Queensland	Moreton
AQ 391440.1	Drymoglossum	heterophyllum	Sri Lanka	Dambulla	Erawalagala Mountain
AQ 391440.2	Drymoglossum	heterophyllum	Sri Lanka	Dambulla	Erawalagala Mountain
AQ 391440.3	Drymoglossum	heterophyllum	Sri Lanka	Dambulla	Erawalagala Mountain
AQ 369998	Drynaria	quercifolia	Australia	Queensland	Cook
AQ 399903	Drynaria	quercifolia	Australia	Queensland	Cook
AQ 171736	Drynaria	rigidula	Australia	Queensland	Cook
AQ 330151.1	Drynaria	rigidula	Australia	Queensland	Cook
AQ 330151.2	Drynaria	rigidula	Australia	Queensland	Cook
AQ 613078.1	Drynaria	rigidula	Australia	Queensland	North Kennedy
AQ 613078.2	Drynaria	rigidula	Australia	Queensland	North Kennedy
AQ 175557	Drynaria	sparsisora	Australia	Queensland	Cook
WAIK 6311.1	Dryopteris	affinis	New Zealand	Waikato	Hamilton
WAIK 6311.2	Dryopteris	affinis	New Zealand	Waikato	Hamilton
WAIK 9312.1	Dryopteris	affinis	New Zealand	Waikato	Hamilton
WAIK 9312.2	Dryopteris	affinis	New Zealand	Waikato	Hamilton
WELT P20870b.1	Dryopteris	filix-mas	New Zealand	Egmont	Egmont
WELT P20870b.2	Dryopteris	filix-mas	New Zealand	Egmont	Egmont
WELT P10260.1	Dryopteris	filix-mas	New Zealand	Waikato	Hamilton
WELT P10260.2	Dryopteris	filix-mas	New Zealand	Waikato	Hamilton
Holmes4469	Eriosorus	flexuosus	United States	Arkansas	Newton County
Holmes4469	Eriosorus	flexuosus	United States	Oregon	Multnomah County
Holmes4469	Eriosorus	flexuosus	United States	Texas	Kimble County
Holmes4469	Eriosorus	flexuosus	United States	Texas	Tarrant County
AQ 772815.1	Goniophlebium	percussum	Australia	Queensland	Cook
AQ 772815.2	Goniophlebium	percussum	Australia	Queensland	Cook
AQ 172758.1	Goniophlebium	percussum	New Guinea	Marobe	Wau
AQ 172758.2	Goniophlebium	percussum	New Guinea	Marobe	Wau
AQ 599462.1	Goniophlebium	subauriculatum	Australia	Queensland	Cook
AQ 599462.2	Goniophlebium	subauriculatum	Australia	Queensland	Cook
AQ 746511.1	Goniophlebium	subauriculatum	Australia	Queensland	North Kennedy
Clements154	Gymnocarpium	dryopteris	United States	Michigan	Antrim County
Clements154	Gymnocarpium	dryopteris	United States	Michigan	Antrim County
US 1349662.1	Helminthostachys	zeylanica	Malaysia	Sabah	Banguey Island
US 1349662.2	Helminthostachys	zeylanica	Malaysia	Sabah	Banguey Island
US 1918496.1	Helminthostachys	zeylanica	Papua New Guinea	Admiralty Islands	Los Negros Island
US 1918496.2	Helminthostachys	zeylanica	Papua New Guinea	Admiralty Islands	Los Negros Island
US 1681420.1	Helminthostachys	zeylanica	Sumatra	Padang Si Dimpoean	Padang Lawas
US 1681420.2	Helminthostachys	zeylanica	Sumatra	Padang Si Dimpoean	Padang Lawas
US 1915638.1	Hymenophyllopsis	ctenitoides	Venezuela	Bolivar	Mt. Roraima
US 547448.1	Hymenophyllopsis	ctenitoides	Venezuela	Bolivar	Mt. Roraima
US 547448.2	Hymenophyllopsis	ctenitoides	Venezuela	Bolivar	Mt. Roraima
US 547448.3	Hymenophyllopsis	ctenitoides	Venezuela	Bolivar	Mt. Roraima
US 1915630.1	Hymenophyllopsis	hymenophylloides	Venezuela	Amazonas	summit of Cerro Duida
US 1915630.2	Hymenophyllopsis	hymenophylloides	Venezuela	Amazonas	summit of Cerro Duida
US 1915630.3	Hymenophyllopsis	hymenophylloides	Venezuela	Amazonas	summit of Cerro Duida
US 2295026.1	Hymenophyllopsis	hymenophylloides	Venezuela	Bolivar	headwaters of Rio Venamo
US 2295026.2	Hymenophyllopsis	hymenophylloides	Venezuela	Bolivar	headwaters of Rio Venamo
US 2295026.3	Hymenophyllopsis	hymenophylloides	Venezuela	Bolivar	headwaters of Rio Venamo
WAIK 9537.1	Hymenophyllum	atrovirens	New Zealand	Northern Volcanic Plateau	Otaneweinuku
WAIK 9537.2	Hymenophyllum	atrovirens	New Zealand	Northern Volcanic Plateau	Otaneweinuku
WAIK 14591.1	Hymenophyllum	atrovirens	New Zealand	Tararua	Tararua
WAIK 14591.2	Hymenophyllum	atrovirens	New Zealand	Tararua	Tararua
WAIK 18034.1	Hymenophyllum	demissum	New Zealand	Waikato	Hamilton
WAIK 18464.1	Hymenophyllum	ferrugineum	New Zealand	Coromandel	Te Aroha

WAIK 18464.2	Hymenophyllum	ferrugineum	New Zealand	Coromandel	Te Aroha
WAIK 688.1	Hymenophyllum	ferrugineum	New Zealand	Waikato	Hinuera
WAIK 688.2	Hymenophyllum	ferrugineum	New Zealand	Waikato	Hinuera
WAIK 16249.2	Hymenophyllum	flabellatum	New Zealand	Northern Volcanic Plateau	Otaneweinuku
WAIK 17589.1	Hymenophyllum	flabellatum	New Zealand	Waikato	Hinuera
WAIK 16239.1	Hymenophyllum	lyallii	New Zealand	Coromandel	Great Barrier
WAIK 16239.2	Hymenophyllum	lyallii	New Zealand	Coromandel	Great Barrier
WAIK 15079.1	Hymenophyllum	lyallii	New Zealand	Tainui	Herangi
WAIK 15079.2	Hymenophyllum	lyallii	New Zealand	Tainui	Herangi
AQ 546214.1	Lastreopsis	decomposita	Australia	Queensland	Darling Downs
AQ 546214.2	Lastreopsis	decomposita	Australia	Queensland	Darling Downs
AQ 768544.1	Lastreopsis	decomposita	Australia	Queensland	Leichhardt
AQ 768544.2	Lastreopsis	decomposita	Australia	Queensland	Leichhardt
AQ 727574.1	Lastreopsis	marginans	Australia	Queensland	Moreton
AQ 727574.2	Lastreopsis	marginans	Australia	Queensland	Moreton
AQ 841043.1	Lastreopsis	marginans	Australia	Queensland	Wide Bay
AQ 841043.2	Lastreopsis	marginans	Australia	Queensland	Wide Bay
AQ 641506.1	Lastreopsis	microsora	Australia	Queensland	Burnett
AQ 641506.2	Lastreopsis	microsora	Australia	Queensland	Burnett
AQ 743968.1	Lastreopsis	microsora	Australia	Queensland	Wide Bay
AQ 743968.2	Lastreopsis	microsora	Australia	Queensland	Wide Bay
AQ 546266.1	Lastreopsis	munita	Australia	Queensland	Darling Downs
AQ 546266.2	Lastreopsis	munita	Australia	Queensland	Darling Downs
AQ 841042.1	Lastreopsis	munita	Australia	Queensland	Wide Bay
AQ 841042.2	Lastreopsis	munita	Australia	Queensland	Wide Bay
AQ 841042.3	Lastreopsis	munita	Australia	Queensland	Wide Bay
AQ 616938.1	Lastreopsis	rufescens	Australia	Queensland	Cook
AQ 616938.2	Lastreopsis	rufescens	Australia	Queensland	Cook
AQ 770638.1	Lastreopsis	rufescens	Australia	Queensland	North Kennedy
AQ 770638.2	Lastreopsis	rufescens	Australia	Queensland	North Kennedy
Welt.Perrie 005.2	Leptolepia	novae-zealandiae	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 005.3	Leptolepia	novae-zealandiae	New Zealand	Manawatu Gorge	South Manawatu Gorge
WELT P020989.1	Leptolepia	novae-zealandiae	New Zealand	Ruahine	Ruahine
WELT P020989.2	Leptolepia	novae-zealandiae	New Zealand	Ruahine	Ruahine
Welt.Perrie 003.1	Leptopteris	hymenophylloides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 003.2	Leptopteris	hymenophylloides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 003.3	Leptopteris	hymenophylloides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 004.1	Leptopteris	hymenophylloides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 004.2	Leptopteris	hymenophylloides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 004.3	Leptopteris	hymenophylloides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 001.2	Leptopteris	superba	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 001.3	Leptopteris	superba	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 002.1	Leptopteris	superba	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 002.2	Leptopteris	superba	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 002.3	Leptopteris	superba	New Zealand	Manawatu Gorge	South Manawatu Gorge
WELT P021009.1	Lexogramme	dictyopteris	New Zealand	Eastern Northland	Eastern Northland and Islands
WELT P021009.2	Lexogramme	dictyopteris	New Zealand	Eastern Northland	Eastern Northland and Islands
WELT P18317.1	Lexogramme	dictyopteris	New Zealand	Western Northland	Maungataniwha
WELT P18317.2	Lexogramme	dictyopteris	New Zealand	Western Northland	Maungataniwha
AQ 722804.1	Lindsaea	brachypoda	Australia	Queensland	North Kennedy
AQ 722804.2	Lindsaea	brachypoda	Australia	Queensland	North Kennedy
AQ 815191.1	Lindsaea	ensifolia	Australia	Queensland	Cook
AQ 815191.2	Lindsaea	ensifolia	Australia	Queensland	Cook
AQ 596891.1	Lindsaea	ensifolia	Australia	Queensland	North Kennedy
AQ 596891.2	Lindsaea	ensifolia	Australia	Queensland	North Kennedy
AQ 671766.1	Lindsaea	microphylla	Australia	Queensland	Leichhardt
AQ 671766.2	Lindsaea	microphylla	Australia	Queensland	Leichhardt
AQ 766644.1	Lindsaea	microphylla	Australia	Queensland	North Kennedy
AQ 766644.2	Lindsaea	microphylla	Australia	Queensland	North Kennedy

AQ 766644.3	Lindsaea	microphylla	Australia	Queensland	North Kennedy
AQ 149072.1	Lindsaea	obtusa	Australia	Queensland	Moreton
AQ 149072.2	Lindsaea	obtusa	Australia	Queensland	Moreton
AQ 617250.1	Lindsaea	obtusa	Australia	Queensland	North Kennedy
AQ 617250.2	Lindsaea	obtusa	Australia	Queensland	North Kennedy
Welt.Perrie 007.1	Lindsaea	trichomanoides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 007.2	Lindsaea	trichomanoides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 007.3	Lindsaea	trichomanoides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 008.1	Lindsaea	trichomanoides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 008.2	Lindsaea	trichomanoides	New Zealand	Manawatu Gorge	South Manawatu Gorge
Welt.Perrie 008.3	Lindsaea	trichomanoides	New Zealand	Manawatu Gorge	South Manawatu Gorge
US 2255557.1	Lophosoria	quadripinnata	Mexico	Hidalgo	E. of Acaxochitlan
US 2255557.2	Lophosoria	quadripinnata	Mexico	Hidalgo	E. of Acaxochitlan
US 3319867.1	Lophosoria	quadripinnata	Mexico	Tlalchinol	Alrededores
US 3319867.2	Lophosoria	quadripinnata	Mexico	Tlalchinol	Alrededores
WAIK 6600C.1	Loxoma	cunninghamii	New Zealand	Coromandel	Tairua
WAIK 6600C.2	Loxoma	cunninghamii	New Zealand	Coromandel	Tairua
WAIK 3396.1	Loxoma	cunninghamii	New Zealand	Coromandel	Thames
WAIK 3396.2	Loxoma	cunninghamii	New Zealand	Coromandel	Thames
Holmes11057	Lygodium	japonicum	United States	Texas	Newton County
Holmes11057	Lygodium	japonicum	United States	Texas	Newton County
Holmes6297	Lygodium	japonicum	United States	Texas	Walker County
Holmes6297	Lygodium	japonicum	United States	Texas	Walker County
Holmes6297	Lygodium	japonicum	United States	Texas	Walker County
AQ 783085.1	Lygodium	microphyllum	Australia	Queensland	Moreton
AQ 783085.2	Lygodium	microphyllum	Australia	Queensland	Moreton
AQ 771681.1	Lygodium	microphyllum	Australia	Queensland	Wide Bay
AQ 771681.2	Lygodium	microphyllum	Australia	Queensland	Wide Bay
Leonard2804	Lygodium	palmatum	United States	North Carolina	Cumberland County
Leonard2804	Lygodium	palmatum	United States	North Carolina	Cumberland County
Thomas153691	Lygodium	palmatum	United States	Tennessee	Monroe County
Thomas153691	Lygodium	palmatum	United States	Tennessee	Monroe County
AQ 748655.1	Lygodium	reticulatum	Australia	Queensland	Cook
AQ 748655.2	Lygodium	reticulatum	Australia	Queensland	Cook
AQ 613080.1	Lygodium	reticulatum	Australia	Queensland	North Kennedy
AQ 613080.2	Lygodium	reticulatum	Australia	Queensland	North Kennedy
AQ 647160.1	Macrothelypteris	polypodioides	Australia	Queensland	Cook
AQ 647160.2	Macrothelypteris	polypodioides	Australia	Queensland	Cook
AQ 596884.1	Macrothelypteris	polypodioides	Australia	Queensland	South Kennedy
AQ 596884.2	Macrothelypteris	polypodioides	Australia	Queensland	South Kennedy
AQ 375683.1	Macrothelypteris	torresiana	Australia	Queensland	Cook
AQ 375683.2	Macrothelypteris	torresiana	Australia	Queensland	Cook
AQ 548303.1	Macrothelypteris	torresiana	Australia	Queensland	North Kennedy
AQ 548303.2	Macrothelypteris	torresiana	Australia	Queensland	North Kennedy
AQ 170026.1	Marattia	attenuata	New Caledonia	Noumea	
AQ 170026.2	Marattia	attenuata	New Caledonia	Noumea	
AQ 170027.1	Marattia	attenuata	Solomon Islands	Guadalcanal	Uulolo
AQ 170027.2	Marattia	attenuata	Solomon Islands	Guadalcanal	Uulolo
US 2356345.1	Marattia	excavata	Costa Rica	Cartago	Cervantes
US 2356345.3	Marattia	excavata	Costa Rica	Cartago	Cervantes
US 2356345.4	Marattia	excavata	Costa Rica	Cartago	Cervantes
US 2137259.1	Marattia	excavata	El Salvador	Los Esesmites	
US 2137259.2	Marattia	excavata	El Salvador	Los Esesmites	
US 2137259.3	Marattia	excavata	El Salvador	Los Esesmites	
US 2137259.4	Marattia	excavata	El Salvador	Los Esesmites	
US 2137259.5	Marattia	excavata	El Salvador	Los Esesmites	
US 2201678.1	Marattia	laxa	Mexico	Teziutlan-Nautla roads	
US 2201678.2	Marattia	laxa	Mexico	Teziutlan-Nautla roads	
US 2201678.3	Marattia	laxa	Mexico	Teziutlan-Nautla roads	
US 1745454.1	Marattia	laxa	Mexico	Vera Cruz	Cuantlaucillo
US 1745454.2	Marattia	laxa	Mexico	Vera Cruz	Cuantlaucillo
US 1745454.3	Marattia	laxa	Mexico	Vera Cruz	Cuantlaucillo
AQ 545289.1	Marattia	oreades	Australia	Queensland	Cook
AQ 545289.2	Marattia	oreades	Australia	Queensland	Cook

AQ 699133.1	Marattia	oreades	Australia	Queensland	North Kennedy
AQ 699133.2	Marattia	oreades	Australia	Queensland	North Kennedy
US 2293548.1	Matonia	foxworthyi		Gunong (Mt.)	
				Sautuboug	
US 3240286.1	Metaxya	lanosa	Peru	Loreto	Maynas
US 3240286.2	Metaxya	lanosa	Peru	Loreto	Maynas
US 3240286.3	Metaxya	lanosa	Peru	Loreto	Maynas
US 1915023.1	Metaxya	lanosa	Venezuela	Amazonas	Cano Negro
US 1915023.2	Metaxya	lanosa	Venezuela	Amazonas	Cano Negro
US 1915023.3	Metaxya	lanosa	Venezuela	Amazonas	Cano Negro
US 1853275.1	Metaxya	rostratum	Colombia	Costa del Pacifico	Rio Cajambre
US 1853275.2	Metaxya	rostratum	Colombia	Costa del Pacifico	Rio Cajambre
US 1853275.3	Metaxya	rostratum	Colombia	Costa del Pacifico	Rio Cajambre
US 2153946.1	Metaxya	rostratum	Peru	San Martin	jungle E of Tingo Maria
US 2153946.2	Metaxya	rostratum	Peru	San Martin	jungle E of Tingo Maria
US 2153946.3	Metaxya	rostratum	Peru	San Martin	jungle E of Tingo Maria
AQ 614340.1	Microlepia	speluncae	Australia	Queensland	Cook
AQ 614340.2	Microlepia	speluncae	Australia	Queensland	Cook
4710.1	Notholaena	copelandii	United States	Texas	Kimble County
4710.1	Notholaena	copelandii	United States	Texas	Kimble County
4710.1	Notholaena	copelandii	United States	Texas	Kimble County
4710.2	Notholaena	copelandii	United States	Texas	Kimble County
4710.2	Notholaena	copelandii	United States	Texas	Kimble County
4710.2	Notholaena	copelandii	United States	Texas	Kimble County
AQ 506712.3	Oenotrichia	tripinnata	Australia	Queensland	Cook
AQ 506712.4	Oenotrichia	tripinnata	Australia	Queensland	Cook
768.1	Osmunda	cinnamomea	no record		
768.1	Osmunda	cinnamomea	no record		
768.1	Osmunda	cinnamomea	no record		
768.2	Osmunda	cinnamomea	no record		
768.2	Osmunda	cinnamomea	no record		
768.2	Osmunda	cinnamomea	no record		
Pace s.n.	Osmunda	cinnamomea	no record		
Pace s.n.	Osmunda	cinnamomea	no record		
Singhurst2000	Osmunda	cinnamomea	United States	Texas	Hardin County
Singhurst2000	Osmunda	cinnamomea	United States	Texas	Hardin County
Holmes12954	Osmunda	cinnamomea	United States	Texas	Wood County
WAIK 5663.1	Osmunda	regalis	New Zealand	Waikato	Hamilton
SinghurstBridges15836	Osmunda	regalis	United States	Texas	Burleson County
SinghurstBridges15836	Osmunda	regalis	United States	Texas	Burleson County
SinghurstBridges15836	Osmunda	regalis	United States	Texas	Burleson County
SinghurstBridges12415	Osmunda	regalis	United States	Texas	Freestone County
SinghurstBridges12415	Osmunda	regalis	United States	Texas	Freestone County
WAIK 8663.1	Osmunda	regalis	New Zealand	Tainui	Herangi
WAIK 8863.2	Osmunda	regalis	New Zealand	Tainui	Herangi
WAIK 5663.2	Osmunda	regalis	New Zealand	Waikato	Hamilton
WAIK 2892.1	Paesia	scaberula	New Zealand	Eastern Northland	Eastern Northland and Islands
WAIK 2892.2	Paesia	scaberula	New Zealand	Eastern Northland	Eastern Northland and Islands
WAIK 8555.1	Paesia	scaberula	New Zealand	North Westland	Foulwind
WAIK 8555.2	Paesia	scaberula	New Zealand	North Westland	Foulwind
AQ 815694.1	Paraceterach	muelleri	Australia	Queensland	Cook
AQ 815694.2	Paraceterach	muelleri	Australia	Queensland	Cook
AQ 610223.1	Paraceterach	muelleri	Australia	Queensland	North Kennedy
AQ 610223.2	Paraceterach	muelleri	Australia	Queensland	North Kennedy
AQ 368781.1	Paraceterach	reynoldsii	Australia	Northern Territory	Alice Springs
AQ 368781.2	Paraceterach	reynoldsii	Australia	Northern Territory	Alice Springs
AQ 780974.1	Paraceterach	reynoldsii	Australia	Western Australia	Pilbara
5547	Pellaea	atropurpurea	United States	Texas	Kimble County
5547	Pellaea	atropurpurea	United States	Texas	Kimble County
5547	Pellaea	atropurpurea	United States	Texas	Kimble County
5547.1	Pellaea	atropurpurea	United States	Texas	Kimble County
5547.1	Pellaea	atropurpurea	United States	Texas	Kimble County
5547.1	Pellaea	atropurpurea	United States	Texas	Kimble County
5547.1	Pellaea	atropurpurea	United States	Texas	Kimble County
6235	Pellaea	atropurpurea	United States	Texas	Kimble County
AQ 538828.1	Pellaea	calidrupium	Australia	New South Wales	Wingen Maid Nature Reserve
AQ 538828.2	Pellaea	calidrupium	Australia	New South Wales	Wingen Maid Nature

					Reserve
AQ 782483.1	Pellaea	calidrupium	Australia	Queensland	Darling Downs
AQ 782483.2	Pellaea	calidrupium	Australia	Queensland	Darling Downs
AQ 782483.3	Pellaea	calidrupium	Australia	Queensland	Darling Downs
AQ 530947.1	Pellaea	falcata	Australia	Queensland	Cook
AQ 530947.2	Pellaea	falcata	Australia	Queensland	Cook
AQ 698779.1	Pellaea	falcata	Australia	Queensland	Port Curtis
AQ 698779.2	Pellaea	falcata	Australia	Queensland	Port Curtis
AQ 558360.1	Pellaea	nana	Australia	Queensland	Cook
AQ 558360.2	Pellaea	nana	Australia	Queensland	Cook
AQ 576544.1	Pellaea	nana	Australia	Queensland	Port Curtis
AQ 576544.2	Pellaea	nana	Australia	Queensland	Port Curtis
AQ 749159.1	Pellaea	paradoxa	Australia	Queensland	Cook
AQ 749159.2	Pellaea	paradoxa	Australia	Queensland	Cook
AQ 768542.1	Pellaea	paradoxa	Australia	Queensland	Leichhardt
AQ 768542.2	Pellaea	paradoxa	Australia	Queensland	Leichhardt
8045	Pellaea	ternifolia	United States	Texas	Mason County
8045	Pellaea	ternifolia	United States	Texas	Mason County
8045	Pellaea	ternifolia	United States	Texas	Mason County
8045	Pellaea	ternifolia	United States	Texas	Mason County
17783	Pellaea	ternifolia	United States	Texas	Mason County
17783	Pellaea	ternifolia	United States	Texas	Mason County
17783	Pellaea	ternifolia	United States	Texas	Mason County
AQ 778098.1	Pellaea	viridis	Australia	Queensland	Moreton
AQ 778098.2	Pellaea	viridis	Australia	Queensland	Moreton
AQ 737255.1	Pityrogramma	calomelanos	Australia	Queensland	South Kennedy
AQ 737255.2	Pityrogramma	calomelanos	Australia	Queensland	South Kennedy
US 2201505.1	Plagiogyria	adnata	China	Lok Fu Mountain	
US 2201505.2	Plagiogyria	adnata	China	Lok Fu Mountain	
US 2649281.1	Plagiogyria	adnata	China	Taichung County	Mt. Amma ?, Mt. Anima ?
US 1507505.1	Plagiogyria	euphlebia	China	Kouy-Tchegu	
US 1507505.2	Plagiogyria	euphlebia	China	Kouy-Tchegu	
US 1507505.3	Plagiogyria	euphlebia	China	Kouy-Tchegu	
US 1211894.1	Plagiogyria	euphlebia	China	Yunnan	between Kambaiti and Tengyueh
US 1211894.2	Plagiogyria	euphlebia	China	Yunnan	between Kambaiti and Tengyueh
US 1211894.3	Plagiogyria	euphlebia	China	Yunnan	between Kambaiti and Tengyueh
WAIK 3016.1	Pneumatopteris	pennigera	New Zealand	Northern Volcanic Plateau	Tauranga
WAIK 3016.2	Pneumatopteris	pennigera	New Zealand	Northern Volcanic Plateau	Tauranga
WAIK 18056.1	Pneumatopteris	pennigera	New Zealand	Tainui	Kawhia
WAIK 18056.2	Pneumatopteris	pennigera	New Zealand	Tainui	Kawhia
AQ 391394.1	Polystichum	acrostichoides	United States	Connecticut	Tolland County
AQ 391394.2	Polystichum	acrostichoides	United States	Connecticut	Tolland County
76200	Polystichum	acrostichoides	United States	Texas	Howard County
76200	Polystichum	acrostichoides	United States	Texas	Howard County
76200	Polystichum	acrostichoides	United States	Texas	Howard County
AQ 631268.1	Polystichum	fallax	Australia	Queensland	Darling Downs
AQ 631268.2	Polystichum	fallax	Australia	Queensland	Darling Downs
AQ 438062.1	Polystichum	fallax	Australia	Queensland	Port Curtis
AQ 438062.2	Polystichum	fallax	Australia	Queensland	Port Curtis
AQ 546271.1	Polystichum	formosum	Australia	Queensland	Darling Downs
AQ 546271.2	Polystichum	formosum	Australia	Queensland	Darling Downs
AQ 501581.1	Polystichum	formosum	Australia	Queensland	Moreton
AQ 501581.2	Polystichum	formosum	Australia	Queensland	Moreton
AQ 501581.3	Polystichum	formosum	Australia	Queensland	Moreton
AQ 501581.4	Polystichum	formosum	Australia	Queensland	Moreton
AQ 755358.1	Pronephrium	triphyllum	Australia	Queensland	Cook
AQ 755358.2	Pronephrium	triphyllum	Australia	Queensland	Cook
AQ 619389.1	Pronephrium	triphyllum	Australia	Queensland	North Kennedy
AQ 619389.2	Pronephrium	triphyllum	Australia	Queensland	North Kennedy
AQ 617594.2	Pteris	ensiformis	Australia	Queensland	Cook
AQ 368854.1	Pteris	ensiformis	Palau	Caroline Islands	Babeldaub Island
AQ 368854.2	Pteris	ensiformis	Palau	Caroline Islands	Babeldaub Island
AQ 791739.1	Pteris	pacifica	Australia	Queensland	Cook
AQ 791739.2	Pteris	pacifica	Australia	Queensland	Cook
AQ 677522.1	Pteris	pacifica	Australia	Queensland	North Kennedy
AQ 677522.2	Pteris	pacifica	Australia	Queensland	North Kennedy

AQ 821266.1	Pteris	tremula	Australia	New South Wales	North Coast
AQ 821266.2	Pteris	tremula	Australia	New South Wales	North Coast
AQ 472164.1	Pteris	tremula	Australia	Queensland	Moreton
AQ 472164.2	Pteris	tremula	Australia	Queensland	Moreton
AQ 619580.1	Pteris	tripartita	Australia	Queensland	Cook
AQ 619580.2	Pteris	tripartita	Australia	Queensland	Cook
AQ 173350.1	Pteris	tripartita	New Guinea	Western	Kiunga
AQ 173350.2	Pteris	tripartita	New Guinea	Western	Kiunga
AQ 673372.1	Pteris	vittata	Australia	Queensland	Cook
AQ 673372.2	Pteris	vittata	Australia	Queensland	Cook
AQ 609021.1	Pyrrosia	confluens	Australia	New South Wales	Dungog
AQ 609021.2	Pyrrosia	confluens	Australia	New South Wales	Dungog
AQ 724157.1	Pyrrosia	confluens	Australia	Queensland	Cook
AQ 724157.2	Pyrrosia	confluens	Australia	Queensland	Cook
AQ 172719.1	Pyrrosia	lanceolata	Malaysia	Pahang	Gua Tipus
AQ 172719.2	Pyrrosia	lanceolata	Malaysia	Pahang	Gua Tipus
AQ 482588.1	Pyrrosia	lanceolata	Thailand	Toon Pong Bay	
AQ 482588.2	Pyrrosia	lanceolata	Thailand	Toon Pong Bay	
AQ 599470.1	Pyrrosia	longifolia	Australia	Queensland	Cook
AQ 599470.2	Pyrrosia	longifolia	Australia	Queensland	Cook
AQ 172619.1	Pyrrosia	longifolia	New Guinea	Sepik	Leitre
AQ 172619.2	Pyrrosia	longifolia	New Guinea	Sepik	Leitre
AQ 815709.1	Pyrrosia	rupestris	Australia	Queensland	Cook
AQ 815709.2	Pyrrosia	rupestris	Australia	Queensland	Cook
AQ 591610.1	Pyrrosia	rupestris	Australia	Queensland	North Kennedy
AQ 591610.2	Pyrrosia	rupestris	Australia	Queensland	North Kennedy
US 3252569.1	Schizaea	elegans	Venezuela	Amazonas	Rio Negro
US 3252569.2	Schizaea	elegans	Venezuela	Amazonas	Rio Negro
US 3252569.3	Schizaea	elegans	Venezuela	Amazonas	Rio Negro
US 3252569.4	Schizaea	elegans	Venezuela	Amazonas	Rio Negro
US 1915248.1	Schizaea	elegans	Venezuela	Bolivar	Ptari-tepuf
US 1915248.2	Schizaea	elegans	Venezuela	Bolivar	Ptari-tepuf
US 1915248.3	Schizaea	elegans	Venezuela	Bolivar	Ptari-tepuf
US 1915248.4	Schizaea	elegans	Venezuela	Bolivar	Ptari-tepuf
US 591553.3	Schizaea	fluminensis	Jamaica	Troy	
US 591553.1	Schizaea	fluminensis	Jamaica	Troy	
US 591553.2	Schizaea	fluminensis	Jamaica	Troy	
US 591553.4	Schizaea	fluminensis	Jamaica	Troy	
US 591553.5	Schizaea	fluminensis	Jamaica	Troy	
US 3038920.1	Schizaea	fluminensis	Puerto Rico	Caribbean National Forest	
US 3038920.2	Schizaea	fluminensis	Puerto Rico	Caribbean National Forest	
US 3038920.3	Schizaea	fluminensis	Puerto Rico	Caribbean National Forest	
US 3038920.4	Schizaea	fluminensis	Puerto Rico	Caribbean National Forest	
US 2018506.1	Sphaeropteris	lepifera	Japan	Okinawa Island	Kunigami
US 2018506.2	Sphaeropteris	lepifera	Japan	Okinawa Island	Kunigami
US 2018506.3	Sphaeropteris	lepifera	Japan	Okinawa Island	Kunigami
US 2136211.1	Sphaeropteris	lepifera	Japan	Ryuku Islands	
US 2136211.2	Sphaeropteris	lepifera	Japan	Ryuku Islands	
US 2136211.3	Sphaeropteris	lepifera	Japan	Ryuku Islands	
US 2257875.1	Sphaeropteris	propinqua	Fiji	Viti Levu	Serua
US 2257875.2	Sphaeropteris	propinqua	Fiji	Viti Levu	Serua
US 2257919.1	Sphaeropteris	propinqua	Fiji	Viti Levu	Serua
US 2257919.2	Sphaeropteris	propinqua	Fiji	Viti Levu	Serua
US 2257919.3	Sphaeropteris	propinqua	Fiji	Viti Levu	Serua
WELT 35562A.1	Sticherus	cunninghamii	New Zealand	Coromandel	Little Barrier
WELT 35562A.2	Sticherus	cunninghamii	New Zealand	Coromandel	Little Barrier
WELT 35562B.1	Sticherus	cunninghamii	New Zealand	Coromandel	Little Barrier
WELT 35562B.2	Sticherus	cunninghamii	New Zealand	Coromandel	Little Barrier
WELT P5410d.1	Sticherus	flabellatus	New Zealand	unknown	
WELT P5410d.2	Sticherus	flabellatus	New Zealand	unknown	
18784	Thelypteris	hispidula	United States	Texas	Jefferson County
18784	Thelypteris	hispidula	United States	Texas	Jefferson County
18784	Thelypteris	hispidula	United States	Texas	Jefferson County
18787	Thelypteris	hispidula	United States	Texas	McClennan County
18787	Thelypteris	hispidula	United States	Texas	McClennan County
18787	Thelypteris	hispidula	United States	Texas	McClennan County
92939	Thelypteris	kunthii	United States	Georgia	Grady County
92939	Thelypteris	kunthii	United States	Georgia	Grady County

92939	Thelypteris	kunthii	United States	Georgia	Grady County
US 3346968.1	Tmesipteris	gracilis	French Polynesia	Tahiti	Tipaerui Stream Valley
US 3346968.2	Tmesipteris	gracilis	French Polynesia	Tahiti	Tipaerui Stream Valley
US 3346968.3	Tmesipteris	gracilis	French Polynesia	Tahiti	Tipaerui Stream Valley
US 1919620.1	Tmesipteris	gracilis	French Polynesia	Tahiti	
US 1919620.2	Tmesipteris	gracilis	French Polynesia	Tahiti	
US 3227408.1	Tmesipteris	norfolkiensis	Australia	Norfolk Island	Mt. Pitt
US 3227408.2	Tmesipteris	norfolkiensis	Australia	Norfolk Island	Mt. Pitt
US 3227408.3	Tmesipteris	norfolkiensis	Australia	Norfolk Island	Mt. Pitt
Sylva1375	Trichomanes	angustatum	Spain	Llanes	Garana
Sylva1375	Trichomanes	angustatum	Spain	Llanes	Garana
Sylva1375	Trichomanes	angustatum	Spain	Llanes	Garana
Sylva1375	Trichomanes	angustatum	Spain	Llanes	Garana
Sylva1375	Trichomanes	angustatum	Spain	Llanes	Garana
WAIK 8867.1	Trichomanes	endlicherianum	New Zealand	Tainui	Kawhia
WAIK 8867.2	Trichomanes	endlicherianum	New Zealand	Tainui	Kawhia
WAIK 8241.1	Trichomanes	endlicherianum	New Zealand	Waikato	Maungatautari
WAIK 8241.2	Trichomanes	endlicherianum	New Zealand	Waikato	Maungatautari
WAIK 15204.1	Trichomanes	reniforme	New Zealand	Eastern Volcanic Plateau	Whirinaki
WAIK 15204.2	Trichomanes	reniforme	New Zealand	Eastern Volcanic Plateau	Whirinaki
WAIK 7.1	Trichomanes	reniforme	New Zealand	Whataroa	Harihari
WAIK 7.2	Trichomanes	reniforme	New Zealand	Whataroa	Harihari
Crosthwaite159	woodsia	obtusa	United States	Arkansas	Newton County
Crosthwaite159	woodsia	obtusa	United States	Arkansas	Newton County
Holmes8108	Woodsia	obtusa	United States	Texas	Henderson County
Sanchez3225	Woodsia	obtusa	United States	Texas	Mason County
Sanchez3225	Woodsia	obtusa	United States	Texas	Mason County
Leidolf1026	Woodwardia	areolata	United States	Texas	Leon County
Holmes8942	Woodwardia	areolata	United States	Texas	Marion County
SinghurstAdamsFitch15304	Woodwardia	areolata	United States	Texas	
Kral91486	Woodwardia	virginica	United States	Georgia	
SinghurstBirdges15934	woodwardia	virginica	United States	Texas	
SinghurstBridges15934	woodwardia	virginica	United States	Texas	
SinghurstBridges15934	woodwardia	virginica	United States	Texas	

APPENDIX C

Growth Habits and Mechanical Leaf Structures of Sampled Ferns

Specimen ID#	Genus	Species	Growth Habit	Mechanical Leaf Structure
311.1b	Botrychium	bitermatum	terrestrial	pinnately compound
311.1c	Botrychium	bitermatum	terrestrial	pinnately compound
311.1A	Botrychium	bitermatum	terrestrial	pinnately compound
311.1e	Botrychium	bitermatum	terrestrial	pinnately compound
Holmes 7602.1	Botrychium	lunarioides	terrestrial	pinnately compound
Holmes 7602.1	Botrychium	lunarioides	terrestrial	pinnately compound
Holmes 7602.2	Botrychium	lunarioides	terrestrial	pinnately compound
Holmes 7602.2	Botrychium	lunarioides	terrestrial	pinnately compound
Holmes 9410	Botrychium	lunarioides	terrestrial	pinnately compound
Holmes 9410	Botrychium	lunarioides	terrestrial	pinnately compound
768.1	Osmunda	cinnamomea	terrestrial	pinnately compound
768.2	Osmunda	cinnamomea	terrestrial	pinnately compound
768.2	Osmunda	cinnamomea	terrestrial	pinnately compound
768.2	Osmunda	cinnamomea	terrestrial	pinnately compound
Holmes12954	Osmunda	cinnamomea	terrestrial	pinnately compound
Pace s.n.	Osmunda	cinnamomea	terrestrial	pinnately compound
Pace s.n.	Osmunda	cinnamomea	terrestrial	pinnately compound
Singhurst2000	Osmunda	cinnamomea	terrestrial	pinnately compound
Singhurst2000	Osmunda	cinnamomea	terrestrial	pinnately compound
4710.1	Notholaena	copelandii	epipetric	pinnately compound
4710.1	Notholaena	copelandii	epipetric	pinnately compound
4710.1	Notholaena	copelandii	epipetric	pinnately compound
4710.2	Notholaena	copelandii	epipetric	pinnately compound
5154.1	Anemia	mexicana	terrestrial	pinnately compound
5154.1	Anemia	mexicana	terrestrial	pinnately compound
5154.2	Anemia	mexicana	terrestrial	pinnately compound
5154.2	Anemia	mexicana	terrestrial	pinnately compound
13053A	Anemia	mexicana	terrestrial	pinnately compound
13053A	Anemia	mexicana	terrestrial	pinnately compound
5547	Pellaea	atropurpurea	epipetric	pinnately compound
5547	Pellaea	atropurpurea	epipetric	pinnately compound
5547	Pellaea	atropurpurea	epipetric	pinnately compound
5547.1	Pellaea	atropurpurea	epipetric	pinnately compound
5547.1	Pellaea	atropurpurea	epipetric	pinnately compound
5547.1	Pellaea	atropurpurea	epipetric	pinnately compound
5547.1	Pellaea	atropurpurea	epipetric	pinnately compound
5547.1	Pellaea	atropurpurea	epipetric	pinnately compound
6235	Pellaea	atropurpurea	epipetric	pinnately compound
5723	Astrolepis	integerrima	epipetric	pinnately compound
5860	Astrolepis	integerrima	epipetric	pinnately compound
5860	Astrolepis	integerrima	epipetric	pinnately compound
5860	Astrolepis	integerrima	epipetric	pinnately compound
6232.1	Argyrochosma	dealbata	epipetric	pinnately compound
6232.2	Argyrochosma	dealbata	epipetric	pinnately compound
6232.2	Argyrochosma	dealbata	epipetric	pinnately compound
6232.2	Argyrochosma	dealbata	epipetric	pinnately compound
8045	Pellaea	ternifolia	epipetric	pinnately compound
8045	Pellaea	ternifolia	epipetric	pinnately compound
8045	Pellaea	ternifolia	epipetric	pinnately compound
8045	Pellaea	ternifolia	epipetric	pinnately compound
8045	Pellaea	ternifolia	epipetric	pinnately compound
8045	Pellaea	ternifolia	epipetric	pinnately compound
17783	Pellaea	ternifolia	epipetric	pinnately compound
17783	Pellaea	ternifolia	epipetric	pinnately compound
17783	Pellaea	ternifolia	epipetric	pinnately compound
10767.1	Botrychium	lunarioides	epipetric	pinnately compound
10767.1	Botrychium	lunarioides	epipetric	pinnately compound
10767.2	Botrychium	lunarioides	epipetric	pinnately compound
10767.2	Botrychium	lunarioides	epipetric	pinnately compound
14294	Cyrtomium	falcatum	terrestrial	pinnately compound
14294	Cyrtomium	falcatum	terrestrial	pinnately compound
14294	Cyrtomium	falcatum	terrestrial	pinnately compound

17692	Cyrtomium	falcatum	terrestrial	pinnately compound
17692	Cyrtomium	falcatum	terrestrial	pinnately compound
17692	Cyrtomium	falcatum	terrestrial	pinnately compound
17496.1	Blechnum	serrulatum	terrestrial	pinnately compound
17496.1	Blechnum	serrulatum	terrestrial	pinnately compound
17496.1	Blechnum	serrulatum	terrestrial	pinnately compound
18784	Thelypteris	hispidula	terrestrial	pinnately compound
18784	Thelypteris	hispidula	terrestrial	pinnately compound
18784	Thelypteris	hispidula	terrestrial	pinnately compound
18787	Thelypteris	hispidula	terrestrial	pinnately compound
18787	Thelypteris	hispidula	terrestrial	pinnately compound
18787	Thelypteris	hispidula	terrestrial	pinnately compound
76200	Polystichum	acrostichoides	terrestrial	pinnately compound
76200	Polystichum	acrostichoides	terrestrial	pinnately compound
76200	Polystichum	acrostichoides	terrestrial	pinnately compound
92939	Thelypteris	kunthii	terrestrial	pinnately compound
92939	Thelypteris	kunthii	terrestrial	pinnately compound
92939	Thelypteris	kunthii	terrestrial	pinnately compound
Clements154	Gymnocarpium	dryopteris	terrestrial	pinnately compound
Clements154	Gymnocarpium	dryopteris	terrestrial	pinnately compound
Crosthwaite159	woodsia	obtusa	terrestrial	pinnately compound
Crosthwaite159	woodsia	obtusa	terrestrial	pinnately compound
Dunton s.n.	Cystopteris	protrusa	terrestrial	pinnately compound
Dunton s.n.	Cystopteris	protrusa	terrestrial	pinnately compound
Dunton s.n.	Cystopteris	protrusa	terrestrial	pinnately compound
Dunton s.n.	Cystopteris	protrusa	terrestrial	pinnately compound
Dunton s.n.	Cystopteris	protrusa	terrestrial	pinnately compound
Hansen4737	Adiantum	capillus-veneris	varies	pinnately compound
Hansen4737	Adiantum	capillus-veneris	varies	pinnately compound
Hansen4737	Adiantum	capillus-veneris	varies	pinnately compound
Hansen4737	Adiantum	capillus-veneris	varies	pinnately compound
Ruth1003	Adiantum	capillus-veneris	varies	pinnately compound
Ruth1003	Adiantum	capillus-veneris	varies	pinnately compound
Holmes4469	Eriosorus	flexuosus	scandent	simple
Holmes4469	Eriosorus	flexuosus	scandent	simple
Holmes4469	Eriosorus	flexuosus	scandent	simple
Holmes4469	Eriosorus	flexuosus	scandent	simple
Holmes11057	Lygodium	japonicum	scandent	pinnately compound
Holmes11057	Lygodium	japonicum	scandent	pinnately compound
Holmes6297	Lygodium	japonicum	scandent	pinnately compound
Holmes6297	Lygodium	japonicum	scandent	pinnately compound
Holmes6297	Lygodium	japonicum	scandent	pinnately compound
Holmes8942	Woodwardia	areolata	terrestrial	simple
Leidolf1026	Woodwardia	areolata	terrestrial	simple
SinghurstAdamsFitch15304	Woodwardia	areolata	terrestrial	simple
Hurst s.n.	Cystopteris	fragilis	epipetric	pinnately compound
Hurst s.n.	Cystopteris	fragilis	epipetric	pinnately compound
Leonard2804	Lygodium	palmatum	scandent	pinnately compound
Leonard2804	Lygodium	palmatum	scandent	pinnately compound
Thomas153691	Lygodium	palmatum	scandent	pinnately compound
Thomas153691	Lygodium	palmatum	scandent	pinnately compound
OdiaBarbosa44	Anemia	phyllitidis	scandent	pinnately compound
OdiaBarbosa44	Anemia	phyllitidis	scandent	pinnately compound
OdiaBarbosa44	Anemia	phyllitidis	scandent	pinnately compound
Pace744.1	Cryptogramma	acrostichoides	terrestrial	simple
Pace744.2	Cryptogramma	acrostichoides	terrestrial	simple
Pace744.3	Cryptogramma	acrostichoides	terrestrial	simple
Redfearn23590	Adiantum	pedatum	terrestrial	pinnately compound
Redfearn23590	Adiantum	pedatum	terrestrial	pinnately compound
Redfearn23590	Adiantum	pedatum	terrestrial	pinnately compound
Schwartz54	Adiantum	pedatum	terrestrial	pinnately compound
Schwartz54	Adiantum	pedatum	terrestrial	pinnately compound
Holmes8108	Woodsia	obtusa	terrestrial	pinnately compound
Sanchez3225	Woodsia	obtusa	terrestrial	pinnately compound
Sanchez3225	Woodsia	obtusa	terrestrial	pinnately compound
Singhurst 4802	Botrychium	lunarioides	prostrate	pinnately compound
Singhurst 4802	Botrychium	lunarioides	prostrate	pinnately compound
Singhurst 4806	Botrychium	lunarioides	prostrate	pinnately compound
Singhurst 4806	Botrychium	lunarioides	prostrate	pinnately compound
Zygo 208	Botrychium	lunarioides	prostrate	pinnately compound
Zygo 208	Botrychium	lunarioides	prostrate	pinnately compound

SinghurstBridges12415	Osmunda	regalis	terrestrial	pinnately compound
SinghurstBridges12415	Osmunda	regalis	terrestrial	pinnately compound
SinghurstBridges15836	Osmunda	regalis	terrestrial	pinnately compound
SinghurstBridges15836	Osmunda	regalis	terrestrial	pinnately compound
SinghurstBridges15836	Osmunda	regalis	terrestrial	pinnately compound
Kral91486	Woodwardia	virginica	terrestrial	pinnately compound
SinghurstBridges15934	woodwardia	virginica	terrestrial	pinnately compound
SinghurstBridges15934	woodwardia	virginica	terrestrial	pinnately compound
Sylva1375	Trichomanes	angustatum	terrestrial	pinnately compound
Sylva1375	Trichomanes	angustatum	terrestrial	pinnately compound
Sylva1375	Trichomanes	angustatum	terrestrial	pinnately compound
Sylva1375	Trichomanes	angustatum	terrestrial	pinnately compound
Sylva1375	Trichomanes	angustatum	terrestrial	pinnately compound
WAIK 12919.1	Asplenium	flabellifolium	hanging to terrestrial	pinnately compound
WAIK 12919.2	Asplenium	flabellifolium	hanging to terrestrial	pinnately compound
WAIK 14564.2	Asplenium	flabellifolium	hanging to terrestrial	pinnately compound
WAIK 14358.1	Anarthropteris	lanceolata	scandent	pinnately compound
WAIK 14358.2	Anarthropteris	lanceolata	scandent	pinnately compound
WAIK 1447.1	Blechnum	banksii	terrestrial	simple
WAIK 1447.2	Blechnum	banksii	terrestrial	simple
WAIK 14591.1	Hymenophyllum	atrovirens	rheophytic	simple
WAIK 14591.2	Hymenophyllum	atrovirens	rheophytic	simple
WAIK 15079.1	Hymenophyllum	lyallii	epiphytic	simple
WAIK 15079.2	Hymenophyllum	lyallii	epiphytic	simple
WAIK 15164.1	Asplenium	obtusatum	terrestrial	pinnately compound
WAIK 15164.2	Asplenium	obtusatum	terrestrial	pinnately compound
WAIK 15204.1	Trichomanes	reniforme	terrestrial	simple
WAIK 15204.2	Trichomanes	reniforme	terrestrial	simple
WAIK 16041.1	Cyclosorus	interruptus	terrestrial	pinnately compound
WAIK 16041.2	Cyclosorus	interruptus	terrestrial	pinnately compound
WAIK 16239.1	Hymenophyllum	lyallii	epiphytic	simple
WAIK 16239.2	Hymenophyllum	lyallii	epiphytic	simple
WAIK 16249.2	Hymenophyllum	flabellatum	hanging to terrestrial to epiphytic	pinnately compound
WAIK 17589.1	Hymenophyllum	flabellatum	hanging to terrestrial to epiphytic	pinnately compound
WAIK 18034.1	Hymenophyllum	demissum	epiphytic to terrestrial	pinnately compound
WAIK 18036.1	Blechnum	membranaceum	terrestrial	simple
WAIK 18036.2	Blechnum	membranaceum	terrestrial	simple
WAIK 18056.1	Pneumatopteris	pennigera	terrestrial	pinnately compound
WAIK 18056.2	Pneumatopteris	pennigera	terrestrial	pinnately compound
WAIK 18405.1	Blechnum	chambersii	terrestrial	simple
WAIK 18405.2	Blechnum	chambersii	terrestrial	simple
WAIK 18464.1	Hymenophyllum	ferrugineum	epiphytic to terrestrial	pinnately compound
WAIK 18464.2	Hymenophyllum	ferrugineum	epiphytic to terrestrial	pinnately compound
WAIK 19019.1	Blechnum	novae-zealandiae	terrestrial	pinnately compound
WAIK 19019.2	Blechnum	novae-zealandiae	terrestrial	pinnately compound
WAIK 19513.1	Asplenium	dimorphum	terrestrial	pinnately compound
WAIK 19513.2	Asplenium	dimorphum	terrestrial	pinnately compound
WAIK 19523.1	Asplenium	oblongifolium	terrestrial	pinnately compound
WAIK 19523.2	Asplenium	oblongifolium	terrestrial	pinnately compound
WAIK 19697.1	Asplenium	dimorphum	epiphytic	pinnately compound
WAIK 19697.2	Asplenium	dimorphum	epiphytic	pinnately compound
WAIK 20197.1	Asplenium	flaccidum	pinnately compound	pinnately compound
WAIK 20197.2	Asplenium	flaccidum	drooping	pinnately compound
WAIK 2892.1	Paesia	scaberula	terrestrial	pinnately compound
WAIK 2892.2	Paesia	scaberula	terrestrial	pinnately compound
WAIK 3016.1	Pneumatopteris	pennigera	terrestrial	pinnately compound
WAIK 3016.2	Pneumatopteris	pennigera	terrestrial	pinnately compound
WAIK 3396.1	Loxoma	cunninghamii	terrestrial	pinnately compound
WAIK 3396.2	Loxoma	cunninghamii	terrestrial	pinnately compound
WAIK 4711.1	Asplenium	obtusatum	terrestrial	pinnately compound
WAIK 4711.2	Asplenium	obtusatum	terrestrial	pinnately compound
WAIK 5193.1	Blechnum	chambersii	terrestrial	simple
WAIK 5193.2	Blechnum	chambersii	terrestrial	simple
WAIK 5663.1	Osmunda	regalis	terrestrial	pinnately compound
WAIK 5663.2	Osmunda	regalis	terrestrial	pinnately compound
WAIK 6052.1	Blechnum	filiforme	scandent	pinnately compound
WAIK 6052.2	Blechnum	filiforme	scandent	pinnately compound
WAIK 6321.1	Blechnum	novae-zealandiae	terrestrial	pinnately compound
WAIK 6321.2	Blechnum	novae-zealandiae	terrestrial	pinnately compound
WAIK 6600C.1	Loxoma	cunninghamii	terrestrial	pinnately compound

WAIK 6600C.2	Loxoma	cunninghamii	terrestrial	pinnately compound
WAIK 6311.1	Dryopteris	affinis	terrestrial	pinnately compound
WAIK 6311.2	Dryopteris	affinis	terrestrial	pinnately compound
WAIK 688.1	Hymenophyllum	ferrugineum	epiphytic to terrestrial	pinnately compound
WAIK 688.2	Hymenophyllum	ferrugineum	epiphytic to terrestrial	pinnately compound
WAIK 7.1	Trichomanes	reniforme	terrestrial	simple
WAIK 7.2	Trichomanes	reniforme	terrestrial	simple
WAIK 7361.1	Blechnum	membranaceum	terrestrial	pinnately compound
WAIK 7361.2	Blechnum	membranaceum	terrestrial	pinnately compound
WAIK 8021.1	Cyclosorus	interruptus	terrestrial	pinnately compound
WAIK 8021.2	Cyclosorus	interruptus	terrestrial	pinnately compound
WAIK 8241.1	Trichomanes	endlicherianum	epiphyte	simple
WAIK 8241.2	Trichomanes	endlicherianum	epiphyte	simple
WAIK 8242.1	Anarthropteris	lanceolata	scandent	pinnately compound
WAIK 8242.2	Anarthropteris	lanceolata	scandent	pinnately compound
WAIK 8540.1	Blechnum	filiforme	scandent	pinnately compound
WAIK 8540.2	Blechnum	filiforme	scandent	pinnately compound
WAIK 8555.2	Paesia	scaberula	terrestrial	pinnately compound
WAIK 8555.1	Paesia	scaberula	terrestrial	pinnately compound
WAIK 8852.1	Asplenium	flaccidum	drooping	pinnately compound
WAIK 8852.2	Asplenium	flaccidum	drooping	pinnately compound
WAIK 8663.1	Osmunda	regalis	terrestrial	pinnately compound
WAIK 8663.2	Osmunda	regalis	terrestrial	pinnately compound
WAIK 8867.1	Trichomanes	endlicherianum	epiphyte	simple
WAIK 8867.2	Trichomanes	endlicherianum	epiphyte	simple
WAIK 9312.1	Dryopteris	affinis	terrestrial	pinnately compound
WAIK 9312.2	Dryopteris	affinis	terrestrial	pinnately compound
WAIK 9476.1	Asplenium	oblongifolium	terrestrial	pinnately compound
WAIK 9476.2	Asplenium	oblongifolium	terrestrial	pinnately compound
WAIK 9537.1	Hymenophyllum	atrovirens	rheophytic	simple
WAIK 9537.2	Hymenophyllum	atrovirens	rheophytic	simple
WAIK 9848.1	Blechnum	banksii	terrestrial	simple
WAIK 9848.2	Blechnum	banksii	terrestrial	simple
Welt.Perrie 001.2	Leptopteris	superba	terrestrial	pinnately compound
Welt.Perrie 001.3	Leptopteris	superba	terrestrial	pinnately compound
Welt.Perrie 002.1	Leptopteris	superba	terrestrial	pinnately compound
Welt.Perrie 002.2	Leptopteris	superba	terrestrial	pinnately compound
Welt.Perrie 002.3	Leptopteris	superba	terrestrial	pinnately compound
Welt.Perrie 003.1	Leptopteris	hymenophylloides	terrestrial	pinnately compound
Welt.Perrie 003.2	Leptopteris	hymenophylloides	terrestrial	pinnately compound
Welt.Perrie 003.3	Leptopteris	hymenophylloides	terrestrial	pinnately compound
Welt.Perrie 004.1	Leptopteris	hymenophylloides	terrestrial	pinnately compound
Welt.Perrie 004.2	Leptopteris	hymenophylloides	terrestrial	pinnately compound
Welt.Perrie 004.3	Leptopteris	hymenophylloides	terrestrial	pinnately compound
Welt.Perrie 005.2	Leptolepia	novae-zealandiae	terrestrial	pinnately compound
Welt.Perrie 005.3	Leptolepia	novae-zealandiae	terrestrial	pinnately compound
Welt.Perrie 006.1	Ctenopteris	heterophylla	epiphyte	simple
Welt.Perrie 006.2	Ctenopteris	heterophylla	epiphyte	simple
Welt.Perrie 006.3	Ctenopteris	heterophylla	epiphyte	simple
Welt.Perrie 007.1	Lindsaea	trichomanoides	terrestrial	pinnately compound
Welt.Perrie 007.2	Lindsaea	trichomanoides	terrestrial	pinnately compound
Welt.Perrie 007.3	Lindsaea	trichomanoides	terrestrial	pinnately compound
Welt.Perrie 008.1	Lindsaea	trichomanoides	terrestrial	pinnately compound
Welt.Perrie 008.2	Lindsaea	trichomanoides	terrestrial	pinnately compound
Welt.Perrie 008.3	Lindsaea	trichomanoides	terrestrial	pinnately compound
WELT 35562A.1	Sticherus	cunninghamii	terrestrial	pinnately compound
WELT 35562A.2	Sticherus	cunninghamii	terrestrial	pinnately compound
WELT 35562B.1	Sticherus	cunninghamii	terrestrial	pinnately compound
WELT 35562B.2	Sticherus	cunninghamii	terrestrial	pinnately compound
WELT P5410d.1	Sticherus	flabellatus	terrestrial	pinnately compound
WELT P5410d.2	Sticherus	flabellatus	terrestrial	pinnately compound
WELT P18317.1	Loxogramme	dictyopteris	epiphytic	simple
WELT P18317.2	Loxogramme	dictyopteris	epiphytic	simple
WELT P021009.1	Loxogramme	dictyopteris	epiphytic	simple
WELT P021009.2	Loxogramme	dictyopteris	epiphytic	simple
WELT P021280.1	Ctenopteris	heterophylla	epiphytic	simple
WELT P021280.2	Ctenopteris	heterophylla	epiphytic	simple
WELT P022918.1	Cheilanthes	sieberi	terrestrial	pinnately compound
WELT P002918.2	Cheilanthes	sieberi	terrestrial	pinnately compound
WELT P020377.1	Cheilanthes	distans	terrestrial	pinnately compound
WELT P020377.2	Cheilanthes	distans	terrestrial	pinnately compound

WELT P17575.1	Cheilanthes	distans	terrestrial	pinnately compound
WELT P17575.2	Cheilanthes	distans	terrestrial	pinnately compound
WELT P020989.1	Leptolepia	novae-zealandiae	terrestrial	pinnately compound
WELT P020989.2	Leptolepia	novae-zealandiae	terrestrial	pinnately compound
WELT P10260.1	Dryopteris	filix-mas	terrestrial	pinnately compound
WELT P10260.2	Dryopteris	filix-mas	terrestrial	pinnately compound
WELT P20870b.1	Dryopteris	filix-mas	terrestrial	pinnately compound
WELT P20870b.2	Dryopteris	filix-mas	terrestrial	pinnately compound
WELT P8992.1	Cystopteris	tasmanica	epipetric	pinnately compound
WELT P8992.2	Cystopteris	tasmanica	epipetric	pinnately compound
WELT P020856.1	Cystopteris	tasmanica	epipetric	pinnately compound
WELT P022306.1	Cystopteris	fragilis	epipetric	pinnately compound
WELT P022306.2	Cystopteris	fragilis	epipetric	pinnately compound
WELT P020570.1	Cyrtomium	falcatum	epipetric or terrestrial	pinnately compound
WELT P020570.2	Cyrtomium	falcatum	epipetric or terrestrial	pinnately compound
AQ 766644.1	Lindsaea	microphylla	terrestrial	pinnately compound
AQ 766644.2	Lindsaea	microphylla	terrestrial	pinnately compound
AQ 766644.3	Lindsaea	microphylla	terrestrial	pinnately compound
AQ 671766.1	Lindsaea	microphylla	terrestrial	pinnately compound
AQ 671766.2	Lindsaea	microphylla	terrestrial	pinnately compound
AQ 722804.1	Lindsaea	brachypoda	terrestrial	pinnately compound
AQ 722804.2	Lindsaea	brachypoda	terrestrial	pinnately compound
AQ 617250.1	Lindsaea	obtusa	terrestrial	pinnately compound
AQ 617250.2	Lindsaea	obtusa	terrestrial	pinnately compound
AQ 149072.1	Lindsaea	obtusa	terrestrial	pinnately compound
AQ 149072.2	Lindsaea	obtusa	terrestrial	pinnately compound
AQ 815191.1	Lindsaea	ensifolia	terrestrial	pinnately compound
AQ 815191.2	Lindsaea	ensifolia	terrestrial	pinnately compound
AQ 596891.1	Lindsaea	ensifolia	terrestrial	pinnately compound
AQ 596891.2	Lindsaea	ensifolia	terrestrial	pinnately compound
AQ 609934.1	Crepidomanes	barnardianum	epiphytic and epipetric	simple
AQ 609934.2	Crepidomanes	barnardianum	epiphytic and epipetric	simple
AQ 646908.1	Crepidomanes	barnardianum	epiphytic and epipetric	simple
AQ 646908.2	Crepidomanes	barnardianum	epiphytic and epipetric	simple
AQ 002599.1	Crepidomanes	bipunctatum	epiphytic and epipetric	simple
AQ 002599.2	Crepidomanes	bipunctatum	epiphytic and epipetric	simple
AQ 733693.1	Crepidomanes	bipunctatum	epiphytic and epipetric	simple
AQ 733693.2	Crepidomanes	bipunctatum	epiphytic and epipetric	simple
AQ 610044.1	Crepidomanes	saxifragoides	epiphytic and epipetric	simple
AQ 610044.2	Crepidomanes	saxifragoides	epiphytic and epipetric	simple
AQ 718506.1	Crepidomanes	saxifragoides	epiphytic and epipetric	simple
AQ 718506.2	Crepidomanes	saxifragoides	epiphytic and epipetric	simple
AQ 396088.1	Crepidomanes	brevipes	epiphytic	simple
AQ 396088.2	Crepidomanes	brevipes	epiphytic	simple
AQ 396088.3	Crepidomanes	brevipes	epiphytic	simple
AQ 309822.2	Crepidomanes	christii	epiphytic	simple
AQ 171590.1	Crypsinus	enervis	epiphytic and epipetric	simple
AQ 171590.2	Crypsinus	enervis	epiphytic and epipetric	simple
AQ 171589.1	Crypsinus	enervis	epiphytic and epipetric	simple
AQ 171589.2	Crypsinus	enervis	epiphytic and epipetric	simple
AQ 569155.1	Crypsinus	simplicissimus	epiphytic and epipetric	simple
AQ 569155.2	Crypsinus	simplicissimus	epiphytic and epipetric	simple
AQ 497577.1	Crypsinus	simplicissimus	epiphytic and epipetric	simple
AQ 497577.2	Crypsinus	simplicissimus	epiphytic and epipetric	simple
AQ 590070.1	Dictymia	brownii	epiphytic and epipetric	simple
AQ 590070.2	Dictymia	brownii	epiphytic and epipetric	simple
AQ 647177.1	Dictymia	brownii	epiphytic and epipetric	simple
AQ 647177.2	Dictymia	brownii	epiphytic and epipetric	simple
AQ 391440.1	Drymoglossum	heterophyllum	epiphyte and scandent	simple
AQ 391440.2	Drymoglossum	heterophyllum	epiphyte and scandent	simple
AQ 391440.3	Drymoglossum	heterophyllum	epiphyte and scandent	simple
AQ 369998	Drynaria	quercifolia	epiphyte	simple
AQ 399903	Drynaria	quercifolia	epiphyte	simple
AQ 171736	Drynaria	rigidula	epiphytic and epipetric	simple
AQ 330151.1	Drynaria	rigidula	epiphytic and epipetric	simple
AQ 330151.2	Drynaria	rigidula	epiphytic and epipetric	simple
AQ 613078.1	Drynaria	rigidula	epiphytic and epipetric	simple
AQ 613078.2	Drynaria	rigidula	epiphytic and epipetric	simple
AQ 175557	Drynaria	sparsisora	epiphytic and epipetric	simple
AQ 172758.1	Goniophlebium	percursum	epiphytic and epipetric	pinnately compound
AQ 172758.2	Goniophlebium	percursum	epiphytic and epipetric	pinnately compound

AQ 772815.1	Goniophlebium	percussum	epiphytic and epipetric	pinnately compound
AQ 772815.2	Goniophlebium	percussum	epiphytic and epipetric	pinnately compound
AQ 599462.1	Goniophlebium	subauriculatum	epiphytic and epipetric	pinnately compound
AQ 599462.2	Goniophlebium	subauriculatum	epiphytic and epipetric	pinnately compound
AQ 746511.1	Goniophlebium	subauriculatum	epiphytic and epipetric	pinnately compound
AQ 815637.1	Doodia	aspera	terrestrial	simple
AQ 815637.2	Doodia	aspera	terrestrial	simple
AQ 745369.1	Doodia	aspera	terrestrial	simple
AQ 745369.2	Doodia	aspera	terrestrial	simple
AQ 768558.1	Doodia	australis	terrestrial	pinnately compound
AQ 768558.2	Doodia	australis	terrestrial	pinnately compound
AQ 145800.1	Doodia	australis	terrestrial	pinnately compound
AQ 145800.2	Doodia	australis	terrestrial	pinnately compound
AQ 145793.1	Doodia	breckenridgei	terrestrial	pinnately compound
AQ 145793.2	Doodia	breckenridgei	terrestrial	pinnately compound
AQ 439692.1	Doodia	breckenridgei	terrestrial	pinnately compound
AQ 439692.2	Doodia	breckenridgei	terrestrial	pinnately compound
AQ 558352.1	Doodia	caudata	terrestrial	pinnately compound
AQ 558352.2	Doodia	caudata	terrestrial	pinnately compound
AQ 545770.1	Doodia	caudata	terrestrial	pinnately compound
AQ 545770.2	Doodia	caudata	terrestrial	pinnately compound
AQ 614776.1	Doodia	heterophylla	terrestrial	simple
AQ 614776.2	Doodia	heterophylla	terrestrial	simple
AQ 566333.1	Cyathea	australis	tree fern	pinnately compound
AQ 566333.2	Cyathea	australis	tree fern	pinnately compound
AQ 433795.1	Cyathea	australis	tree fern	pinnately compound
AQ 433795.2	Cyathea	australis	tree fern	pinnately compound
AQ 145934.1	Cyathea	aeneifolia	tree fern	pinnately compound
AQ 145934.2	Cyathea	aeneifolia	tree fern	pinnately compound
AQ 145935.1	Cyathea	aeneifolia	tree fern	pinnately compound
AQ 145935.2	Cyathea	aeneifolia	tree fern	pinnately compound
AQ 368795.1	Cyathea	albifrons	tree fern	pinnately compound
AQ 368795.2	Cyathea	albifrons	tree fern	pinnately compound
AQ 420699.1	Cyathea	albifrons	tree fern	pinnately compound
AQ 420699.2	Cyathea	albifrons	tree fern	pinnately compound
AQ 146567.1	Cyathea	archboldii	tree fern	pinnately compound
AQ 146567.2	Cyathea	archboldii	tree fern	pinnately compound
AQ 146482.1	Cyathea	archboldii	tree fern	pinnately compound
AQ 146482.2	Cyathea	archboldii	tree fern	pinnately compound
AQ 295730.1	Cyathea	atrox	tree fern	pinnately compound
AQ 295730.2	Cyathea	atrox	tree fern	pinnately compound
AQ 145952.1	Cyathea	atrox	tree fern	pinnately compound
AQ 145952.2	Cyathea	atrox	tree fern	pinnately compound
AQ 170026.1	Marattia	attenuata	terrestrial	pinnately compound
AQ 170026.2	Marattia	attenuata	terrestrial	pinnately compound
AQ 170027.1	Marattia	attenuata	terrestrial	pinnately compound
AQ 170027.2	Marattia	attenuata	terrestrial	pinnately compound
AQ 545289.1	Marattia	oreades	terrestrial	pinnately compound
AQ 545289.2	Marattia	oreades	terrestrial	pinnately compound
AQ 699133.1	Marattia	oreades	terrestrial	pinnately compound
AQ 699133.2	Marattia	oreades	terrestrial	pinnately compound
AQ 614340.1	Microlepia	speluncae	terrestrial	pinnately compound
AQ 614340.2	Microlepia	speluncae	terrestrial	pinnately compound
AQ 644968.1	Arachniodes	aristata	terrestrial	pinnately compound
AQ 644968.2	Arachniodes	aristata	terrestrial	pinnately compound
AQ 764817.1	Arachniodes	aristata	terrestrial	pinnately compound
AQ 764817.2	Arachniodes	aristata	terrestrial	pinnately compound
AQ 671629.1	Coveniella	poecilophlebia	epipetric	pinnately compound
AQ 671629.2	Coveniella	poecilophlebia	epipetric	pinnately compound
AQ 549197.1	Coveniella	poecilophlebia	epipetric	pinnately compound
AQ 549197.2	Coveniella	poecilophlebia	epipetric	pinnately compound
AQ 546214.1	Lastreopsis	decomposita	terrestrial	pinnately compound
AQ 546214.2	Lastreopsis	decomposita	terrestrial	pinnately compound
AQ 768544.1	Lastreopsis	decomposita	terrestrial	pinnately compound
AQ 768544.2	Lastreopsis	decomposita	terrestrial	pinnately compound
AQ 841043.1	Lastreopsis	marginans	terrestrial	pinnately compound
AQ 841043.2	Lastreopsis	marginans	terrestrial	pinnately compound
AQ 727574.1	Lastreopsis	marginans	terrestrial	pinnately compound
AQ 727574.2	Lastreopsis	marginans	terrestrial	pinnately compound
AQ 743968.1	Lastreopsis	microsora	terrestrial	pinnately compound
AQ 743968.2	Lastreopsis	microsora	terrestrial	pinnately compound

AQ 641506.1	Lastreopsis	microsora	terrestrial	pinnately compound
AQ 641506.2	Lastreopsis	microsora	terrestrial	pinnately compound
AQ 841042.1	Lastreopsis	munita	terrestrial	pinnately compound
AQ 841042.2	Lastreopsis	munita	terrestrial	pinnately compound
AQ 841042.3	Lastreopsis	munita	terrestrial	pinnately compound
AQ 546266.1	Lastreopsis	munita	terrestrial	pinnately compound
AQ 546266.2	Lastreopsis	munita	terrestrial	pinnately compound
AQ 616938.1	Lastreopsis	rufescens	terrestrial	pinnately compound
AQ 616938.2	Lastreopsis	rufescens	terrestrial	pinnately compound
AQ 770638.1	Lastreopsis	rufescens	terrestrial	pinnately compound
AQ 770638.2	Lastreopsis	rufescens	terrestrial	pinnately compound
AQ 506712.3	Oenotrichia	tripinnata	terrestrial	pinnately compound
AQ 506712.4	Oenotrichia	tripinnata	terrestrial	pinnately compound
AQ 391394.1	Polystichum	acrostichoides	terrestrial	pinnately compound
AQ 391394.2	Polystichum	acrostichoides	terrestrial	pinnately compound
AQ 438062.1	Polystichum	fallax	terrestrial	pinnately compound
AQ 438062.2	Polystichum	fallax	terrestrial	pinnately compound
AQ 631268.1	Polystichum	fallax	terrestrial	pinnately compound
AQ 631268.2	Polystichum	fallax	terrestrial	pinnately compound
AQ 546271.1	Polystichum	formosum	terrestrial	pinnately compound
AQ 546271.2	Polystichum	formosum	terrestrial	pinnately compound
AQ 501581.1	Polystichum	formosum	terrestrial	pinnately compound
AQ 501581.2	Polystichum	formosum	terrestrial	pinnately compound
AQ 501581.3	Polystichum	formosum	terrestrial	pinnately compound
AQ 501581.4	Polystichum	formosum	terrestrial	pinnately compound
AQ 599470.1	Pyrrosia	longifolia	terrestrial	simple
AQ 599470.2	Pyrrosia	longifolia	terrestrial	simple
AQ 172619.1	Pyrrosia	longifolia	terrestrial	simple
AQ 172619.2	Pyrrosia	longifolia	terrestrial	simple
AQ 482588.1	Pyrrosia	lanceolata	terrestrial	simple
AQ 482588.2	Pyrrosia	lanceolata	terrestrial	simple
AQ 172719.1	Pyrrosia	lanceolata	terrestrial	simple
AQ 172719.2	Pyrrosia	lanceolata	terrestrial	simple
AQ 815709.1	Pyrrosia	rupestris	terrestrial	simple
AQ 815709.2	Pyrrosia	rupestris	terrestrial	simple
AQ 591610.1	Pyrrosia	rupestris	terrestrial	simple
AQ 591610.2	Pyrrosia	rupestris	terrestrial	simple
AQ 724157.1	Pyrrosia	confluens	terrestrial	simple
AQ 724157.2	Pyrrosia	confluens	terrestrial	simple
AQ 609021.1	Pyrrosia	confluens	terrestrial	simple
AQ 609021.2	Pyrrosia	confluens	terrestrial	simple
AQ 830151.1	Acrostichum	speciosum	terrestrial	pinnately compound
AQ 830151.2	Acrostichum	speciosum	terrestrial	pinnately compound
AQ 625223.1	Acrostichum	speciosum	terrestrial	pinnately compound
AQ 625223.2	Acrostichum	speciosum	terrestrial	pinnately compound
AQ 172986.1	Acrostichum	aureum	terrestrial	pinnately compound
AQ 172986.2	Acrostichum	aureum	terrestrial	pinnately compound
AQ 446117.1	Acrostichum	aureum	terrestrial	pinnately compound
AQ 446117.2	Acrostichum	aureum	terrestrial	pinnately compound
AQ 617594.2	Pteris	ensiformis	terrestrial	pinnately compound
AQ 368854.1	Pteris	ensiformis	terrestrial	pinnately compound
AQ 368854.2	Pteris	ensiformis	terrestrial	pinnately compound
AQ 791739.1	Pteris	pacifica	terrestrial	pinnately compound
AQ 791739.2	Pteris	pacifica	terrestrial	pinnately compound
AQ 677522.1	Pteris	pacifica	terrestrial	pinnately compound
AQ 677522.2	Pteris	pacifica	terrestrial	pinnately compound
AQ 821266.1	Pteris	tremula	terrestrial	pinnately compound
AQ 821266.2	Pteris	tremula	terrestrial	pinnately compound
AQ 472164.1	Pteris	tremula	terrestrial	pinnately compound
AQ 472164.2	Pteris	tremula	terrestrial	pinnately compound
AQ 619580.1	Pteris	tripartita	terrestrial	pinnately compound
AQ 619580.2	Pteris	tripartita	terrestrial	pinnately compound
AQ 173350.1	Pteris	tripartita	terrestrial	pinnately compound
AQ 173350.2	Pteris	tripartita	terrestrial	pinnately compound
AQ 673372.1	Pteris	vittata	epipetric or terrestrial	pinnately compound
AQ 673372.2	Pteris	vittata	epipetric or terrestrial	pinnately compound
AQ 815694.1	Paraceterach	muelleri	terrestrial	pinnately compound
AQ 815694.2	Paraceterach	muelleri	terrestrial	pinnately compound
AQ 610223.1	Paraceterach	muelleri	terrestrial	pinnately compound
AQ 610223.2	Paraceterach	muelleri	terrestrial	simple
AQ 368781.1	Paraceterach	reynoldsii	terrestrial	pinnately compound

AQ 368781.2	Paraceterach	reynoldsii	terrestrial	pinnately compound
AQ 780974.1	Paraceterach	reynoldsii	terrestrial	pinnately compound
AQ 782483.1	Pellaea	calidrupium	epipetric	pinnately compound
AQ 782483.2	Pellaea	calidrupium	epipetric	pinnately compound
AQ 782483.3	Pellaea	calidrupium	epipetric	pinnately compound
AQ 538828.1	Pellaea	calidrupium	epipetric	pinnately compound
AQ 538828.2	Pellaea	calidrupium	epipetric	pinnately compound
AQ 698779.1	Pellaea	falcata	epipetric	pinnately compound
AQ 698779.2	Pellaea	falcata	epipetric	pinnately compound
AQ 530947.1	Pellaea	falcata	epipetric	pinnately compound
AQ 530947.2	Pellaea	falcata	epipetric	pinnately compound
AQ 558360.1	Pellaea	nana	epipetric	pinnately compound
AQ 558360.2	Pellaea	nana	epipetric	pinnately compound
AQ 576544.1	Pellaea	nana	epipetric	pinnately compound
AQ 576544.2	Pellaea	nana	epipetric	pinnately compound
AQ 768542.1	Pellaea	paradoxa	epipetric	pinnately compound
AQ 768542.2	Pellaea	paradoxa	epipetric	pinnately compound
AQ 749159.1	Pellaea	paradoxa	epipetric	pinnately compound
AQ 749159.2	Pellaea	paradoxa	epipetric	pinnately compound
AQ 778098.1	Pellaea	viridis	epipetric	pinnately compound
AQ 778098.2	Pellaea	viridis	epipetric	pinnately compound
AQ 737255.1	Pityrogramma	calomelanos	terrestrial	pinnately compound
AQ 737255.2	Pityrogramma	calomelanos	terrestrial	pinnately compound
AQ 548303.1	Macrothelypteris	torresiana	terrestrial	pinnately compound
AQ 548303.2	Macrothelypteris	torresiana	terrestrial	pinnately compound
AQ 375683.1	Macrothelypteris	torresiana	terrestrial	pinnately compound
AQ 375683.2	Macrothelypteris	torresiana	terrestrial	pinnately compound
AQ 647160.1	Macrothelypteris	polypodiodes	terrestrial	pinnately compound
AQ 647160.2	Macrothelypteris	polypodiodes	terrestrial	pinnately compound
AQ 596884.1	Macrothelypteris	polypodiodes	terrestrial	pinnately compound
AQ 596884.2	Macrothelypteris	polypodiodes	terrestrial	pinnately compound
AQ 619389.1	Pronephrium	triphyllum	terrestrial	pinnately compound
AQ 619389.2	Pronephrium	triphyllum	terrestrial	pinnately compound
AQ 755358.1	Pronephrium	triphyllum	terrestrial	pinnately compound
AQ 755358.2	Pronephrium	triphyllum	terrestrial	pinnately compound
AQ 815249.1	Davallia	denticulata	epiphytic	pinnately compound
AQ 815249.2	Davallia	denticulata	epiphytic	pinnately compound
AQ 020001.1	Davallia	denticulata	epiphytic	pinnately compound
AQ 020001.2	Davallia	denticulata	epiphytic	pinnately compound
AQ 020001.3	Davallia	denticulata	epiphytic	pinnately compound
AQ 020031.1	Davallia	denticulata	epiphytic	pinnately compound
AQ 020031.2	Davallia	denticulata	epiphytic	pinnately compound
AQ 020066.1	Davallia	pyxidata	epiphytic	pinnately compound
AQ 020066.2	Davallia	pyxidata	epiphytic	pinnately compound
AQ 629805.1	Davallia	pyxidata	epiphytic	pinnately compound
AQ 629805.2	Davallia	pyxidata	epiphytic	pinnately compound
AQ 020094.1	Davallia	solida	epiphytic	pinnately compound
AQ 020094.2	Davallia	solida	epiphytic	pinnately compound
AQ 520103.1	Davallia	solida	epiphytic	pinnately compound
AQ 520103.2	Davallia	solida	epiphytic	pinnately compound
AQ 783085.1	Lygodium	microphyllum	scandent	pinnately compound
AQ 783085.2	Lygodium	microphyllum	scandent	pinnately compound
AQ 771681.1	Lygodium	microphyllum	scandent	pinnately compound
AQ 771681.2	Lygodium	microphyllum	scandent	pinnately compound
AQ 748655.1	Lygodium	reticulatum	scandent	pinnately compound
AQ 748655.2	Lygodium	reticulatum	scandent	pinnately compound
AQ 613080.1	Lygodium	reticulatum	scandent	pinnately compound
AQ 613080.2	Lygodium	reticulatum	scandent	pinnately compound
US 3227408.1	Tmesipteris	norfolkiensis	epiphytic	pinnately compound
US 3227408.2	Tmesipteris	norfolkiensis	epiphytic	pinnately compound
US 3227408.3	Tmesipteris	norfolkiensis	epiphytic	pinnately compound
US 3346968.1	Tmesipteris	gracilis	epiphytic	pinnately compound
US 3346968.2	Tmesipteris	gracilis	epiphytic	pinnately compound
US 3346968.3	Tmesipteris	gracilis	epiphytic	pinnately compound
US 1919620.1	Tmesipteris	gracilis	epiphytic	pinnately compound
US 1919620.2	Tmesipteris	gracilis	epiphytic	pinnately compound
US 3555210.1	Angiopteris	crassipes	terrestrial	pinnately compound
US 3555210.2	Angiopteris	crassipes	terrestrial	pinnately compound
US 3555210.3	Angiopteris	crassipes	terrestrial	pinnately compound
US 1719542.1	Angiopteris	crassipes	terrestrial	pinnately compound
US 1719542.2	Angiopteris	crassipes	terrestrial	pinnately compound

US 1719542.3	Angiopteris	crassipes	terrestrial	pinnately compound
US 3508153.1	Angiopteris	angustifolia	terrestrial	pinnately compound
US 3508153.2	Angiopteris	angustifolia	terrestrial	pinnately compound
US 3508153.3	Angiopteris	angustifolia	terrestrial	pinnately compound
US 3508155.1	Angiopteris	angustifolia	terrestrial	pinnately compound
US 3508155.2	Angiopteris	angustifolia	terrestrial	pinnately compound
US 3508155.3	Angiopteris	angustifolia	terrestrial	pinnately compound
US 2906136.1	Angiopteris	evecta	terrestrial	pinnately compound
US 2906136.2	Angiopteris	evecta	terrestrial	pinnately compound
US 2906136.3	Angiopteris	evecta	terrestrial	pinnately compound
US 691112.1	Angiopteris	evecta	terrestrial	pinnately compound
US 691112.2	Angiopteris	evecta	terrestrial	pinnately compound
US 691112.3	Angiopteris	evecta	terrestrial	pinnately compound
US 3481303.1	Angiopteris	palmiformis	terrestrial	pinnately compound
US 3481303.2	Angiopteris	palmiformis	terrestrial	pinnately compound
US 3569615.1	Angiopteris	palmiformis	terrestrial	pinnately compound
US 3569615.2	Angiopteris	palmiformis	terrestrial	pinnately compound
US 3569615.3	Angiopteris	palmiformis	terrestrial	pinnately compound
US 652133.1	Christensenia	aesculifolia	terrestrial	palmately compound
US 652133.2	Christensenia	aesculifolia	terrestrial	palmately compound
US 1262739.1	Christensenia	lobbiana	terrestrial	simple
US 1262739.2	Christensenia	lobbiana	terrestrial	simple
US 1718247	Christensenia	lobbiana	terrestrial	simple
US 902770	Christensenia	lobbiana	terrestrial	simple
US 2018157.1	Danaea	elliptica	terrestrial	pinnately compound
US 2018157.2	Danaea	elliptica	terrestrial	pinnately compound
US 2018157.3	Danaea	elliptica	terrestrial	pinnately compound
US 1493831.1	Danaea	elliptica	terrestrial	pinnately compound
US 1493831.2	Danaea	elliptica	terrestrial	pinnately compound
US 1493831.3	Danaea	elliptica	terrestrial	pinnately compound
US 2776145.1	Danaea	moritziana	terrestrial	pinnately compound
US 2776145.2	Danaea	moritziana	terrestrial	pinnately compound
US 2776145.3	Danaea	moritziana	terrestrial	pinnately compound
US 2356343.1	Danaea	moritziana	terrestrial	pinnately compound
US 2356343.2	Danaea	moritziana	terrestrial	pinnately compound
US 2356343.3	Danaea	moritziana	terrestrial	pinnately compound
US 3057554.1	Danaea	nodosa	terrestrial	pinnately compound
US 3057554.2	Danaea	nodosa	terrestrial	pinnately compound
US 3057554.3	Danaea	nodosa	terrestrial	pinnately compound
US 464884.1	Danaea	nodosa	terrestrial	pinnately compound
US 464884.2	Danaea	nodosa	terrestrial	pinnately compound
US 2356345.1	Marattia	excavata	terrestrial	pinnately compound
US 2356345.3	Marattia	excavata	terrestrial	pinnately compound
US 2356345.4	Marattia	excavata	terrestrial	pinnately compound
US 2137259.1	Marattia	excavata	terrestrial	pinnately compound
US 2137259.2	Marattia	excavata	terrestrial	pinnately compound
US 2137259.3	Marattia	excavata	terrestrial	pinnately compound
US 2137259.4	Marattia	excavata	terrestrial	pinnately compound
US 2137259.5	Marattia	excavata	terrestrial	pinnately compound
US 1745454.1	Marattia	laxa	terrestrial	pinnately compound
US 1745454.2	Marattia	laxa	terrestrial	pinnately compound
US 1745454.3	Marattia	laxa	terrestrial	pinnately compound
US 2201678.1	Marattia	laxa	terrestrial	pinnately compound
US 2201678.2	Marattia	laxa	terrestrial	pinnately compound
US 2201678.3	Marattia	laxa	terrestrial	pinnately compound
US 1918496.1	Helminthostachys	zeylanica	terrestrial	palmately compound
US 1918496.2	Helminthostachys	zeylanica	terrestrial	palmately compound
US 1349662.1	Helminthostachys	zeylanica	terrestrial	palmately compound
US 1349662.2	Helminthostachys	zeylanica	terrestrial	palmately compound
US 1681420.1	Helminthostachys	zeylanica	terrestrial	palmately compound
US 1681420.2	Helminthostachys	zeylanica	terrestrial	palmately compound
US 1631813.1	Botrychium	jenmanii	terrestrial	pinnately compound
US 1631813.2	Botrychium	jenmanii	terrestrial	pinnately compound
US 1631813.3	Botrychium	jenmanii	terrestrial	pinnately compound
US 1631813.6	Botrychium	jenmanii	terrestrial	pinnately compound
US 1631813.7	Botrychium	jenmanii	terrestrial	pinnately compound
US 510789.1	Botrychium	jenmanii	terrestrial	pinnately compound
US 510789.2	Botrychium	jenmanii	terrestrial	pinnately compound
US 510789.3	Botrychium	jenmanii	terrestrial	pinnately compound
US 510789.4	Botrychium	jenmanii	terrestrial	pinnately compound
US 2415484.1	Botrychium	bitermatum	terrestrial	pinnately compound

US 2415484.2	Botrychium	bitermatum	terrestrial	pinnately compound
US 2415484.3	Botrychium	bitermatum	terrestrial	pinnately compound
US 2415484.4	Botrychium	bitermatum	terrestrial	pinnately compound
US 2415484.5	Botrychium	bitermatum	terrestrial	pinnately compound
US 2415484.6	Botrychium	bitermatum	terrestrial	pinnately compound
US 674866.1	Botrychium	dissectum	terrestrial	pinnately compound
US 674866.2	Botrychium	dissectum	terrestrial	pinnately compound
US 674866.3	Botrychium	dissectum	terrestrial	pinnately compound
US 674866.4	Botrychium	dissectum	terrestrial	pinnately compound
US 674866.5	Botrychium	dissectum	terrestrial	pinnately compound
US 674866.6	Botrychium	dissectum	terrestrial	pinnately compound
US 674866.7	Botrychium	dissectum	terrestrial	pinnately compound
US 674866.8	Botrychium	dissectum	terrestrial	pinnately compound
US 674844.2	Botrychium	dissectum	terrestrial	pinnately compound
US 674844.3	Botrychium	dissectum	terrestrial	pinnately compound
US 674844.4	Botrychium	dissectum	terrestrial	pinnately compound
US 674844.5	Botrychium	dissectum	terrestrial	pinnately compound
US 591553.1	Schizaea	fluminensis	terrestrial	dichotomously branched
US 591553.2	Schizaea	fluminensis	terrestrial	dichotomously branched
US 591553.3	Schizaea	fluminensis	terrestrial	dichotomously branched
US 591553.4	Schizaea	fluminensis	terrestrial	dichotomously branched
US 591553.5	Schizaea	fluminensis	terrestrial	dichotomously branched
US 3038920.1	Schizaea	fluminensis	terrestrial	dichotomously branched
US 3038920.2	Schizaea	fluminensis	terrestrial	dichotomously branched
US 3038920.3	Schizaea	fluminensis	terrestrial	dichotomously branched
US 3038920.4	Schizaea	fluminensis	terrestrial	dichotomously branched
US 1915248.1	Schizaea	elegans	terrestrial	dichotomously branched
US 1915248.2	Schizaea	elegans	terrestrial	dichotomously branched
US 1915248.3	Schizaea	elegans	terrestrial	dichotomously branched
US 1915248.4	Schizaea	elegans	terrestrial	dichotomously branched
US 3252569.1	Schizaea	elegans	terrestrial	dichotomously branched
US 3252569.2	Schizaea	elegans	terrestrial	dichotomously branched
US 3252569.3	Schizaea	elegans	terrestrial	dichotomously branched
US 3252569.4	Schizaea	elegans	terrestrial	dichotomously branched
US 3538573.1	Actinostachys	subtrijuga	terrestrial	palmately compound
US 3538573.2	Actinostachys	subtrijuga	terrestrial	palmately compound
US 3538573.3	Actinostachys	subtrijuga	terrestrial	palmately compound
US 2136600.1	Actinostachys	subtrijuga	terrestrial	palmately compound
US 2136600.2	Actinostachys	subtrijuga	terrestrial	palmately compound
US 2136600.3	Actinostachys	subtrijuga	terrestrial	palmately compound
US 2136866.1	Actinostachys	subtrijuga	terrestrial	palmately compound
US 2136866.2	Actinostachys	subtrijuga	terrestrial	palmately compound
US 2136866.3	Actinostachys	subtrijuga	terrestrial	palmately compound
US 2864640.1	Actinostachys	pennula	terrestrial	palmately compound
US 2864640.2	Actinostachys	pennula	terrestrial	palmately compound
US 3278375.1	Actinostachys	pennula	terrestrial	palmately compound
US 3278375.2	Actinostachys	pennula	terrestrial	palmately compound
US 2948915.1	Actinostachys	pennula	terrestrial	palmately compound
US 2948915.2	Actinostachys	pennula	terrestrial	palmately compound
US 2948915.3	Actinostachys	pennula	terrestrial	palmately compound
US 2293548.1	Matonia	foxworthyi	terrestrial	pinnately compound
US 2416108.1	Cibotium	schiedei	tree fern	pinnately compound
US 2416108.2	Cibotium	schiedei	tree fern	pinnately compound
US 2416108.3	Cibotium	schiedei	tree fern	pinnately compound
US 2254822.1	Cibotium	schiedei	tree fern	pinnately compound
US 2254822.2	Cibotium	schiedei	tree fern	pinnately compound
US 2254822.3	Cibotium	schiedei	tree fern	pinnately compound
US 1793133.1	Cibotium	regale	tree fern	pinnately compound
US 1793133.2	Cibotium	regale	tree fern	pinnately compound
US 1793133.3	Cibotium	regale	tree fern	pinnately compound
US 1792976.1	Cibotium	regale	tree fern	pinnately compound
US 1792976.2	Cibotium	regale	tree fern	pinnately compound
US 2201505.1	Plagiogyria	adnata	tree fern	simple
US 2201505.2	Plagiogyria	adnata	tree fern	simple
US 2649281.1	Plagiogyria	adnata	tree fern	simple
US 1211894.1	Plagiogyria	euphlebia	tree fern	pinnately compound
US 1211894.2	Plagiogyria	euphlebia	tree fern	pinnately compound
US 1211894.3	Plagiogyria	euphlebia	tree fern	pinnately compound
US 1507505.1	Plagiogyria	euphlebia	tree fern	pinnately compound
US 1507505.2	Plagiogyria	euphlebia	tree fern	pinnately compound
US 1507505.3	Plagiogyria	euphlebia	tree fern	pinnately compound

US 530603.1	Anemia	phyllitidis	terrestrial	pinnately compound
US 530603.2	Anemia	phyllitidis	terrestrial	pinnately compound
US 530603.3	Anemia	phyllitidis	terrestrial	pinnately compound
US 3240286.1	Metaxya	lanosa	tree fern	pinnately compound
US 3240286.2	Metaxya	lanosa	tree fern	pinnately compound
US 3240286.3	Metaxya	lanosa	tree fern	pinnately compound
US 1915023.1	Metaxya	lanosa	tree fern	pinnately compound
US 1915023.2	Metaxya	lanosa	tree fern	pinnately compound
US 1915023.3	Metaxya	lanosa	tree fern	pinnately compound
US 2153946.1	Metaxya	rostratum	tree fern	pinnately compound
US 2153946.2	Metaxya	rostratum	tree fern	pinnately compound
US 2153946.3	Metaxya	rostratum	tree fern	pinnately compound
US 1853275.1	Metaxya	rostratum	tree fern	pinnately compound
US 1853275.2	Metaxya	rostratum	tree fern	pinnately compound
US 1853275.3	Metaxya	rostratum	tree fern	pinnately compound
US 2416106.1	Dipteris	conjugata	terrestrial	dichotomous
US 2416106.2	Dipteris	conjugata	terrestrial	dichotomous
US 1053780	Dipteris	conjugata	terrestrial	dichotomous
US 456677.1	Dipteris	conjugata	terrestrial	dichotomous
US 456677.2	Dipteris	conjugata	terrestrial	dichotomous
US 456677.3	Dipteris	conjugata	terrestrial	dichotomous
US 2255285.1	Cheiropleura	bicuspis	terrestrial	simple
US 2255285.2	Cheiropleura	bicuspis	terrestrial	simple
US 2255285.3	Cheiropleura	bicuspis	terrestrial	simple
US 2255044.1	Cheiropleura	bicuspis	terrestrial	simple
US 2255044.2	Cheiropleura	bicuspis	terrestrial	simple
US 2255044.3	Cheiropleura	bicuspis	terrestrial	simple
US 2080747.1	Alsophila	camarooniana	tree fern	pinnately compound
US 2080747.2	Alsophila	camarooniana	tree fern	pinnately compound
US 2080747.3	Alsophila	camarooniana	tree fern	pinnately compound
US 2018846.1	Alsophila	capensis	tree fern	pinnately compound
US 2018846.2	Alsophila	capensis	tree fern	pinnately compound
US 2018846.3	Alsophila	capensis	tree fern	pinnately compound
US 2293755.1	Alsophila	capensis	tree fern	pinnately compound
US 2293755.2	Alsophila	capensis	tree fern	pinnately compound
US 2293755.3	Alsophila	capensis	tree fern	pinnately compound
US 2293755.4	Alsophila	capensis	tree fern	pinnately compound
US 547448.1	Hymenophyllopsis	ctenitoides	tree fern	pinnately compound
US 547448.2	Hymenophyllopsis	ctenitoides	tree fern	pinnately compound
US 547448.3	Hymenophyllopsis	ctenitoides	tree fern	pinnately compound
US 1915638.1	Hymenophyllopsis	ctenitoides	tree fern	pinnately compound
US 2295026.1	Hymenophyllopsis	hymenophylloides	tree fern	pinnately compound
US 2295026.2	Hymenophyllopsis	hymenophylloides	tree fern	pinnately compound
US 2295026.3	Hymenophyllopsis	hymenophylloides	tree fern	pinnately compound
US 1915630.1	Hymenophyllopsis	hymenophylloides	tree fern	pinnately compound
US 1915630.2	Hymenophyllopsis	hymenophylloides	tree fern	pinnately compound
US 1915630.3	Hymenophyllopsis	hymenophylloides	tree fern	pinnately compound
US 3479458.1	Culcita	coniifolia	tree fern	pinnately compound
US 3479458.2	Culcita	coniifolia	tree fern	pinnately compound
US 3479458.4	Culcita	coniifolia	tree fern	pinnately compound
US 3479458.5	Culcita	coniifolia	tree fern	pinnately compound
US 2356593.1	Culcita	coniifolia	tree fern	pinnately compound
US 2356593.2	Culcita	coniifolia	tree fern	pinnately compound
US 2356593.3	Culcita	coniifolia	tree fern	pinnately compound
US 2356593.4	Culcita	coniifolia	tree fern	pinnately compound
US 2356593.5	Culcita	coniifolia	tree fern	pinnately compound
US 1918390.1	Calochlaena	straminea	tree fern	pinnately compound
US 1918390.2	Calochlaena	straminea	tree fern	pinnately compound
US 2927546.1	Calochlaena	straminea	tree fern	pinnately compound
US 2927546.2	Calochlaena	straminea	tree fern	pinnately compound
US 2927546.3	Calochlaena	straminea	tree fern	pinnately compound
US 2927546.4	Calochlaena	straminea	tree fern	pinnately compound
US 1616029.1	Dicksonia	karsteniana	tree fern	pinnately compound
US 1616029.2	Dicksonia	karsteniana	tree fern	pinnately compound
US 1616029.3	Dicksonia	karsteniana	tree fern	pinnately compound
US 1616029.4	Dicksonia	karsteniana	tree fern	pinnately compound
US 1744662.1	Dicksonia	karsteniana	tree fern	pinnately compound
US 1744662.2	Dicksonia	karsteniana	tree fern	pinnately compound
US 1744662.3	Dicksonia	karsteniana	tree fern	pinnately compound
US 1744662.4	Dicksonia	karsteniana	tree fern	pinnately compound
US 2255557.1	Lophosoria	quadripinnata	tree fern	pinnately compound

US 2255557.2	Lophosoria	quadripinnata	tree fern	pinnately compound
US 3319867.1	Lophosoria	quadripinnata	tree fern	pinnately compound
US 3319867.2	Lophosoria	quadripinnata	tree fern	pinnately compound
US3033944.1	Dicranopteris	flexuosa	scandent and terrestrial	pinnately compound
US3033944.2	Dicranopteris	flexuosa	scandent and terrestrial	pinnately compound
US 3381720.1	Dicranopteris	flexuosa	scandent and terrestrial	pinnately compound
US 3381720.2	Dicranopteris	flexuosa	scandent and terrestrial	pinnately compound
US 3005599.1	Dicranopteris	linearis	scandent	pinnately compound
US 3005599.2	Dicranopteris	linearis	scandent	pinnately compound
US 2084111.1	Dicranopteris	linearis	scandent	pinnately compound
US 2084111.2	Dicranopteris	linearis	scandent	pinnately compound
US 1915124.1	Diplopterygium	bancroftii	Drooping	pinnately compound
US 1915124.2	Diplopterygium	bancroftii	Drooping	pinnately compound
US 1915124.3	Diplopterygium	bancroftii	Drooping	pinnately compound
US 2359241.1	Diplopterygium	bancroftii	Drooping	pinnately compound
US 2359241.2	Diplopterygium	bancroftii	Drooping	pinnately compound
US 2359241.3	Diplopterygium	bancroftii	Drooping	pinnately compound
US 2136211.1	Sphaeropteris	lepifera	tree fern	pinnately compound
US 2136211.2	Sphaeropteris	lepifera	tree fern	pinnately compound
US 2136211.3	Sphaeropteris	lepifera	tree fern	pinnately compound
US 2018506.1	Sphaeropteris	lepifera	tree fern	pinnately compound
US 2018506.2	Sphaeropteris	lepifera	tree fern	pinnately compound
US 2018506.3	Sphaeropteris	lepifera	tree fern	pinnately compound
US 2257875.1	Sphaeropteris	propinqua	tree fern	pinnately compound
US 2257875.2	Sphaeropteris	propinqua	tree fern	pinnately compound
US 2257919.1	Sphaeropteris	propinqua	tree fern	pinnately compound
US 2257919.2	Sphaeropteris	propinqua	tree fern	pinnately compound
US 2257919.3	Sphaeropteris	propinqua	tree fern	pinnately compound
US 2137257.1	Dicksonia	giganta	tree fern	pinnately compound
US 2137257.2	Dicksonia	giganta	tree fern	pinnately compound
US 2017091.1	Dicksonia	giganta	tree fern	pinnately compound
US 2017091.2	Dicksonia	giganta	tree fern	pinnately compound

APPENDIX D

Fern Data Measurements

Specimen ID#	Level of Leaf Organization	Dry Mass (g)	Leaf Area (cm ²)	Leaf area (m ²)	Petiole Width (cm)	Petiole Width (m)
311.1b	Primary Pinna	0.066	5.030	0.00050	0.125	0.00125
311.1c	Primary Pinna	0.142	10.834	0.00108	0.179	0.00179
311.1A	Frond	0.761	51.129	0.00511	0.314	0.00314
311.1e	Secondary Pinna	0.020	1.799	0.00018	0.066	0.00066
Holmes 7602.1	Primary Pinna	0.002	0.188	0.00002	0.079	0.00079
Holmes 7602.1	Primary Pinna	0.002	0.265	0.00003	0.126	0.00126
Holmes 7602.2	Primary Pinna	0.003	0.257	0.00003	0.116	0.00116
Holmes 7602.2	Primary Pinna	0.004	0.372	0.00004	0.151	0.00151
Holmes 9410	Primary Pinna	0.001	0.146	0.00001	0.080	0.00080
Holmes 9410	Primary Pinna	0.002	0.193	0.00002	0.084	0.00084
768.1	Frond	0.224	81.863	0.00819	0.071	0.00071
768.2	Frond	0.433	19.230	0.00192	0.169	0.00169
768.2	Primary Pinna	0.023	8.420	0.00084	0.229	0.00229
768.2	Primary Pinna	0.021	7.716	0.00077	0.160	0.00160
Holmes12954	Primary Pinna	0.024	8.825	0.00088	0.108	0.00108
Pace s.n.	Primary Pinna	0.005	2.983	0.00030	0.066	0.00066
Pace s.n.	Primary Pinna	0.002	1.071	0.00011	0.041	0.00041
Singhurst2000	Primary Pinna	0.081	14.894	0.00149	0.105	0.00105
Singhurst2000	Primary Pinna	0.018	3.077	0.00031	0.091	0.00091
4710.1	Frond	0.183	14.297	0.00143	0.086	0.00086
4710.1	Primary Pinna	0.014	1.180	0.00012	0.088	0.00088
4710.1	Primary Pinna	0.013	1.206	0.00012	0.126	0.00126
4710.2	Frond	0.181	19.220	0.00192	0.120	0.00120
5154.1	Primary Pinna	0.025	5.416	0.00054	0.099	0.00099
5154.1	Primary Pinna	0.022	4.845	0.00048	0.100	0.00100
5154.2	Primary Pinna	0.018	3.370	0.00034	0.097	0.00097
5154.2	Primary Pinna	0.015	2.538	0.00025	0.070	0.00070
13053A	Primary Pinna	0.023	5.186	0.00052	0.122	0.00122
13053A	Primary Pinna	0.033	7.050	0.00071	0.142	0.00142
5547	Frond	0.144	15.011	0.00150	0.100	0.00100
5547	Primary Pinna	0.014	1.447	0.00014	0.053	0.00053
5547	Primary Pinna	0.012	1.368	0.00014	0.075	0.00075
5547.1	Primary Pinna	0.031	3.076	0.00031	0.069	0.00069
5547.1	Frond	0.248	25.546	0.00255	0.088	0.00088
5547.1	Secondary Pinna	0.010	0.909	0.00009	0.049	0.00049
5547.1	Secondary Pinna	0.010	0.909	0.00009	0.026	0.00026
6235	Secondary Pinna	0.010	0.909	0.00009	0.094	0.00094
5723	Frond	0.227	9.080	0.00091	0.086	0.00086
5860	Frond	0.420	16.300	0.00163	0.130	0.00130
5860	Primary Pinna	0.007	0.335	0.00003	0.056	0.00056
5860	Primary Pinna	0.006	0.270	0.00003	0.050	0.00050
6232.1	Frond	0.019	2.336	0.00023	0.055	0.00055
6232.2	Primary Pinna	0.002	1.366	0.00014	0.027	0.00027
6232.2	Primary Pinna	0.006	2.735	0.00027	0.031	0.00031
6232.2	Frond	0.029	3.070	0.00031	0.042	0.00042
8045	Primary Pinna	0.007	0.636	0.00006	0.050	0.00050
8045	Primary Pinna	0.009	1.003	0.00010	0.046	0.00046
8045	Secondary Pinna	0.011	0.899	0.00009	0.067	0.00067
8045	Frond	0.166	13.100	0.00131	0.071	0.00071
8045	Secondary Pinna	0.005	0.427	0.00004	0.037	0.00037
17783	Frond	0.224	7.925	0.00079	0.099	0.00099
17783	Primary Pinna	0.002	0.083	0.00001	0.023	0.00023
17783	Primary Pinna	0.004	0.111	0.00001	0.029	0.00029
10767.1	Primary Pinna	0.002	0.139	0.00001	0.087	0.00087
10767.1	Primary Pinna	0.003	0.331	0.00003	0.166	0.00166
10767.2	Primary Pinna	0.002	0.135	0.00001	0.077	0.00077
10767.2	Primary Pinna	0.002	0.145	0.00001	0.075	0.00075
14294	Frond	1.463	216.437	0.02164	0.226	0.00226
14294	Primary Pinna	0.076	13.571	0.00136	0.041	0.00041
14294	Primary Pinna	0.072	12.806	0.00128	0.048	0.00048

17692	Frond	2.262	199.272	0.01993	0.305	0.00305
17692	Primary Pinna	0.138	12.085	0.00121	0.111	0.00111
17692	Primary Pinna	0.129	14.439	0.00144	0.105	0.00105
17496.1	Frond	4.594	225.146	0.02251	0.415	0.00415
17496.1	Primary Pinna	0.083	6.642	0.00066	0.090	0.00090
17496.1	Primary Pinna	0.062	5.168	0.00052	0.067	0.00067
18784	Frond	0.307	63.590	0.00636	0.122	0.00122
18784	Primary Pinna	0.011	3.818	0.00038	0.081	0.00081
18784	Primary Pinna	0.009	3.254	0.00033	0.086	0.00086
18787	Frond	0.884	162.888	0.01629	0.212	0.00212
18787	Primary Pinna	0.023	6.574	0.00066	0.077	0.00077
18787	Primary Pinna	0.021	5.942	0.00059	0.070	0.00070
76200	Frond	1.599	145.166	0.01452	0.222	0.00222
76200	Primary Pinna	0.039	4.922	0.00049	0.076	0.00076
76200	Primary Pinna	0.028	3.454	0.00035	0.061	0.00061
92939	Frond	0.894	234.435	0.02344	0.160	0.00160
92939	Primary Pinna	0.025	5.929	0.00059	0.046	0.00046
92939	Primary Pinna	0.019	6.321	0.00063	0.049	0.00049
Clements154	Frond	0.077	35.230	0.00352	0.044	0.00044
Clements154	Frond	0.014	9.635	0.00096	0.019	0.00019
Crosthwaite159	Primary Pinna	0.020	3.101	0.00031	0.043	0.00043
Crosthwaite159	Primary Pinna	0.017	2.580	0.00026	0.036	0.00036
Dunton s.n.	Frond	0.003	2.120	0.00021	0.040	0.00040
Dunton s.n.	Frond	0.005	1.864	0.00019	0.042	0.00042
Dunton s.n.	Primary Pinna	0.001	0.233	0.00002	0.034	0.00034
Dunton s.n.	Primary Pinna	0.001	0.188	0.00002	0.043	0.00043
Dunton s.n.	Primary Pinna	0.002	0.765	0.00008	0.085	0.00085
Hansen4737	Frond	0.015	7.689	0.00077	0.040	0.00040
Hansen4737	Primary Pinna	0.003	1.461	0.00015	0.028	0.00028
Hansen4737	Primary Pinna	0.002	0.803	0.00008	0.021	0.00021
Hansen4737	Primary Pinna	0.002	1.302	0.00013	0.030	0.00030
Ruth1003	Primary Pinna	0.001	1.392	0.00014	0.023	0.00023
Ruth1003	Primary Pinna	0.001	1.176	0.00012	0.017	0.00017
Holmes4469	Frond	0.047	19.985	0.00200	0.087	0.00087
Holmes4469	Frond	0.050	21.782	0.00218	0.110	0.00110
Holmes4469	Frond	0.002	0.940	0.00009	0.058	0.00058
Holmes4469	Frond	0.008	2.462	0.00025	0.057	0.00057
Holmes11057	Primary Pinna	0.005	1.301	0.00013	0.062	0.00062
Holmes11057	Primary Pinna	0.005	0.966	0.00010	0.074	0.00074
Holmes6297	Primary Pinna	0.012	3.786	0.00038	0.098	0.00098
Holmes6297	Primary Pinna	0.009	2.866	0.00029	0.077	0.00077
Holmes6297	Primary Pinna	0.020	5.788	0.00058	0.076	0.00076
Holmes8942	Frond	0.856	240.860	0.02409	0.164	0.00164
Leidolf1026	Frond	0.383	67.200	0.00672	0.145	0.00145
SinghurstAdamsFitch15304	Frond	0.705	207.019	0.02070	0.102	0.00102
Hurst s.n.	Primary Pinna	0.003	0.729	0.00007	0.096	0.00096
Hurst s.n.	Primary Pinna	0.002	0.679	0.00007	0.087	0.00087
Leonard2804	Primary Pinna	0.011	3.303	0.00033	0.047	0.00047
Leonard2804	Primary Pinna	0.011	3.189	0.00032	0.043	0.00043
Thomas153691	Primary Pinna	0.039	9.593	0.00096	0.056	0.00056
Thomas153691	Primary Pinna	0.025	6.724	0.00067	0.065	0.00065
OdiaBarbosa44	Primary Pinna	0.039	8.492	0.00085	0.085	0.00085
OdiaBarbosa44	Primary Pinna	0.038	8.716	0.00087	0.090	0.00090
OdiaBarbosa44	Primary Pinna	0.056	9.059	0.00091	0.127	0.00127
Pace744.1	Frond	0.004	0.500	0.00005	0.053	0.00053
Pace744.2	Frond	0.004	0.554	0.00006	0.052	0.00052
Pace744.3	Frond	0.006	0.790	0.00008	0.066	0.00066
Redfearn23590	Primary Pinna	0.002	0.988	0.00010	0.032	0.00032
Redfearn23590	Primary Pinna	0.001	0.831	0.00008	0.024	0.00024
Redfearn23590	Primary Pinna	0.001	0.914	0.00009	0.028	0.00028
Schwartz54	Primary Pinna	0.001	0.947	0.00009	0.022	0.00022
Schwartz54	Primary Pinna	0.002	0.869	0.00009	0.022	0.00022
Holmes8108	Primary Pinna	0.031	5.344	0.00053	0.069	0.00069
Sanchez3225	Primary Pinna	0.009	2.957	0.00030	0.083	0.00083
Sanchez3225	Primary Pinna	0.005	1.114	0.00011	0.073	0.00073
Singhurst 4802	Primary Pinna	0.004	0.384	0.00004	0.017	0.00017
Singhurst 4802	Primary Pinna	0.004	0.434	0.00004	0.026	0.00026
Singhurst 4806	Primary Pinna	0.003	0.365	0.00004	0.107	0.00107
Singhurst 4806	Primary Pinna	0.003	0.378	0.00004	0.100	0.00100
Zygo 208	Primary Pinna	0.002	0.276	0.00003	0.118	0.00118
Zygo 208	Primary Pinna	0.002	0.215	0.00002	0.090	0.00090

SinghurstBridges12415	Primary Pinna	0.011	2.482	0.00025	0.036	0.00036
SinghurstBridges12415	Primary Pinna	0.013	2.795	0.00028	0.049	0.00049
SinghurstBridges15836	Primary Pinna	0.007	2.612	0.00026	0.049	0.00049
SinghurstBridges15836	Primary Pinna	0.007	2.358	0.00024	0.049	0.00049
SinghurstBridges15836	Primary Pinna	0.009	3.496	0.00035	0.088	0.00088
Kral91486	Primary Pinna	0.164	30.909	0.00309	0.076	0.00076
SinghurstBridges15934	Primary Pinna	0.092	9.851	0.00099	0.091	0.00091
SinghurstBridges15934	Primary Pinna	0.008	1.030	0.00010	0.076	0.00076
Sylva1375	Frond	0.028	12.443	0.00124	0.035	0.00035
Sylva1375	Frond	0.026	11.628	0.00116	0.031	0.00031
Sylva1375	Frond	0.026	11.985	0.00120	0.030	0.00030
Sylva1375	Frond	0.010	3.186	0.00032	0.026	0.00026
Sylva1375	Frond	0.026	11.536	0.00115	0.035	0.00035
WAIK 12919.1	Primary Pinna	0.001	0.262	0.00003	0.0300	0.00030
WAIK 12919.2	Primary Pinna	0.001	0.344	0.00003	0.0410	0.00041
WAIK 14564.2	Primary Pinna	0.001	0.393	0.00004	0.0370	0.00037
WAIK 14358.1	Primary Pinna	0.039	3.668	0.00037	0.0740	0.00074
WAIK 14358.2	Primary Pinna	0.020	2.427	0.00024	0.0530	0.00053
WAIK 1447.1	Frond	0.067	2.310	0.00023	0.1050	0.00105
WAIK 1447.2	Frond	0.068	3.065	0.00031	0.1030	0.00103
WAIK 14591.1	Frond	0.028	2.907	0.00029	0.0410	0.00041
WAIK 14591.2	Frond	0.050	6.778	0.00068	0.0620	0.00062
WAIK 15079.1	Frond	0.003	0.805	0.00008	0.0230	0.00023
WAIK 15079.2	Frond	0.007	1.432	0.00014	0.0290	0.00029
WAIK 15164.1	Primary Pinna	0.013	1.234	0.00012	0.0500	0.00050
WAIK 15164.2	Primary Pinna	0.018	1.781	0.00018	0.0520	0.00052
WAIK 15204.1	Frond	0.382	37.030	0.00370	0.1370	0.00137
WAIK 15204.2	Frond	0.285	22.287	0.00223	0.0870	0.00087
WAIK 16041.1	Primary Pinna	0.032	4.376	0.00044	0.0770	0.00077
WAIK 16041.2	Primary Pinna	0.034	4.854	0.00049	0.0660	0.00066
WAIK 16239.1	Frond	0.004	0.994	0.00010	0.0380	0.00038
WAIK 16239.2	Frond	0.001	0.775	0.00008	0.0360	0.00036
WAIK 16249.2	Frond	0.018	3.784	0.00038	0.0760	0.00076
WAIK 17589.1	Frond	0.014	3.047	0.00030	0.0430	0.00043
WAIK 18034.1	Frond	0.337	45.293	0.00453	0.0770	0.00077
WAIK 18036.1	Frond	0.127	18.555	0.00186	0.0720	0.00072
WAIK 18036.2	Frond	0.035	5.892	0.00059	0.0850	0.00085
WAIK 18056.1	Primary Pinna	0.049	8.237	0.00082	0.0800	0.00080
WAIK 18056.2	Primary Pinna	0.051	7.688	0.00077	0.1100	0.00110
WAIK 18405.1	Frond	0.128	19.695	0.00197	0.0640	0.00064
WAIK 18405.2	Frond	0.261	33.808	0.00338	0.0970	0.00097
WAIK 18464.1	Frond	0.021	6.195	0.00062	0.0500	0.00050
WAIK 18464.2	Frond	0.024	6.258	0.00063	0.0630	0.00063
WAIK 19019.1	Primary Pinna	0.085	11.484	0.00115	0.0960	0.00096
WAIK 19019.2	Primary Pinna	0.080	11.672	0.00117	0.1750	0.00175
WAIK 19513.1	Secondary Pinna	0.028	4.557	0.00046	0.0400	0.00040
WAIK 19513.2	Secondary Pinna	0.018	2.895	0.00029	0.0260	0.00026
WAIK 19523.1	Primary Pinna	0.139	24.060	0.00241	0.1230	0.00123
WAIK 19523.2	Primary Pinna	0.166	21.500	0.00215	0.1680	0.00168
WAIK 19697.1	Secondary Pinna	0.013	2.935	0.00029	0.0210	0.00021
WAIK 19697.2	Secondary Pinna	0.009	2.308	0.00023	0.0230	0.00023
WAIK 20197.1	Primary Pinna	0.064	2.074	0.00021	0.0300	0.00030
WAIK 20197.2	Primary Pinna	0.046	2.759	0.00028	0.0170	0.00017
WAIK 2892.1	Primary Pinna	0.013	1.458	0.00015	0.0160	0.00016
WAIK 2892.2	Primary Pinna	0.071	9.945	0.00099	0.0630	0.00063
WAIK 3016.1	Primary Pinna	0.023	7.552	0.00076	0.0510	0.00051
WAIK 3016.2	Primary Pinna	0.015	5.083	0.00051	0.0490	0.00049
WAIK 3396.1	Primary Pinna	0.082	11.742	0.00117	0.0450	0.00045
WAIK 3396.2	Primary Pinna	0.080	11.357	0.00114	0.0670	0.00067
WAIK 4711.1	Primary Pinna	0.061	4.152	0.00042	0.0440	0.00044
WAIK 4711.2	Primary Pinna	0.062	3.110	0.00031	0.0320	0.00032
WAIK 5193.1	Frond	0.188	23.827	0.00238	0.0930	0.00093
WAIK 5193.2	Frond	0.125	16.662	0.00167	0.0770	0.00077
WAIK 5663.1	Primary Pinna	0.106	40.939	0.00409	0.0970	0.00097
WAIK 5663.2	Secondary Pinna	0.010	4.193	0.00042	0.0340	0.00034
WAIK 6052.1	Primary Pinna	0.023	3.794	0.00038	0.0380	0.00038
WAIK 6052.2	Primary Pinna	0.020	3.381	0.00034	0.0450	0.00045
WAIK 6321.1	Primary Pinna	0.145	17.597	0.00176	0.0750	0.00075
WAIK 6321.2	Primary Pinna	0.159	17.739	0.00177	0.0800	0.00080
WAIK 6600C.1	Primary Pinna	0.313	71.404	0.00714	0.1450	0.00145
WAIK 6600C.2	Secondary Pinna	0.058	13.690	0.00137	0.0870	0.00087

WAIK 6311.1	Primary Pinna	0.012	3.381	0.00034	0.0330	0.00033
WAIK 6311.2	Primary Pinna	0.073	9.140	0.00091	0.0660	0.00066
WAIK 688.1	Frond	0.092	13.403	0.00134	0.0810	0.00081
WAIK 688.2	Frond	0.066	8.433	0.00084	0.0910	0.00091
WAIK 7.1	Frond	0.676	55.354	0.00554	0.1410	0.00141
WAIK 7.2	Frond	0.903	59.097	0.00591	0.1690	0.00169
WAIK 7361.1	Frond	0.013	2.959	0.00030	0.0450	0.00045
WAIK 7361.2	Frond	0.026	4.502	0.00045	0.0590	0.00059
WAIK 8021.1	Primary Pinna	0.032	4.604	0.00046	0.0570	0.00057
WAIK 8021.2	Primary Pinna	0.030	4.447	0.00044	0.0640	0.00064
WAIK 8241.1	Frond	0.012	2.935	0.00029	0.0390	0.00039
WAIK 8241.2	Frond	0.007	2.025	0.00020	0.0420	0.00042
WAIK 8242.1	Primary Pinna	0.005	1.674	0.00017	0.0340	0.00034
WAIK 8242.2	Primary Pinna	0.010	1.844	0.00018	0.0370	0.00037
WAIK 8540.1	Primary Pinna	0.021	3.088	0.00031	0.0450	0.00045
WAIK 8540.2	Primary Pinna	0.012	1.980	0.00020	0.0400	0.00040
WAIK 8555.2	Primary Pinna	0.015	1.678	0.00017	0.0590	0.00059
WAIK 8555.1	Primary Pinna	0.074	10.150	0.00102	0.0770	0.00077
WAIK 8852.1	Primary Pinna	0.040	1.869	0.00019	0.0400	0.00040
WAIK 8852.2	Primary Pinna	0.066	2.709	0.00027	0.0380	0.00038
WAIK 8663.1	Secondary Pinna	0.010	2.819	0.00028	0.0610	0.00061
WAIK 8863.2	Secondary Pinna	0.013	2.975	0.00030	0.0540	0.00054
WAIK 8867.1	Frond	0.003	0.776	0.00008	0.0310	0.00031
WAIK 8867.2	Frond	0.005	1.416	0.00014	0.0300	0.00030
WAIK 9312.1	Primary Pinna	0.097	12.855	0.00129	0.0520	0.00052
WAIK 9312.2	Primary Pinna	0.075	7.234	0.00072	0.0310	0.00031
WAIK 9476.1	Primary Pinna	0.065	8.592	0.00086	0.0410	0.00041
WAIK 9476.2	Primary Pinna	0.123	12.139	0.00121	0.0400	0.00040
WAIK 9537.1	Frond	0.003	0.336	0.00003	0.0300	0.00030
WAIK 9537.2	Frond	0.013	1.148	0.00011	0.0420	0.00042
WAIK 9848.1	Frond	0.048	5.662	0.00057	0.0670	0.00067
WAIK 9848.2	Frond	0.031	4.006	0.00040	0.0580	0.00058
Welt.Perrie 001.2	Primary Pinna	0.047	6.365	0.00064	0.0620	0.00062
Welt.Perrie 001.3	Primary Pinna	0.043	5.879	0.00059	0.0620	0.00062
Welt.Perrie 002.1	Frond	0.764	101.597	0.01016	0.1390	0.00139
Welt.Perrie 002.2	Primary Pinna	0.015	2.861	0.00029	0.0445	0.00045
Welt.Perrie 002.3	Primary Pinna	0.013	2.245	0.00022	0.0410	0.00041
Welt.Perrie 003.1	Frond	2.142	333.658	0.03337	0.2550	0.00255
Welt.Perrie 003.2	Primary Pinna	0.094	17.182	0.00172	0.0970	0.00097
Welt.Perrie 003.3	Primary Pinna	0.086	15.421	0.00154	0.0825	0.00083
Welt.Perrie 004.1	Frond	1.076	189.638	0.01896	0.2000	0.00200
Welt.Perrie 004.2	Primary Pinna	0.028	6.710	0.00067	0.0405	0.00041
Welt.Perrie 004.3	Primary Pinna	0.021	5.259	0.00053	0.0450	0.00045
Welt.Perrie 005.2	Primary Pinna	0.089	28.602	0.00286	0.1425	0.00143
Welt.Perrie 005.3	Primary Pinna	0.052	17.889	0.00179	0.1340	0.00134
Welt.Perrie 006.1	Frond	0.179	13.643	0.00136	0.0760	0.00076
Welt.Perrie 006.2	Frond	0.153	15.879	0.00159	0.0770	0.00077
Welt.Perrie 006.3	Frond	0.043	4.820	0.00048	0.0640	0.00064
Welt.Perrie 007.1	Frond	0.062	13.986	0.00140	0.0590	0.00059
Welt.Perrie 007.2	Primary Pinna	0.007	2.142	0.00021	0.0330	0.00033
Welt.Perrie 007.3	Primary Pinna	0.006	1.822	0.00018	0.0290	0.00029
Welt.Perrie 008.1	Frond	0.146	21.302	0.00213	0.0800	0.00080
Welt.Perrie 008.2	Primary Pinna	0.004	1.176	0.00012	0.0680	0.00068
Welt.Perrie 008.3	Primary Pinna	0.008	1.498	0.00015	0.0690	0.00069
WELT 35562A.1	Primary Pinna	0.098	7.773	0.00078	0.0980	0.00098
WELT 35562A.2	Frond	0.174	21.953	0.00220	0.1000	0.00100
WELT 35562B.1	Frond	0.271	23.181	0.00232	0.0630	0.00063
WELT 35562B.2	Frond	0.222	19.505	0.00195	0.0760	0.00076
WELT P5410d.1	Primary Pinna	0.272	25.979	0.00260	0.1420	0.00142
WELT P5410d.2	Frond	0.420	49.018	0.00490	0.1850	0.00185
WELT P18317.1	Frond	0.331	16.736	0.00167	0.1390	0.00139
WELT P18317.2	Frond	0.353	19.769	0.00198	0.1610	0.00161
WELT P021009.1	Frond	0.057	4.020	0.00040	0.0420	0.00042
WELT P021009.2	Frond	0.049	4.420	0.00044	0.0370	0.00037
WELT P021280.1	Frond	0.151	9.629	0.00096	0.0740	0.00074
WELT P021280.2	Frond	0.106	10.880	0.00109	0.0520	0.00052
WELT P022918.1	Primary Pinna	0.017	1.228	0.00012	0.0680	0.00068
WELT P002918.2	Primary Pinna	0.021	0.945	0.00009	0.0600	0.00060
WELT P020377.1	Frond	0.099	6.410	0.00064	0.0780	0.00078
WELT P020377.2	Frond	0.087	4.312	0.00043	0.0770	0.00077
WELT P17575.1	Frond	0.032	2.896	0.00029	0.0790	0.00079

WELT P17575.2	Frond	0.025	2.343	0.00023	0.0730	0.00073
WELT P020989.1	Primary Pinna	0.019	4.815	0.00048	0.0390	0.00039
WELT P020989.2	Primary Pinna	0.071	17.551	0.00176	0.0650	0.00065
WELT P10260.1	Primary Pinna	0.050	10.498	0.00105	0.0510	0.00051
WELT P10260.2	Primary Pinna	0.068	21.211	0.00212	0.1100	0.00110
WELT P20870b.1	Primary Pinna	0.115	19.637	0.00196	0.0600	0.00060
WELT P20870b.2	Primary Pinna	0.081	21.014	0.00210	0.0800	0.00080
WELT P8992.1	Primary Pinna	0.006	3.236	0.00032	0.0410	0.00041
WELT P8992.2	Primary Pinna	0.002	0.966	0.00010	0.0270	0.00027
WELT P020856.1	Frond	0.003	1.364	0.00014	0.0340	0.00034
WELT P022306.1	Primary Pinna	0.006	2.168	0.00022	0.0440	0.00044
WELT P022306.2	Primary Pinna	0.001	0.331	0.00003	0.0240	0.00024
WELT P020570.1	Primary Pinna	0.255	24.656	0.00247	0.0860	0.00086
WELT P020570.2	Primary Pinna	0.239	23.276	0.00233	0.0700	0.00070
AQ 766644.1	Frond	0.490	25.278	0.00253	0.1260	0.00126
AQ 766644.2	Primary Pinna	0.006	1.482	0.00015	0.0390	0.00039
AQ 766644.3	Primary Pinna	0.008	1.490	0.00015	0.0430	0.00043
AQ 671766.1	Primary Pinna	0.006	1.604	0.00016	0.0320	0.00032
AQ 671766.2	Primary Pinna	0.006	1.381	0.00014	0.0330	0.00033
AQ 722804.1	Frond	0.021	4.727	0.00047	0.0520	0.00052
AQ 722804.2	Frond	0.013	3.207	0.00032	0.0480	0.00048
AQ 617250.1	Frond	0.006	1.525	0.00015	0.0370	0.00037
AQ 617250.2	Frond	0.020	4.180	0.00042	0.0550	0.00055
AQ 149072.1	Frond	0.042	8.651	0.00087	0.0710	0.00071
AQ 149072.2	Frond	0.014	3.379	0.00034	0.0550	0.00055
AQ 815191.1	Frond	0.058	9.803	0.00098	0.0650	0.00065
AQ 815191.2	Primary Pinna	0.011	2.209	0.00022	0.0330	0.00033
AQ 596891.1	Primary Pinna	0.007	1.067	0.00011	0.0410	0.00041
AQ 596891.2	Primary Pinna	0.028	3.963	0.00040	0.0470	0.00047
AQ 609934.1	Frond	0.016	2.779	0.00028	0.0580	0.00058
AQ 609934.2	Frond	0.006	1.151	0.00012	0.0570	0.00057
AQ 646908.1	Frond	0.001	0.433	0.00004	0.0370	0.00037
AQ 646908.2	Frond	0.001	0.270	0.00003	0.0420	0.00042
AQ 002599.1	Frond	0.008	1.441	0.00014	0.0440	0.00044
AQ 002599.2	Frond	0.011	1.805	0.00018	0.0590	0.00059
AQ 733693.1	Frond	0.011	2.260	0.00023	0.0740	0.00074
AQ 733693.2	Frond	0.014	2.519	0.00025	0.0730	0.00073
AQ 610044.1	Frond	0.001	0.257	0.00003	0.0220	0.00022
AQ 610044.2	Frond	0.001	0.285	0.00003	0.0310	0.00031
AQ 718506.1	Frond	0.001	0.119	0.00001	0.0240	0.00024
AQ 718506.2	Frond	0.001	0.404	0.00004	0.0280	0.00028
AQ 396088.1	Frond	0.001	0.395	0.00004	0.0280	0.00028
AQ 396088.2	Frond	0.018	3.207	0.00032	0.0860	0.00086
AQ 396088.3	Frond	0.006	1.253	0.00013	0.0520	0.00052
AQ 309822.2	Frond	0.006	2.045	0.00020	0.0470	0.00047
AQ 171590.1	Frond	0.057	6.060	0.00061	0.0450	0.00045
AQ 171590.2	Frond	0.096	9.171	0.00092	0.0580	0.00058
AQ 171589.1	Frond	0.158	14.472	0.00145	0.0700	0.00070
AQ 171589.2	Frond	0.061	9.175	0.00092	0.0560	0.00056
AQ 569155.1	Frond	0.032	3.542	0.00035	0.0440	0.00044
AQ 569155.2	Frond	0.069	7.409	0.00074	0.0550	0.00055
AQ 497577.1	Frond	0.063	5.264	0.00053	0.0530	0.00053
AQ 497577.2	Frond	0.029	3.558	0.00036	0.0470	0.00047
AQ 590070.1	Frond	1.183	46.156	0.00462	0.2110	0.00211
AQ 590070.2	Frond	0.389	12.526	0.00125	0.1470	0.00147
AQ 647177.1	Frond	0.411	8.994	0.00090	0.1610	0.00161
AQ 647177.2	Frond	0.535	13.772	0.00138	0.1860	0.00186
AQ 391440.1	Frond	0.018	1.972	0.00020	0.0530	0.00053
AQ 391440.2	Frond	0.046	3.157	0.00032	0.0600	0.00060
AQ 391440.3	Frond	0.060	3.427	0.00034	0.0670	0.00067
AQ 369998	Frond	3.403	361.013	0.03610	0.3670	0.00367
AQ 399903	Frond	0.341	79.821	0.00798	0.2180	0.00218
AQ 171736	Frond	0.503	101.522	0.01015	0.2050	0.00205
AQ 330151.1	Frond	0.155	26.175	0.00262	0.1180	0.00118
AQ 330151.2	Frond	0.120	21.041	0.00210	0.1230	0.00123
AQ 613078.1	Frond	0.090	12.089	0.00121	0.0670	0.00067
AQ 613078.2	Frond	0.081	10.076	0.00101	0.0630	0.00063
AQ 175557	Frond	0.880	110.511	0.01105	0.1840	0.00184
AQ 172758.1	Primary Pinna	0.131	23.293	0.00233	0.0690	0.00069
AQ 172758.2	Primary Pinna	0.209	38.974	0.00390	0.1120	0.00112
AQ 772815.1	Primary Pinna	0.080	25.539	0.00255	0.0870	0.00087

AQ 772815.2	Primary Pinna	0.059	25.149	0.00251	0.0870	0.00087
AQ 599462.1	Primary Pinna	0.053	9.158	0.00092	0.0370	0.00037
AQ 599462.2	Primary Pinna	0.024	4.650	0.00047	0.0340	0.00034
AQ 746511.1	Primary Pinna	0.031	9.132	0.00091	0.0800	0.00080
AQ 815637.1	Frond	0.109	15.241	0.00152	0.1190	0.00119
AQ 815637.2	Frond	0.091	14.090	0.00141	0.1170	0.00117
AQ 745369.1	Frond	0.725	62.633	0.00626	0.1140	0.00114
AQ 745369.2	Frond	0.748	64.752	0.00648	0.1000	0.00100
AQ 768558.1	Frond	0.205	26.089	0.00261	0.0700	0.00070
AQ 768558.2	Frond	0.227	28.931	0.00289	0.0780	0.00078
AQ 145800.1	Frond	0.394	36.057	0.00361	0.1170	0.00117
AQ 145800.2	Frond	0.418	28.437	0.00284	0.1280	0.00128
AQ 145793.1	Primary Pinna	0.010	1.450	0.00015	0.0640	0.00064
AQ 145793.2	Primary Pinna	0.017	2.151	0.00022	0.0710	0.00071
AQ 439692.1	Primary Pinna	0.015	1.227	0.00012	0.0640	0.00064
AQ 439692.2	Primary Pinna	0.011	1.140	0.00011	0.0660	0.00066
AQ 558352.1	Primary Pinna	0.004	1.181	0.00012	0.0190	0.00019
AQ 558352.2	Primary Pinna	0.003	1.000	0.00010	0.0190	0.00019
AQ 545770.1	Primary Pinna	0.001	0.288	0.00003	0.0260	0.00026
AQ 545770.2	Primary Pinna	0.001	0.296	0.00003	0.0270	0.00027
AQ 614776.1	Frond	0.193	32.831	0.00328	0.0640	0.00064
AQ 614776.2	Frond	0.211	29.322	0.00293	0.0680	0.00068
AQ 566333.1	Primary Pinna	0.041	3.175	0.00032	0.0340	0.00034
AQ 566333.2	Primary Pinna	0.092	6.348	0.00063	0.1130	0.00113
AQ 433795.1	Primary Pinna	0.096	7.627	0.00076	0.0830	0.00083
AQ 433795.2	Primary Pinna	0.051	4.045	0.00040	0.0550	0.00055
AQ 145934.1	Primary Pinna	0.202	7.135	0.00071	0.1440	0.00144
AQ 145934.2	Primary Pinna	0.152	5.537	0.00055	0.0870	0.00087
AQ 145935.1	Primary Pinna	0.225	16.282	0.00163	0.0780	0.00078
AQ 145935.2	Primary Pinna	0.207	16.814	0.00168	0.0990	0.00099
AQ 368795.1	Primary Pinna	0.315	13.336	0.00133	0.1250	0.00125
AQ 368795.2	Primary Pinna	0.150	6.890	0.00069	0.1480	0.00148
AQ 420699.1	Primary Pinna	0.428	21.092	0.00211	0.1020	0.00102
AQ 420699.2	Primary Pinna	0.271	13.597	0.00136	0.1160	0.00116
AQ 146567.1	Primary Pinna	0.076	6.368	0.00064	0.0800	0.00080
AQ 146567.2	Primary Pinna	0.081	7.741	0.00077	0.0840	0.00084
AQ 146482.1	Primary Pinna	0.068	4.928	0.00049	0.1100	0.00110
AQ 146482.2	Primary Pinna	0.079	5.040	0.00050	0.0890	0.00089
AQ 295730.1	Primary Pinna	0.116	3.743	0.00037	0.0760	0.00076
AQ 295730.2	Primary Pinna	0.120	4.424	0.00044	0.0760	0.00076
AQ 145952.1	Primary Pinna	0.171	6.643	0.00066	0.1100	0.00110
AQ 145952.2	Primary Pinna	0.119	4.859	0.00049	0.0840	0.00084
AQ 170026.1	Primary Pinna	0.020	2.345	0.00023	0.0490	0.00049
AQ 170026.2	Primary Pinna	0.029	3.155	0.00032	0.0500	0.00050
AQ 170027.1	Primary Pinna	0.092	9.232	0.00092	0.0800	0.00080
AQ 170027.2	Primary Pinna	0.081	7.107	0.00071	0.0690	0.00069
AQ 545289.1	Primary Pinna	0.143	24.578	0.00246	0.1180	0.00118
AQ 545289.2	Primary Pinna	0.099	19.511	0.00195	0.1480	0.00148
AQ 699133.1	Primary Pinna	0.103	11.922	0.00119	0.0710	0.00071
AQ 699133.2	Primary Pinna	0.127	14.953	0.00150	0.0880	0.00088
AQ 614340.1	Primary Pinna	0.015	4.529	0.00045	0.0790	0.00079
AQ 614340.2	Primary Pinna	0.007	2.385	0.00024	0.0600	0.00060
AQ 644968.1	Primary Pinna	0.054	8.264	0.00083	0.0810	0.00081
AQ 644968.2	Primary Pinna	0.020	2.765	0.00028	0.0740	0.00074
AQ 764817.1	Primary Pinna	0.150	19.975	0.00200	0.1030	0.00103
AQ 764817.2	Primary Pinna	0.030	4.198	0.00042	0.0780	0.00078
AQ 671629.1	Primary Pinna	0.180	35.407	0.00354	0.0790	0.00079
AQ 671629.2	Primary Pinna	0.069	17.140	0.00171	0.0500	0.00050
AQ 549197.1	Primary Pinna	0.193	37.393	0.00374	0.0940	0.00094
AQ 549197.2	Primary Pinna	0.188	37.653	0.00377	0.0800	0.00080
AQ 546214.1	Primary Pinna	0.040	7.560	0.00076	0.0530	0.00053
AQ 546214.2	Primary Pinna	0.021	2.872	0.00029	0.0480	0.00048
AQ 768544.1	Secondary Pinna	0.053	9.148	0.00091	0.0680	0.00068
AQ 768544.2	Secondary Pinna	0.011	1.745	0.00017	0.0370	0.00037
AQ 841043.1	Secondary Pinna	0.056	7.625	0.00076	0.0540	0.00054
AQ 841043.2	Secondary Pinna	0.111	14.610	0.00146	0.0780	0.00078
AQ 727574.1	Secondary Pinna	0.047	4.064	0.00041	0.0610	0.00061
AQ 727574.2	Primary Pinna	0.551	44.294	0.00443	0.1210	0.00121
AQ 743968.1	Secondary Pinna	0.079	12.331	0.00123	0.1000	0.00100
AQ 743968.2	Secondary Pinna	0.134	18.224	0.00182	0.1060	0.00106
AQ 641506.1	Primary Pinna	0.024	5.041	0.00050	0.0490	0.00049

AQ 641506.2	Secondary Pinna	0.023	3.908	0.00039	0.0390	0.00039
AQ 841042.1	Frond	0.722	77.482	0.00775	0.1240	0.00124
AQ 841042.2	Primary Pinna	0.026	4.709	0.00047	0.0470	0.00047
AQ 841042.3	Primary Pinna	0.058	9.627	0.00096	0.0660	0.00066
AQ 546266.1	Primary Pinna	0.144	26.709	0.00267	0.0950	0.00095
AQ 546266.2	Primary Pinna	0.104	20.724	0.00207	0.0810	0.00081
AQ 616938.1	Primary Pinna	0.009	2.940	0.00029	0.0180	0.00018
AQ 616938.2	Primary Pinna	0.009	2.959	0.00030	0.0160	0.00016
AQ 770638.1	Primary Pinna	0.018	3.741	0.00037	0.0250	0.00025
AQ 770638.2	Primary Pinna	0.021	7.817	0.00078	0.0360	0.00036
AQ 506712.3	Primary Pinna	0.020	4.953	0.00050	0.0460	0.00046
AQ 506712.4	Primary Pinna	0.005	1.252	0.00013	0.0580	0.00058
AQ 391394.1	Primary Pinna	0.034	4.555	0.00046	0.0450	0.00045
AQ 391394.2	Primary Pinna	0.021	3.074	0.00031	0.0340	0.00034
AQ 438062.1	Primary Pinna	0.064	8.697	0.00087	0.1170	0.00117
AQ 438062.2	Primary Pinna	0.034	4.636	0.00046	0.0720	0.00072
AQ 631268.1	Primary Pinna	0.022	3.087	0.00031	0.0480	0.00048
AQ 631268.2	Primary Pinna	0.023	2.145	0.00021	0.0630	0.00063
AQ 546271.1	Primary Pinna	0.062	7.295	0.00073	0.0670	0.00067
AQ 546271.2	Primary Pinna	0.016	1.638	0.00016	0.0500	0.00050
AQ 501581.1	Primary Pinna	0.131	14.564	0.00146	0.0910	0.00091
AQ 501581.2	Primary Pinna	0.016	2.351	0.00024	0.0320	0.00032
AQ 501581.3	Secondary Pinna	0.003	0.456	0.00005	0.0160	0.00016
AQ 501581.4	Secondary Pinna	0.004	0.345	0.00003	0.0170	0.00017
AQ 599470.1	Frond	0.627	12.948	0.00129	0.2140	0.00214
AQ 599470.2	Frond	1.144	26.909	0.00269	0.2420	0.00242
AQ 172619.1	Frond	0.649	38.469	0.00385	0.1800	0.00180
AQ 172619.2	Frond	1.299	34.891	0.00349	0.1820	0.00182
AQ 482588.1	Frond	0.336	6.580	0.00066	0.1500	0.00150
AQ 482588.2	Frond	0.371	7.985	0.00080	0.1630	0.00163
AQ 172719.1	Frond	0.105	3.971	0.00040	0.0900	0.00090
AQ 172719.2	Frond	0.073	4.032	0.00040	0.0680	0.00068
AQ 815709.1	Frond	0.019	1.034	0.00010	0.0580	0.00058
AQ 815709.2	Frond	0.007	0.430	0.00004	0.0430	0.00043
AQ 591610.1	Frond	0.013	0.759	0.00008	0.0640	0.00064
AQ 591610.2	Frond	0.018	0.957	0.00010	0.0650	0.00065
AQ 724157.1	Frond	0.434	5.958	0.00060	0.1510	0.00151
AQ 724157.2	Frond	0.202	3.465	0.00035	0.1070	0.00107
AQ 609021.1	Frond	0.387	13.785	0.00138	0.1220	0.00122
AQ 609021.2	Frond	0.333	13.635	0.00136	0.1400	0.00140
AQ 830151.1	Primary Pinna	0.344	23.930	0.00239	0.1590	0.00159
AQ 830151.2	Primary Pinna	0.199	15.833	0.00158	0.1570	0.00157
AQ 625223.1	Primary Pinna	0.696	23.913	0.00239	0.1490	0.00149
AQ 625223.2	Primary Pinna	1.009	35.447	0.00354	0.0920	0.00092
AQ 172986.1	Primary Pinna	0.588	56.358	0.00564	0.1920	0.00192
AQ 172986.2	Primary Pinna	0.635	64.928	0.00649	0.1900	0.00190
AQ 446117.1	Primary Pinna	1.305	80.011	0.00800	0.2000	0.00200
AQ 446117.2	Primary Pinna	0.670	45.291	0.00453	0.1660	0.00166
AQ 617594.2	Primary Pinna	0.035	8.032	0.00080	0.0790	0.00079
AQ 368854.1	Frond	0.154	15.843	0.00158	0.0810	0.00081
AQ 368854.2	Frond	0.084	10.630	0.00106	0.0910	0.00091
AQ 791739.1	Secondary Pinna	0.166	39.921	0.00399	0.0860	0.00086
AQ 791739.2	Secondary Pinna	0.105	24.836	0.00248	0.0460	0.00046
AQ 677522.1	Primary pinna	0.126	25.014	0.00250	0.0280	0.00028
AQ 677522.2	Primary pinna	0.070	15.842	0.00158	0.0260	0.00026
AQ 821266.1	Primary pinna	0.087	13.106	0.00131	0.0760	0.00076
AQ 821266.2	Primary pinna	0.022	3.609	0.00036	0.0670	0.00067
AQ 472164.1	Secondary Pinna	0.008	4.291	0.00043	0.0340	0.00034
AQ 472164.2	Primary Pinna	0.015	6.677	0.00067	0.0490	0.00049
AQ 619580.1	Primary Pinna	0.245	45.423	0.00454	0.1030	0.00103
AQ 619580.2	Primary Pinna	0.069	12.757	0.00128	0.0690	0.00069
AQ 173350.1	Primary Pinna	0.107	11.990	0.00120	0.0570	0.00057
AQ 173350.2	Primary Pinna	0.092	11.786	0.00118	0.0580	0.00058
AQ 673372.1	Primary Pinna	0.039	3.810	0.00038	0.0290	0.00029
AQ 673372.2	Primary Pinna	0.039	4.961	0.00050	0.0640	0.00064
AQ 815694.1	Frond	0.857	30.990	0.00310	0.2740	0.00274
AQ 815694.2	Frond	0.705	27.437	0.00274	0.2260	0.00226
AQ 610223.1	Frond	0.147	10.432	0.00104	0.2080	0.00208
AQ 610223.2	Frond	0.268	14.940	0.00149	0.2190	0.00219
AQ 368781.1	Frond	0.231	18.471	0.00185	0.1440	0.00144
AQ 368781.2	Frond	0.229	14.384	0.00144	0.1220	0.00122

AQ 780974.1	Frond	0.073	5.770	0.00058	0.1260	0.00126
AQ 782483.1	Frond	0.331	20.636	0.00206	0.1140	0.00114
AQ 782483.2	Primary Pinna	0.026	1.910	0.00019	0.0770	0.00077
AQ 782483.3	Primary Pinna	0.019	1.382	0.00014	0.0580	0.00058
AQ 538828.1	Frond	0.400	27.477	0.00275	0.1080	0.00108
AQ 538828.2	Frond	0.343	19.887	0.00199	0.1480	0.00148
AQ 698779.1	Primary Pinna	0.007	0.939	0.00009	0.0680	0.00068
AQ 698779.2	Primary Pinna	0.008	0.965	0.00010	0.0600	0.00060
AQ 530947.1	Primary Pinna	0.018	1.839	0.00018	0.0860	0.00086
AQ 530947.2	Primary Pinna	0.010	0.922	0.00009	0.0770	0.00077
AQ 558360.1	Frond	0.090	8.049	0.00080	0.1150	0.00115
AQ 558360.2	Frond	0.078	7.687	0.00077	0.0800	0.00080
AQ 576544.1	Primary Pinna	0.010	1.185	0.00012	0.0770	0.00077
AQ 576544.2	Primary Pinna	0.007	0.811	0.00008	0.0700	0.00070
AQ 768542.1	Primary Pinna	0.028	3.444	0.00034	0.0740	0.00074
AQ 768542.2	Primary Pinna	0.043	4.278	0.00043	0.0790	0.00079
AQ 749159.1	Primary Pinna	0.023	2.353	0.00024	0.0620	0.00062
AQ 749159.2	Primary Pinna	0.040	1.452	0.00015	0.0700	0.00070
AQ 778098.1	Primary Pinna	0.021	2.171	0.00022	0.0610	0.00061
AQ 778098.2	Primary Pinna	0.041	3.981	0.00040	0.0700	0.00070
AQ 737255.1	Primary Pinna	0.058	6.074	0.00061	0.0490	0.00049
AQ 737255.2	Primary Pinna	0.058	7.012	0.00070	0.0650	0.00065
AQ 548303.1	Primary Pinna	0.034	8.483	0.00085	0.0580	0.00058
AQ 548303.2	Primary Pinna	0.021	5.631	0.00056	0.0420	0.00042
AQ 375683.1	Primary Pinna	0.017	3.186	0.00032	0.0400	0.00040
AQ 375683.2	Primary Pinna	0.033	5.814	0.00058	0.0540	0.00054
AQ 647160.1	Secondary Pinna	0.007	1.455	0.00015	0.0280	0.00028
AQ 647160.2	Secondary Pinna	0.015	2.557	0.00026	0.0320	0.00032
AQ 596884.1	Primary Pinna	0.034	2.299	0.00023	0.0430	0.00043
AQ 596884.2	Primary Pinna	0.070	4.625	0.00046	0.0630	0.00063
AQ 619389.1	Frond	0.064	14.218	0.00142	0.0670	0.00067
AQ 619389.2	Frond	0.131	29.283	0.00293	0.0690	0.00069
AQ 755358.1	Frond	0.129	20.656	0.00207	0.0900	0.00090
AQ 755358.2	Frond	0.154	25.123	0.00251	0.0720	0.00072
AQ 815249.1	Primary Pinna	0.025	5.560	0.00056	0.0840	0.00084
AQ 815249.2	Primary Pinna	0.023	5.222	0.00052	0.0700	0.00070
AQ 020001.1	Secondary Pinna	0.055	10.115	0.00101	0.0520	0.00052
AQ 020001.2	Secondary Pinna	0.020	3.723	0.00037	0.0200	0.00020
AQ 020001.3	Secondary Pinna	0.012	2.495	0.00025	0.0200	0.00020
AQ 020031.1	Secondary Pinna	0.013	2.005	0.00020	0.0470	0.00047
AQ 020031.2	Secondary Pinna	0.037	5.102	0.00051	0.0560	0.00056
AQ 020066.1	Primary Pinna	0.192	19.176	0.00192	0.0880	0.00088
AQ 020066.2	Primary Pinna	0.061	6.431	0.00064	0.0450	0.00045
AQ 629805.1	Primary Pinna	0.006	1.581	0.00016	0.0090	0.00009
AQ 629805.2	Primary Pinna	0.020	5.186	0.00052	0.0150	0.00015
AQ 020094.1	Primary Pinna	0.109	30.424	0.00304	0.1060	0.00106
AQ 020094.2	Primary Pinna	0.026	8.205	0.00082	0.1080	0.00108
AQ 520103.1	Primary Pinna	0.382	38.424	0.00384	0.1280	0.00128
AQ 520103.2	Primary Pinna	0.087	8.682	0.00087	0.0640	0.00064
AQ 783085.1	Primary Pinna	0.011	2.279	0.00023	0.0510	0.00051
AQ 783085.2	Primary Pinna	0.009	3.385	0.00034	0.0600	0.00060
AQ 771681.1	Primary Pinna	0.008	1.615	0.00016	0.0380	0.00038
AQ 771681.2	Primary Pinna	0.005	1.138	0.00011	0.0360	0.00036
AQ 748655.1	Primary Pinna	0.020	3.417	0.00034	0.0550	0.00055
AQ 748655.2	Primary Pinna	0.032	5.117	0.00051	0.0800	0.00080
AQ 613080.1	Primary Pinna	0.039	10.341	0.00103	0.0590	0.00059
AQ 613080.2	Primary Pinna	0.023	5.970	0.00060	0.0420	0.00042
US 3227408.1	Frond	0.178	20.442	0.00204	0.146	0.00146
US 3227408.2	Frond	0.214	23.289	0.00233	0.177	0.00177
US 3227408.3	Frond	0.158	18.697	0.00187	0.081	0.00081
US 3346968.1	Frond	0.071	8.316	0.00083	0.048	0.00048
US 3346968.2	Frond	0.061	7.151	0.00072	0.079	0.00079
US 3346968.3	Frond	0.095	9.618	0.00096	0.094	0.00094
US 1919620.1	Frond	0.276	11.171	0.00112	0.130	0.00130
US 1919620.2	Frond	0.096	21.169	0.00212	0.174	0.00174
US 3555210.1	Primary Pinna	0.032	6.964	0.00070	0.157	0.00157
US 3555210.2	Primary Pinna	0.039	7.922	0.00079	0.171	0.00171
US 3555210.3	Primary Pinna	0.046	10.632	0.00106	0.122	0.00122
US 1719542.1	Primary Pinna	0.038	5.598	0.00056	0.079	0.00079
US 1719542.2	Primary Pinna	0.070	10.532	0.00105	0.067	0.00067
US 1719542.3	Primary Pinna	0.070	11.392	0.00114	0.106	0.00106

US 3508153.1	Primary Pinna	0.124	12.110	0.00121	0.142	0.00142
US 3508153.2	Primary Pinna	0.128	11.974	0.00120	0.137	0.00137
US 3508153.3	Primary Pinna	0.119	10.902	0.00109	0.116	0.00116
US 3508155.1	Primary Pinna	0.069	12.803	0.00128	0.144	0.00144
US 3508155.2	Primary Pinna	0.064	12.317	0.00123	0.148	0.00148
US 3508155.3	Primary Pinna	0.058	10.147	0.00101	0.128	0.00128
US 2906136.1	Primary pinna	0.046	6.093	0.00061	0.106	0.00106
US 2906136.2	Primary pinna	0.082	10.432	0.00104	0.119	0.00119
US 2906136.3	Primary pinna	0.062	7.551	0.00076	0.091	0.00091
US 691112.1	Primary pinna	0.207	13.798	0.00138	0.166	0.00166
US 691112.2	Primary pinna	0.142	9.545	0.00095	0.158	0.00158
US 691112.3	Primary pinna	0.198	13.479	0.00135	0.151	0.00151
US 3481303.1	Primary pinna	0.152	26.863	0.00269	0.178	0.00178
US 3481303.2	Primary pinna	0.156	26.004	0.00260	0.163	0.00163
US 3569615.1	Primary pinna	0.103	9.605	0.00096	0.117	0.00117
US 3569615.2	Primary pinna	0.115	8.853	0.00089	0.118	0.00118
US 3569615.3	Primary pinna	0.107	11.113	0.00111	0.163	0.00163
US 652133.1	Frond	2.500	161.746	0.01617	0.434	0.00434
US 652133.2	Primary Pinna	0.379	41.701	0.00417	0.247	0.00247
US 1262739.1	Frond	0.900	112.521	0.01125	0.247	0.00247
US 1262739.2	Frond	1.250	135.271	0.01353	0.229	0.00229
US 1718247	Frond	0.185	19.617	0.00196	0.165	0.00165
US 902770	Frond	0.318	29.933	0.00299	0.210	0.00210
US 2018157.1	Frond	5.700	336.990	0.03370	0.300	0.00300
US 2018157.2	Primary Pinna	0.362	45.855	0.00459	0.170	0.00170
US 2018157.3	Primary Pinna	0.312	37.896	0.00379	0.154	0.00154
US 1493831.1	Frond	4.050	318.060	0.03181	0.261	0.00261
US 1493831.2	Primary Pinna	0.193	32.456	0.00325	0.058	0.00058
US 1493831.3	Primary Pinna	0.234	22.682	0.00227	0.110	0.00110
US 2776145.1	Primary Pinna	0.014	2.839	0.00028	0.060	0.00060
US 2776145.2	Primary Pinna	0.015	3.543	0.00035	0.093	0.00093
US 2776145.3	Primary Pinna	0.012	3.120	0.00031	0.074	0.00074
US 2356343.1	Primary Pinna	0.104	20.918	0.00209	0.093	0.00093
US 2356343.2	Primary Pinna	0.086	17.918	0.00179	0.090	0.00090
US 2356343.3	Primary Pinna	0.094	20.184	0.00202	0.102	0.00102
US 3057554.1	Frond	4.250	410.501	0.04105	0.386	0.00386
US 3057554.2	Primary Pinna	0.309	49.533	0.00495	0.130	0.00130
US 3057554.3	Primary Pinna	0.191	34.635	0.00346	0.180	0.00180
US 464884.1	Primary Pinna	0.381	65.640	0.00656	0.194	0.00194
US 464884.2	Primary Pinna	0.406	69.748	0.00697	0.281	0.00281
US 2356345.1	Primary Pinna	1.150	125.661	0.01257	0.290	0.00290
US 2356345.2	Secondary Pinna	0.037	4.359	0.00044	0.116	0.00116
US 2356345.3	Secondary Pinna	0.048	5.344	0.00053	0.127	0.00127
US 2137259.1	Frond	6.800	842.803	0.08428	0.472	0.00472
US 2137259.2	Primary Pinna	0.209	35.133	0.00351	0.252	0.00252
US 2137259.3	Primary Pinna	0.309	48.436	0.00484	0.220	0.00220
US 2137259.4	Secondary Pinna	0.015	2.683	0.00027	0.123	0.00123
US 2137259.5	Secondary Pinna	0.016	1.991	0.00020	0.047	0.00047
US 1745454.1	Primary Pinna	0.079	9.659	0.00097	0.131	0.00131
US 1745454.2	Primary Pinna	0.114	12.730	0.00127	0.099	0.00099
US 1745454.3	Primary Pinna	0.105	12.078	0.00121	0.126	0.00126
US 2201678.1	Primary Pinna	0.060	9.140	0.00091	0.117	0.00117
US 2201678.2	Primary Pinna	0.036	5.166	0.00052	0.095	0.00095
US 2201678.3	Primary Pinna	0.067	9.169	0.00092	0.121	0.00121
US 1918496.1	Frond	0.700	100.872	0.01009	0.320	0.00320
US 1918496.2	Primary Pinna	0.107	27.266	0.00273	0.165	0.00165
US 1349662.1	Frond	0.850	39.693	0.00397	0.267	0.00267
US 1349662.2	Primary Pinna	0.209	47.448	0.00474	0.185	0.00185
US 1681420.1	Frond	1.450	237.127	0.02371	0.261	0.00261
US 1681420.2	Primary Pinna	0.261	65.070	0.00651	0.149	0.00149
US 1631813.1	Frond	0.240	25.015	0.00250	0.406	0.00406
US 1631813.2	Primary Pinna	0.053	5.418	0.00054	0.236	0.00236
US 1631813.3	Primary Pinna	0.061	6.051	0.00061	0.193	0.00193
US 1631813.6	Tertiary Pinna	0.003	0.465	0.00005	0.109	0.00109
US 1631813.7	Tertiary Pinna	0.003	0.373	0.00004	0.095	0.00095
US 510789.1	Frond	0.288	24.664	0.00247	0.228	0.00228
US 510789.2	Primary Pinna	0.033	6.952	0.00070	0.225	0.00225
US 510789.3	Secondary Pinna	0.004	0.918	0.00009	0.114	0.00114
US 510789.4	Secondary Pinna	0.009	2.202	0.00022	0.087	0.00087
US 2415484.1	Frond	0.111	9.427	0.00094	0.261	0.00261
US 2415484.2	Frond	0.089	8.064	0.00081	0.187	0.00187

US 2415484.3	Primary Pinna	0.037	4.142	0.00041	0.130	0.00130
US 2415484.4	Primary Pinna	0.038	4.616	0.00046	0.153	0.00153
US 2415484.5	Secondary Pinna	0.010	1.169	0.00012	0.075	0.00075
US 2415484.6	Secondary Pinna	0.012	1.747	0.00017	0.106	0.00106
US 674866.1	Frond	0.970	94.998	0.00950	0.455	0.00455
US 674866.2	Frond	0.505	50.813	0.00508	0.371	0.00371
US 674866.3	Primary Pinna	0.219	23.791	0.00238	0.291	0.00291
US 674866.4	Primary Pinna	0.041	4.238	0.00042	0.162	0.00162
US 674866.5	Secondary Pinna	0.025	4.314	0.00043	0.154	0.00154
US 674866.6	Secondary Pinna	0.026	3.845	0.00038	0.104	0.00104
US 674866.7	Tertiary Pinna	0.017	2.392	0.00024	0.104	0.00104
US 674866.8	Tertiary Pinna	0.018	2.387	0.00024	0.084	0.00084
US 674844.2	Primary Pinna	0.039	6.216	0.00062	0.143	0.00143
US 674844.3	Primary Pinna	0.073	10.237	0.00102	0.180	0.00180
US 674844.4	Secondary Pinna	0.012	1.944	0.00019	0.114	0.00114
US 674844.5	Secondary Pinna	0.018	3.172	0.00032	0.100	0.00100
US 591553.1	Frond	0.024	2.268	0.00023	0.176	0.00176
US 591553.2	Frond	0.050	4.053	0.00041	0.176	0.00176
US 591553.3	Primary Pinna	0.005	0.600	0.00006	0.183	0.00183
US 591553.4	Primary Pinna	0.005	0.568	0.00006	0.223	0.00223
US 591553.5	Frond	0.010	1.148	0.00011	0.098	0.00098
US 3038920.1	Frond	0.051	4.364	0.00044	0.275	0.00275
US 3038920.2	Frond	0.032	1.923	0.00019	0.239	0.00239
US 3038920.3	Primary Pinna	0.010	0.885	0.00009	0.256	0.00256
US 3038920.4	Primary Pinna	0.007	0.507	0.00005	0.171	0.00171
US 1915248.1	Frond	0.148	13.475	0.00135	0.231	0.00231
US 1915248.2	Frond	0.062	6.553	0.00066	0.218	0.00218
US 1915248.3	Primary Pinna	0.020	2.655	0.00027	0.139	0.00139
US 1915248.4	Primary Pinna	0.017	2.541	0.00025	0.166	0.00166
US 3252569.1	Frond	0.129	12.254	0.00123	0.223	0.00223
US 3252569.2	Frond	0.068	7.763	0.00078	0.237	0.00237
US 3252569.3	Primary pinna	0.027	4.620	0.00046	0.329	0.00329
US 3252569.4	Primary pinna	0.034	5.324	0.00053	0.056	0.00056
US 3538573.1	Frond	0.044	2.933	0.00029	0.083	0.00083
US 3538573.2	Frond	0.030	2.245	0.00022	0.070	0.00070
US 3538573.3	Frond	0.031	1.762	0.00018	0.087	0.00087
US 2136600.1	Frond	0.007	0.773	0.00008	0.042	0.00042
US 2136600.2	Frond	0.016	1.748	0.00017	0.067	0.00067
US 2136600.3	Frond	0.020	1.920	0.00019	0.048	0.00048
US 2136866.1	Frond	0.034	2.041	0.00020	0.053	0.00053
US 2136866.2	Frond	0.028	2.064	0.00021	0.082	0.00082
US 2136866.3	Frond	0.036	2.069	0.00021	0.050	0.00050
US 2864640.1	Frond	0.130	6.549	0.00065	0.073	0.00073
US 2864640.2	Frond	0.080	4.686	0.00047	0.083	0.00083
US 3278375.1	Frond	0.222	9.049	0.00090	0.068	0.00068
US 3278375.2	Frond	0.080	3.754	0.00038	0.061	0.00061
US 2948915.1	Frond	0.126	4.957	0.00050	0.121	0.00121
US 2948915.2	Frond	0.113	6.003	0.00060	0.106	0.00106
US 2948915.3	Frond	0.095	5.154	0.00052	0.152	0.00152
US 2293548.1	Frond	3.800	229.035	0.02290	0.469	0.00469
US 2416108.1	Frond	3.550	350.926	0.03509	0.317	0.00317
US 2416108.2	Primary Pinna	0.053	4.479	0.00045	0.054	0.00054
US 2416108.3	Primary Pinna	0.034	4.870	0.00049	0.071	0.00071
US 2254822.1	Frond	2.900	231.170	0.02312	0.209	0.00209
US 2254822.2	Primary Pinna	0.022	4.264	0.00043	0.054	0.00054
US 2254822.3	Primary Pinna	0.018	3.316	0.00033	0.065	0.00065
US 1793133.1	Primary Pinna	0.050	5.154	0.00052	0.062	0.00062
US 1793133.2	Primary Pinna	0.051	5.222	0.00052	0.097	0.00097
US 1793133.3	Primary Pinna	0.046	5.446	0.00054	0.104	0.00104
US 1792976.1	Primary Pinna	0.141	14.252	0.00143	0.089	0.00089
US 1792976.2	Primary Pinna	0.074	7.500	0.00075	0.093	0.00093
US 2201505.1	Frond	0.782	101.617	0.01016	0.164	0.00164
US 2201505.2	Frond	0.336	47.306	0.00473	0.184	0.00184
US 2649281.1	Frond	3.600	279.404	0.02794	0.299	0.00299
US 1211894.1	Primary Pinna	0.135	22.498	0.00225	0.143	0.00143
US 1211894.2	Primary Pinna	0.089	13.675	0.00137	0.047	0.00047
US 1211894.3	Primary Pinna	0.129	18.533	0.00185	0.103	0.00103
US 1507505.1	Primary Pinna	0.125	25.699	0.00257	0.102	0.00102
US 1507505.2	Primary Pinna	0.105	17.195	0.00172	0.167	0.00167
US 1507505.3	Primary Pinna	0.161	26.707	0.00267	0.159	0.00159
US 530603.1	Frond	0.850	113.063	0.01131	0.247	0.00247

US 530603.2	Primary Pinna	0.054	11.017	0.00110	0.024	0.00024
US 530603.3	Primary Pinna	0.031	6.860	0.00069	0.065	0.00065
US 3240286.1	Primary Pinna	0.370	53.524	0.00535	0.124	0.00124
US 3240286.2	Primary Pinna	0.407	50.361	0.00504	0.214	0.00214
US 3240286.3	Primary Pinna	0.436	50.308	0.00503	0.121	0.00121
US 1915023.1	Primary Pinna	0.245	41.281	0.00413	0.130	0.00130
US 1915023.2	Primary Pinna	0.273	44.810	0.00448	0.128	0.00128
US 1915023.3	Primary Pinna	0.294	51.292	0.00513	0.119	0.00119
US 2153946.1	Primary Pinna	0.456	59.833	0.00598	0.111	0.00111
US 2153946.2	Primary Pinna	0.454	55.690	0.00557	0.100	0.00100
US 2153946.3	Primary Pinna	0.484	61.908	0.00619	0.120	0.00120
US 1853275.1	Primary Pinna	0.426	50.886	0.00509	0.145	0.00145
US 1853275.2	Primary Pinna	0.326	36.788	0.00368	0.113	0.00113
US 1853275.3	Primary Pinna	0.287	35.882	0.00359	0.184	0.00184
US 2416106.1	Frond	3.650	245.029	0.02450	0.240	0.00240
US 2416106.2	Primary Pinna	1.200	124.312	0.01243	0.204	0.00204
US 1053780	Frond	9.350	391.516	0.03915	0.399	0.00399
US 456677.1	Frond	9.400	445.237	0.04452	0.294	0.00294
US 456677.2	Primary Pinna	2.300	214.862	0.02149	0.184	0.00184
US 456677.3	Primary Pinna	2.150	207.752	0.02078	0.178	0.00178
US 2255285.1	Frond	0.600	49.524	0.00495	0.331	0.00331
US 2255285.2	Frond	0.600	57.468	0.00575	0.263	0.00263
US 2255285.3	Frond	0.700	61.861	0.00619	0.242	0.00242
US 2255044.1	Frond	0.171	24.069	0.00241	0.082	0.00082
US 2255044.2	Frond	0.137	14.196	0.00142	0.060	0.00060
US 2255044.3	Frond	0.329	31.422	0.00314	0.145	0.00145
US 2080747.1	Secondary Pinna	0.181	54.091	0.00541	0.109	0.00109
US 2080747.2	Secondary Pinna	0.047	16.616	0.00166	0.082	0.00082
US 2080747.3	Secondary Pinna	0.080	23.383	0.00234	0.109	0.00109
US 2018846.1	Primary Pinna	0.750	426.630	0.04266	0.159	0.00159
US 2018846.2	Secondary Pinna	0.028	6.704	0.00067	0.098	0.00098
US 2018846.3	Secondary Pinna	0.025	4.999	0.00050	0.072	0.00072
US 2293755.1	Primary Pinna	1.500	174.385	0.01744	0.211	0.00211
US 2293755.2	Secondary Pinna	0.041	5.281	0.00053	0.060	0.00060
US 2293755.3	Secondary Pinna	0.043	5.414	0.00054	0.105	0.00105
US 2293755.4	Secondary Pinna	0.051	5.826	0.00058	0.065	0.00065
US 547448.1	Frond	0.150	14.735	0.00147	0.095	0.00095
US 547448.2	Frond	0.149	16.977	0.00170	0.102	0.00102
US 547448.3	Frond	0.092	12.266	0.00123	0.056	0.00056
US 1915638.1	Frond	0.089	9.504	0.00095	0.081	0.00081
US 2295026.1	Frond	0.049	9.167	0.00092	0.082	0.00082
US 2295026.2	Frond	0.051	6.562	0.00066	0.037	0.00037
US 2295026.3	Frond	0.042	4.162	0.00042	0.040	0.00040
US 1915630.1	Frond	0.004	0.866	0.00009	0.059	0.00059
US 1915630.2	Frond	0.015	2.264	0.00023	0.078	0.00078
US 1915630.3	Frond	0.021	2.580	0.00026	0.070	0.00070
US 3479458.1	Secondary Pinna	0.027	3.540	0.00035	0.063	0.00063
US 3479458.2	Secondary Pinna	0.248	27.150	0.00272	0.105	0.00105
US 3479458.4	Tertiary Pinna	0.016	2.288	0.00023	0.061	0.00061
US 3479458.5	Tertiary Pinna	0.016	1.451	0.00015	0.091	0.00091
US 2356593.1	Secondary Pinna	1.061	213.696	0.02137	0.243	0.00243
US 2356593.2	Secondary Pinna	0.019	17.684	0.00177	0.091	0.00091
US 2356593.3	Tertiary Pinna	0.057	6.130	0.00061	0.080	0.00080
US 2356593.4	Tertiary Pinna	0.012	1.055	0.00011	0.072	0.00072
US 2356593.5	Tertiary Pinna	0.035	2.922	0.00029	0.063	0.00063
US 1918390.1	Secondary Pinna	0.037	5.632	0.00056	0.077	0.00077
US 1918390.2	Secondary Pinna	0.025	3.629	0.00036	0.065	0.00065
US 2927546.1	Secondary Pinna	0.130	22.576	0.00226	0.093	0.00093
US 2927546.2	Secondary Pinna	0.115	21.929	0.00219	0.084	0.00084
US 2927546.3	Tertiary Pinna	0.036	0.741	0.00007	0.061	0.00061
US 2927546.4	Tertiary Pinna	0.046	0.920	0.00009	0.047	0.00047
US 1616029.1	Primary Pinna	2.468	145.277	0.01453	0.272	0.00272
US 1616029.2	Primary Pinna	2.109	119.776	0.01198	0.298	0.00298
US 1616029.3	Secondary Pinna	0.042	2.822	0.00028	0.095	0.00095
US 1616029.4	Secondary Pinna	0.028	2.042	0.00020	0.095	0.00095
US 1744662.1	Primary Pinna	2.153	137.705	0.01377	0.235	0.00235
US 1744662.2	Primary Pinna	2.289	125.171	0.01252	0.290	0.00290
US 1744662.3	Primary Pinna	0.033	2.960	0.00030	0.090	0.00090
US 1744662.4	Primary Pinna	0.046	3.424	0.00034	0.104	0.00104
US 2255557.1	Tertiary Pinna	0.066	8.235	0.00082	0.056	0.00056
US 2255557.2	Tertiary Pinna	0.112	12.601	0.00126	0.092	0.00092

US 3319867.1	Tertiary Pinna	0.119	7.707	0.00077	0.089	0.00089
US 3319867.2	Tertiary Pinna	0.068	3.982	0.00040	0.063	0.00063
US3033944.1	Primary Pinna	0.246	25.760	0.00258	0.098	0.00098
US3033944.2	Primary Pinna	0.397	25.650	0.00257	0.185	0.00185
US 3381720.1	Primary Pinna	0.255	23.351	0.00234	0.113	0.00113
US 3381720.2	Primary Pinna	0.445	43.732	0.00437	0.119	0.00119
US 3005599.1	Primary Pinna	0.677	58.075	0.00581	0.182	0.00182
US 3005599.2	Primary Pinna	0.490	50.054	0.00501	0.133	0.00133
US 2084111.1	Primary Pinna	0.539	56.802	0.00568	0.108	0.00108
US 2084111.2	Primary Pinna	0.147	14.703	0.00147	0.106	0.00106
US 1915124.1	Secondary Pinna	0.022	2.075	0.00021	0.081	0.00081
US 1915124.2	Secondary Pinna	0.028	3.148	0.00031	0.074	0.00074
US 1915124.3	Secondary Pinna	0.049	5.146	0.00051	0.094	0.00094
US 2359241.1	Secondary Pinna	0.033	3.720	0.00037	0.075	0.00075
US 2359241.2	Secondary Pinna	0.015	2.495	0.00025	0.110	0.00110
US 2359241.3	Secondary Pinna	0.034	4.544	0.00045	0.114	0.00114
US 2136211.1	Tertiary Pinna	0.023	1.482	0.00015	0.054	0.00054
US 2136211.2	Tertiary Pinna	0.057	5.032	0.00050	0.082	0.00082
US 2136211.3	Tertiary Pinna	0.069	6.479	0.00065	0.070	0.00070
US 2018506.1	Tertiary Pinna	0.119	15.216	0.00152	0.108	0.00108
US 2018506.2	Tertiary Pinna	0.057	7.832	0.00078	0.079	0.00079
US 2018506.3	Tertiary Pinna	0.142	12.240	0.00122	0.155	0.00155
US 2257875.1	Secondary Pinna	0.090	10.082	0.00101	0.077	0.00077
US 2257875.2	Secondary Pinna	0.050	6.016	0.00060	0.143	0.00143
US 2257919.1	Secondary Pinna	0.076	9.840	0.00098	0.113	0.00113
US 2257919.2	Tertiary Pinna	0.053	6.906	0.00069	0.101	0.00101
US 2257919.3	Tertiary Pinna	0.060	7.090	0.00071	0.093	0.00093
US 2137257.1	Secondary Pinna	0.082	9.477	0.00095	0.086	0.00086
US 2137257.2	Secondary Pinna	0.058	7.882	0.00079	0.110	0.00110
US 2017091.1	Secondary Pinna	0.082	7.197	0.00072	0.073	0.00073
US 2017091.2	Secondary Pinna	0.107	9.753	0.00098	0.087	0.00087

APPENDIX E

Fern Data Calculations for Cantilevered Beam Model

There are fewer measurements shown in Appendix E and Appendix F because all fern leaves without distinct petioles were removed for calculation purposes. The models will only work if a distinct petiole is shown to exist. Below, measurements are shown as averages amongst species.

Specimen ID#	LMA (g/m2)	Log [LMA]	Species Avg log [LMA]	PW ⁴ /LA	log (pw4/la)	Std Dev log [LMA]	Average PW ⁴ /LA	Std dev log [LMA]
US 1053780	238.815	2.378	2.292	0.000	-8.189	0.106	-8.611	0.368
US 2416106.1	148.962	2.173		0.000	-8.868			
US 456677.1	211.124	2.325		0.000	-8.775			
US 1915248.1	109.536	2.040	1.995	0.000	-7.675	0.045	-7.556	0.152
US 1915248.2	95.224	1.979		0.000	-7.463			
US 3252569.1	105.598	2.024		0.000	-7.695			
US 3252569.2	87.080	1.940		0.000	-7.391			
US 3038920.1	117.324	2.069	2.072	0.000	-6.883	0.096	-7.349	0.545
US 3038920.2	164.847	2.217		0.000	-6.770			
US 591553.1	106.261	2.026		0.000	-7.374			
US 591553.2	122.872	2.089		0.000	-7.626			
US 591553.5	90.592	1.957		0.000	-8.095			
US 652133.1	154.563	2.189	2.189	0.000	-7.659		-7.659	
US 2864640.1	198.351	2.297	2.313	0.000	-9.363	0.064	-8.920	0.606
US 2864640.2	171.575	2.234		0.000	-8.994			
US 2948915.1	254.186	2.405		0.000	-8.364			
US 2948915.2	187.739	2.274		0.000	-8.677			
US 2948915.3	183.935	2.265		0.000	-7.985			
US 3278375.1	245.220	2.390		0.000	-9.627			
US 3278375.2	213.106	2.329		0.000	-9.433			
US 2136600.1	86.675	1.938	2.119	0.000	-9.395	0.120	-9.082	0.399
US 2136600.2	90.389	1.956		0.000	-8.938			
US 2136600.3	105.208	2.022		0.000	-9.558			
US 2136866.1	168.055	2.225		0.000	-9.413			
US 2136866.2	135.174	2.131		0.000	-8.659			
US 2136866.3	172.064	2.236		0.000	-9.520			
US 3538573.1	151.381	2.180		0.000	-8.791			
US 3538573.2	135.412	2.132		0.000	-8.971			
US 3538573.3	177.072	2.248		0.000	-8.488			
US 1349662.1	214.144	2.331	1.986	0.000	-7.893	0.300	-8.195	0.447
US 1681420.1	61.149	1.786		0.000	-8.708			
US 1918496.1	69.395	1.841		0.000	-7.983			
US 1262739.1	79.985	1.903	1.967	0.000	-8.480	0.050	-8.446	0.207
US 1262739.2	92.407	1.966		0.000	-8.692			
US 1718247	94.051	1.973		0.000	-8.423			
US 902770	106.070	2.026		0.000	-8.187			
US 2201505.1	76.956	1.886	1.949	0.000	-9.148	0.140	-8.769	0.330
US 2201505.2	71.111	1.852		0.000	-8.616			
US 2649281.1	128.846	2.110		0.000	-8.544			
US 2255044.1	71.046	1.852	2.002	0.000	-9.726	0.081	-8.761	0.960
US 2255044.2	96.647	1.985		0.000	-10.040			
US 2255044.3	104.736	2.020		0.000	-8.852			
US 2255285.1	121.153	2.083		0.000	-7.616			
US 2255285.2	104.406	2.019		0.000	-8.080			
US 2255285.3	113.157	2.054		0.000	-8.256			
AQ 609934.1	57.575	1.760	1.671	0.000	-9.390	0.141	-9.164	0.257
AQ 609934.2	52.129	1.717		0.000	-9.038			
AQ 646908.1	23.095	1.364		0.000	-9.364			
AQ 646908.2	37.037	1.569		0.000	-8.938			

AQ 002599.1	55.517	1.744		0.000	-9.585			
AQ 002599.2	60.942	1.785		0.000	-9.173			
AQ 733693.1	48.673	1.687		0.000	-8.877			
AQ 733693.2	55.578	1.745		0.000	-8.948			
AQ 396088.1	25.316	1.403	1.611	0.000	-9.808	0.183	-9.358	0.521
AQ 396088.2	56.127	1.749		0.000	-8.768			
AQ 396088.3	47.885	1.680		0.000	-9.234			
AQ 309822.2	29.340	1.467	1.467	0.000	-9.622		-9.622	
AQ 610044.1	38.911	1.590	1.538	0.000	-10.040	0.101	-9.726	0.253
AQ 610044.2	35.088	1.545		0.000	-9.489			
AQ 718506.1	42.017	1.623		0.000	-9.555			
AQ 718506.2	24.752	1.394		0.000	-9.818			
WAIK 14591.1	96.319	1.984	1.964	0.000	-10.012	0.077	-9.567	0.202
WAIK 14591.2	73.768	1.868		0.000	-9.662			
WAIK 9537.1	89.286	1.951		0.000	-9.618			
WAIK 9537.2	113.240	2.054		0.000	-9.567			
WAIK 15079.1	37.267	1.571	1.494	0.000	-10.459	0.260	-10.027	0.415
WAIK 15079.2	48.883	1.689		0.000	-10.306			
WAIK 16239.1	40.241	1.605		0.000	-9.678			
WAIK 16239.2	12.903	1.111		0.000	-9.664			
WAIK 8241.1	40.886	1.612	1.571	0.000	-10.103	0.034	-10.021	0.190
WAIK 8241.2	34.568	1.539		0.000	-9.813			
WAIK 8867.1	38.660	1.587		0.000	-9.924			
WAIK 8867.2	35.311	1.548		0.000	-10.243			
WAIK 15204.1	103.160	2.014	2.098	0.000	-9.022	0.070	-9.154	0.313
WAIK 15204.2	127.877	2.107		0.000	-9.590			
WAIK 7.1	122.123	2.087		0.000	-9.146			
WAIK 7.2	152.800	2.184		0.000	-8.860			
WAIK 1447.1	290.043	2.462	2.156	0.000	-8.279	0.291	-8.928	0.664
WAIK 1447.2	221.860	2.346		0.000	-8.435			
WAIK 9848.1	84.776	1.928		0.000	-9.449			
WAIK 9848.2	77.384	1.889		0.000	-9.549			
WAIK 18405.1	64.991	1.813	1.868	0.000	-10.070	0.038	-9.708	0.251
WAIK 18405.2	77.201	1.888		0.000	-9.582			
WAIK 5193.1	78.902	1.897		0.000	-9.503			
WAIK 5193.2	75.021	1.875		0.000	-9.676			
WAIK 18036.1	68.445	1.835	1.805	0.000	-9.839		-9.446	
WAIK 18036.2	59.403	1.774		0.000	-9.053			
AQ 745369.1	115.754	2.064	1.948	0.000	-9.569	0.134	-9.284	0.479
AQ 745369.2	115.518	2.063		0.000	-9.811			
AQ 815637.1	71.518	1.854		0.000	-8.881			
AQ 815637.2	64.585	1.810		0.000	-8.876			
AQ 614776.1	58.786	1.769	1.813	0.000	-10.292		-10.214	
AQ 614776.2	71.960	1.857		0.000	-10.137			
Holmes8942	35.539	1.551	1.613	0.000	-9.522	0.124	-9.662	0.563
Leidolf1026	56.994	1.756		0.000	-9.182			
SinghurstAdamsFitch15304	34.055	1.532		0.000	-10.282			
AQ 171589.1	109.176	2.038	1.964	0.000	-9.780	0.098	-9.957	0.162
AQ 171589.2	66.485	1.823		0.000	-9.970			
AQ 171590.1	94.059	1.973		0.000	-10.170			
AQ 171590.2	104.678	2.020		0.000	-9.909			
AQ 497577.1	119.681	2.078	1.979	0.000	-9.824	0.071	-9.893	0.065
AQ 497577.2	81.506	1.911		0.000	-9.863			
AQ 569155.1	90.344	1.956		0.000	-9.975			
AQ 569155.2	93.130	1.969		0.000	-9.908			
WELT P021280.1	156.818	2.195	2.047	0.000	-9.507	0.105	-9.681	0.286
WELT P021280.2	97.426	1.989		0.000	-10.173			
Welt.Perrie 006.1	131.203	2.118		0.000	-9.612			
Welt.Perrie 006.2	96.354	1.984		0.000	-9.655			
Welt.Perrie 006.3	89.212	1.950		0.000	-9.458			
AQ 590070.1	256.305	2.409	2.538	0.000	-8.367	0.110	-8.246	0.179
AQ 590070.2	310.554	2.492		0.000	-8.429			
AQ 647177.1	456.971	2.660		0.000	-8.127			
AQ 647177.2	388.469	2.589		0.000	-8.061			
AQ 391440.1	91.278	1.960	2.122	0.000	-9.398	0.146	-9.338	0.093
AQ 391440.2	145.708	2.163		0.000	-9.387			
AQ 391440.3	175.080	2.243		0.000	-9.231			
AQ 369998	94.263	1.974	1.802	0.000	-8.299		-8.424	
AQ 399903	42.721	1.631		0.000	-8.548			
AQ 171736	49.546	1.695	1.800	0.000	-8.760	0.087	-9.287	0.479
AQ 330151.1	59.217	1.772		0.000	-9.130			

AQ 330151.2	57.032	1.756		0.000	-8.963			
AQ 613078.1	74.448	1.872		0.000	-9.778			
AQ 613078.2	80.389	1.905		0.000	-9.806			
AQ 175557	79.630	1.901	1.901	0.000	-8.984		-8.984	
WELT P021009.1	141.791	2.152	2.186	0.000	-10.111	0.112	-9.401	0.980
WELT P021009.2	110.860	2.045		0.000	-10.373			
WELT P18317.1	197.777	2.296		0.000	-8.652			
WELT P18317.2	178.562	2.252		0.000	-8.469			
AQ 609021.1	280.740	2.448	2.616	0.000	-8.794	0.233	-8.456	0.306
AQ 609021.2	244.224	2.388		0.000	-8.550			
AQ 724157.1	728.432	2.862		0.000	-8.059			
AQ 724157.2	582.973	2.766		0.000	-8.422			
AQ 172719.1	264.417	2.422	2.514	0.000	-8.782	0.212	-8.556	0.582
AQ 172719.2	181.052	2.258		0.000	-9.275			
AQ 482588.1	510.638	2.708		0.000	-8.114			
AQ 482588.2	464.621	2.667		0.000	-8.054			
AQ 172619.1	168.707	2.227	2.528	0.000	-8.564	0.206	-8.188	0.402
AQ 172619.2	372.302	2.571		0.000	-8.502			
AQ 599470.1	484.245	2.685		0.000	-7.791			
AQ 599470.2	425.137	2.629		0.000	-7.895			
AQ 591610.1	171.278	2.234	2.246	0.000	-8.656	0.029	-8.861	0.205
AQ 591610.2	188.088	2.274		0.000	-8.729			
AQ 815709.1	183.752	2.264		0.000	-8.961			
AQ 815709.2	162.791	2.212		0.000	-9.100			
Pace744.1	80.000	1.903	1.881	0.000	-8.802	0.022	-8.767	0.133
Pace744.2	72.202	1.859		0.000	-8.879			
Pace744.3	75.949	1.881		0.000	-8.619			
Holmes4469	23.518	1.371	1.393	0.000	-9.543	0.081	-9.251	0.268
Holmes4469	22.955	1.361		0.000	-9.173			
Holmes4469	21.277	1.328		0.000	-8.919			
Holmes4469	32.494	1.512		0.000	-9.368			
AQ 610223.2	179.384	2.254	2.254	0.000	-7.813		-7.813	
US 1493831.1	127.334	2.105	2.167	0.000	-8.836		-8.728	
US 2018157.1	169.144	2.228		0.000	-8.619			
US 3057554.1	103.532	2.015	2.015	0.000	-8.267		-8.267	
US 2137259.1	80.683	1.907	1.907	0.000	-8.230		-8.230	
US 2254822.1	125.449	2.098	2.052	0.000	-9.083		-8.812	
US 2416108.1	101.161	2.005		0.000	-8.541			
US 1915638.1	93.119	1.969	1.950	0.000	-9.344	0.055	-9.473	0.420
US 547448.1	101.866	2.008		0.000	-9.257			
US 547448.2	87.943	1.944		0.000	-9.195			
US 547448.3	75.330	1.877		0.000	-10.096			
US 1915630.1	47.344	1.675	1.838	0.000	-8.854	0.125	-9.456	0.744
US 1915630.2	64.488	1.809		0.000	-8.786			
US 1915630.3	82.946	1.919		0.000	-9.031			
US 2295026.1	53.016	1.724		0.000	-9.307			
US 2295026.2	77.720	1.891		0.000	-10.544			
US 2295026.3	101.634	2.007		0.000	-10.211			
WELT 35562A.2	79.260	1.899	2.008	0.000	-9.341	0.094	-9.759	0.413
WELT 35562B.1	116.906	2.068		0.000	-10.168			
WELT 35562B.2	113.817	2.056		0.000	-9.767			
WELT P5410d.2	85.683	1.933	1.933	0.000	-8.622		-8.622	
US 2293548.1	165.914	2.220	2.220	0.000	-7.675		-7.675	
WAIK 18034.1	74.404	1.872	1.872	0.000	-10.110		-10.110	
WAIK 18464.1	33.898	1.530	1.711	0.000	-9.996	0.181	-9.545	0.373
WAIK 18464.2	38.351	1.584		0.000	-9.599			
WAIK 688.1	68.641	1.837		0.000	-9.493			
WAIK 688.2	78.264	1.894		0.000	-9.090			
WAIK 16249.2	47.569	1.677	1.670	0.000	-9.055		-9.502	
WAIK 17589.1	45.947	1.662		0.000	-9.950			
Sylva1375	22.503	1.352	1.378	0.000	-10.919	0.067	-10.984	0.143
Sylva1375	22.360	1.349		0.000	-11.100			
Sylva1375	21.694	1.336		0.000	-11.170			
Sylva1375	31.387	1.497		0.000	-10.843			
Sylva1375	22.538	1.353		0.000	-10.886			
Welt.Perrie 003.1	64.197	1.808	1.781	0.000	-8.897		-8.985	
Welt.Perrie 004.1	56.740	1.754		0.000	-9.074			
Welt.Perrie 002.1	75.199	1.876	1.876	0.000	-9.435		-9.435	
768.1	27.363	1.437	1.895	0.000	-10.508		-9.440	
768.2	225.169	2.353		0.000	-8.372			
WAIK 7361.1	43.934	1.643	1.702	0.000	-9.858		-9.714	

WAIK 7361.2	57.752	1.762		0.000	-9.570			
17496.1	204.045	2.310	2.310	0.000	-7.880			
AQ 145800.1	109.271	2.039	1.999	0.000	-9.284	0.131	-7.880	0.483
AQ 145800.2	146.992	2.167		0.000	-9.025			
AQ 768558.1	78.577	1.895		0.000	-10.036			
AQ 768558.2	78.463	1.895		0.000	-9.893			
14294	67.595	1.830	1.942	0.000	-8.919		-8.641	
17692	113.513	2.055		0.000	-8.362			
Dunton s.n.	14.151	1.151	1.290	0.000	-9.918		-9.848	
Dunton s.n.	26.824	1.429		0.000	-9.777			
WELT P020856.1	21.994	1.342	1.342	0.000	-10.009		-10.009	
Clements154	21.856	1.340	1.251	0.000	-10.973		-11.421	
Clements154	14.530	1.162		0.000	-11.869			
AQ 841042.1	93.183	1.969	1.969	0.000	-9.516		-9.516	
76200	110.150	2.042	2.042	0.000	-8.776		-8.776	
AQ 722804.1	44.426	1.648	1.628	0.000	-9.811		-9.796	
AQ 722804.2	40.536	1.608		0.000	-9.781			
AQ 815191.1	59.166	1.772	1.772	0.000	-9.740		-9.740	
AQ 766644.1	193.844	2.287	2.287	0.000	-9.001		-9.001	
AQ 149072.1	48.549	1.686	1.645	0.000	-9.532	0.045	-9.667	0.171
AQ 149072.2	41.432	1.617		0.000	-9.567			
AQ 617250.1	39.344	1.595		0.000	-9.910			
AQ 617250.2	47.847	1.680		0.000	-9.660			
Welt.Perrie 007.1	44.330	1.647	1.741	0.000	-10.062		-9.889	
Welt.Perrie 008.1	68.538	1.836		0.000	-9.716			
Hansen4737	19.508	1.290	1.290	0.000	-10.478		-10.478	
6232.1	81.336	1.910	1.943	0.000	-9.407		-9.701	
6232.2	94.463	1.975		0.000	-9.994			
5723	250.000	2.398	2.405	0.000	-9.220		-8.988	
5860	257.669	2.411		0.000	-8.756			
WELT P020377.1	154.446	2.189	2.141	0.000	-9.238	0.131	-9.029	0.168
WELT P020377.2	201.763	2.305		0.000	-9.089			
WELT P17575.1	110.497	2.043		0.000	-8.871			
WELT P17575.2	106.701	2.028		0.000	-8.916			
4710.1	127.999	2.107	2.041	0.000	-9.417		-9.192	
4710.2	94.173	1.974		0.000	-8.967			
AQ 610223.1	140.913	2.149	2.334	0.000	-7.746	0.161	-7.836	0.161
AQ 815694.1	276.541	2.442		0.000	-7.740			
AQ 815694.2	256.952	2.410		0.000	-8.022			
AQ 368781.1	125.061	2.097	2.134	0.000	-8.633	0.059	-8.602	0.228
AQ 368781.2	159.205	2.202		0.000	-8.812			
AQ 780974.1	126.516	2.102		0.000	-8.360			
5547	95.930	1.982	1.985	0.000	-9.176		-9.403	
5547.1	97.080	1.987		0.000	-9.629			
AQ 538828.1	145.576	2.163	2.202	0.000	-9.305	0.037	-9.003	0.351
AQ 538828.2	172.474	2.237		0.000	-8.618			
AQ 782483.1	160.399	2.205		0.000	-9.087			
AQ 558360.1	111.815	2.049	2.027	0.000	-8.663		-8.968	
AQ 558360.2	101.470	2.006		0.000	-9.273			
8045	126.718	2.103	2.277	0.000	-9.712		-9.314	
17783	282.650	2.451		0.000	-8.916			
AQ 368854.1	97.204	1.988	1.943	0.000	-9.566		-9.378	
AQ 368854.2	79.022	1.898		0.000	-9.190			
AQ 619389.1	45.013	1.653	1.722	0.000	-9.849	0.081	-9.857	0.262
AQ 619389.2	44.736	1.651		0.000	-10.111			
AQ 755358.1	62.452	1.796		0.000	-9.498			
AQ 755358.2	61.298	1.787		0.000	-9.971			
18784	48.278	1.684	1.709	0.000	-9.458		-9.182	
18787	54.270	1.735		0.000	-8.907			
92939	38.134	1.581	1.581	0.000	-9.554		-9.554	
US 530603.1	75.179	1.876	1.876	0.000	-8.483		-8.483	
311.1A	148.839	2.173	2.094	0.000	-7.721	0.069	-7.616	0.271
US 2415484.1	117.429	2.070		0.000	-7.308			
US 2415484.2	109.747	2.040		0.000	-7.819			
US 674866.1	102.107	2.009	2.003	0.000	-7.346		-7.387	
US 674866.2	99.286	1.997		0.000	-7.428			
US 1631813.1	95.942	1.982	2.025	0.000	-6.964		-7.462	
US 510789.1	116.729	2.067		0.000	-7.960			
US 1919620.1	247.158	2.393	1.981	0.000	-8.592	0.265	-9.101	0.712
US 1919620.2	45.397	1.657		0.000	-8.364			
US 3346968.1	84.897	1.929		0.000	-10.195			

US 3346968.2	85.443	1.932		0.000	-9.264			
US 3346968.3	98.981	1.996		0.000	-9.091			
US 3227408.1	86.880	1.939	1.943	0.000	-8.653	0.018	-8.889	0.663
US 3227408.2	91.846	1.963		0.000	-8.375			
US 3227408.3	84.506	1.927		0.000	-9.638			

APPENDIX F

Fern Data Calculations for Original Model Proposed by Royer et al. (2007)

Specimen ID#	LMA (g/m2)	Log [LMA]	Species Avg log [LMA]	Std Dev log [LMA]	PW ² /LA (PW ² /LA)	Log {PW ² /LA}	Species Avg log [LMA]	Std Dev log [LMA]
US 1053780	238.815	2.378	2.292	0.106	0.000407	-3.390804	-3.577	0.167
US 2416106.1	148.962	2.173			0.000235	-3.628795		
US 456677.1	211.124	2.325			0.000194	-3.711897		
US 1915248.1	109.536	2.040	1.995	0.045	0.003960	-2.402305	-2.269	0.148
US 1915248.2	95.224	1.979			0.007252	-2.139527		
US 3252569.1	105.598	2.024			0.004058	-2.391668		
US 3252569.2	87.080	1.940			0.007235	-2.140533		
US 3038920.1	117.324	2.069	2.072	0.096	0.017329	-1.761219	-1.869	0.242
US 3038920.2	164.847	2.217			0.029704	-1.527183		
US 591553.1	106.261	2.026			0.013658	-1.864618		
US 591553.2	122.872	2.089			0.007643	-2.116751		
US 591553.5	90.592	1.957			0.008366	-2.077490		
US 652133.1	154.563	2.189	2.189		0.001165	-2.933854	-2.934	
US 2864640.1	198.351	2.297	2.313	0.064	0.000814	-3.089529	-2.832	0.327
US 2864640.2	171.575	2.234			0.001470	-2.832646		
US 2948915.1	254.186	2.405			0.002954	-2.529648		
US 2948915.2	187.739	2.274			0.001872	-2.727757		
US 2948915.3	183.935	2.265			0.004483	-2.348457		
US 3278375.1	245.220	2.390			0.000511	-3.291583		
US 3278375.2	213.106	2.329			0.000991	-3.003835		
US 2136600.1	86.675	1.938	2.119	0.120	0.002282	-2.641681	-2.675	0.192
US 2136600.2	90.389	1.956			0.002568	-2.590392		
US 2136600.3	105.208	2.022			0.001200	-2.920819		
US 2136866.1	168.055	2.225			0.001376	-2.861291		
US 2136866.2	135.174	2.131			0.003258	-2.487082		
US 2136866.3	172.064	2.236			0.001208	-2.917820		
US 3538573.1	151.381	2.180			0.002349	-2.629156		
US 3538573.2	135.412	2.132			0.002183	-2.661020		
US 3538573.3	177.072	2.248			0.004296	-2.366967		
US 1349662.1	214.144	2.331	1.986	0.300	0.001796	-2.745691	-3.094	0.407
US 1681420.1	61.149	1.786			0.000287	-3.541700		
US 1918496.1	69.395	1.841			0.001015	-2.993471		
US 1262739.1	79.985	1.903	1.967	0.050	0.000542	-3.265840	-3.092	0.292
US 1262739.2	92.407	1.966			0.000388	-3.411534		
US 1718247	94.051	1.973			0.001388	-2.857665		
US 902770	106.070	2.026			0.001473	-2.831712		
US 2201505.1	76.956	1.886	1.949	0.140	0.000265	-3.577279	-3.406	0.229
US 2201505.2	71.111	1.852			0.000716	-3.145281		
US 2649281.1	128.846	2.110			0.000320	-3.494890		
US 2255044.1	71.046	1.852	2.002	0.081	0.000279	-3.553830	-3.154	0.368
US 2255044.2	96.647	1.985			0.000254	-3.595863		
US 2255044.3	104.736	2.020			0.000669	-3.174498		
US 2255285.1	121.153	2.083			0.002212	-2.655160		
US 2255285.2	104.406	2.019			0.001204	-2.919515		
US 2255285.3	113.157	2.054			0.000947	-3.023786		
AQ 609934.1	57.575	1.760	1.671	0.141	0.001211	-2.917033	-2.629	0.230
AQ 609934.2	52.129	1.717			0.002823	-2.549326		
AQ 646908.1	23.095	1.364			0.003162	-2.500084		
AQ 646908.2	37.037	1.569			0.006533	-2.184865		
AQ 002599.1	55.517	1.744			0.001344	-2.871759		
AQ 002599.2	60.942	1.785			0.001929	-2.714773		
AQ 733693.1	48.673	1.687			0.002423	-2.615645		
AQ 733693.2	55.578	1.745			0.002116	-2.674582		
AQ 396088.1	25.316	1.403	1.611	0.183	0.001985	-2.702281	-2.668	0.033
AQ 396088.2	56.127	1.749			0.002306	-2.637102		
AQ 396088.3	47.885	1.680			0.002158	-2.665944		

AQ 309822.2	29.340	1.467	1.467		0.001080	-2.966498	-2.966	
AQ 610044.1	38.911	1.590	1.538	0.101	0.001883	-2.725088	-2.556	0.198
AQ 610044.2	35.088	1.545			0.003372	-2.472121		
AQ 718506.1	42.017	1.623			0.004840	-2.315124		
AQ 718506.2	24.752	1.394			0.001941	-2.712065		
WAIK 14591.1	96.319	1.984	1.964	0.077	0.000578	-3.237877	-2.967	0.332
WAIK 14591.2	73.768	1.868			0.000567	-3.246318		
WAIK 9537.1	89.286	1.951			0.002679	-2.572097		
WAIK 9537.2	113.240	2.054			0.001537	-2.813443		
WAIK 15079.1	37.267	1.571	1.494	0.260	0.000657	-3.182340	-3.007	0.233
WAIK 15079.2	48.883	1.689			0.000587	-3.231147		
WAIK 16239.1	40.241	1.605			0.001453	-2.837819		
WAIK 16239.2	12.903	1.111			0.001672	-2.776697		
WAIK 8241.1	40.886	1.612	1.571	0.034	0.000518	-3.285479	-3.112	0.165
WAIK 8241.2	34.568	1.539			0.000871	-3.059926		
WAIK 8867.1	38.660	1.587			0.001238	-2.907138		
WAIK 8867.2	35.311	1.548			0.000636	-3.196821		
WAIK 15204.1	103.160	2.014	2.098	0.070	0.000507	-3.295113	-3.381	0.088
WAIK 15204.2	127.877	2.107			0.000340	-3.469013		
WAIK 7.1	122.123	2.087			0.000359	-3.444711		
WAIK 7.2	152.800	2.184			0.000483	-3.315792		
WAIK 1447.1	290.043	2.462	2.156	0.291	0.004773	-2.321233	-2.740	0.407
WAIK 1447.2	221.860	2.346			0.003461	-2.460756		
WAIK 9848.1	84.776	1.928			0.000793	-3.100820		
WAIK 9848.2	77.384	1.889			0.000840	-3.075855		
WAIK 18405.1	64.991	1.813	1.868	0.038	0.000208	-3.681996	-3.532	0.113
WAIK 18405.2	77.201	1.888			0.000278	-3.555476		
WAIK 5193.1	78.902	1.897			0.000363	-3.440103		
WAIK 5193.2	75.021	1.875			0.000356	-3.448746		
WAIK 18036.1	68.445	1.835	1.805		0.000279	-3.553796	-3.233	
WAIK 18036.2	59.403	1.774			0.001226	-2.911425		
AQ 745369.1	115.754	2.064	1.948	0.134	0.000207	-3.682994	-3.385	0.422
AQ 745369.2	115.518	2.063			0.000154	-3.811253		
AQ 815637.1	71.518	1.854			0.000929	-3.031920		
AQ 815637.2	64.585	1.810			0.000972	-3.012539		
AQ 614776.1	58.786	1.769	1.813		0.000125	-3.903924	-3.853	
AQ 614776.2	71.960	1.857			0.000158	-3.802176		
Holmes8942	35.539	1.551	1.613	0.124	0.000112	-3.952077	-3.919	0.398
Leidolf1026	56.994	1.756			0.000313	-3.504633		
SinghurstAdamsFitch15304	34.055	1.532			0.000050	-4.298810		
AQ 171589.1	109.176	2.038	1.964	0.098	0.000339	-3.470332	-3.462	0.018
AQ 171589.2	66.485	1.823			0.000342	-3.466230		
AQ 171590.1	94.059	1.973			0.000334	-3.476048		
AQ 171590.2	104.678	2.020			0.000367	-3.435561		
AQ 497577.1	119.681	2.078	1.979	0.071	0.000534	-3.272764	-3.283	0.076
AQ 497577.2	81.506	1.911			0.000621	-3.207010		
AQ 569155.1	90.344	1.956			0.000547	-3.262343		
AQ 569155.2	93.130	1.969			0.000408	-3.389034		
WELT P021280.1	156.818	2.195	2.047	0.105	0.000569	-3.245118	-3.344	0.200
WELT P021280.2	97.426	1.989			0.000249	-3.604622		
Welt.Perrie 006.1	131.203	2.118			0.000423	-3.373283		
Welt.Perrie 006.2	96.354	1.984			0.000373	-3.427842		
Welt.Perrie 006.3	89.212	1.950			0.000850	-3.070687		
AQ 590070.1	256.305	2.409	2.538	0.110	0.000965	-3.015663	-2.730	0.213
AQ 590070.2	310.554	2.492			0.001725	-2.763178		
AQ 647177.1	456.971	2.660			0.002882	-2.540301		
AQ 647177.2	388.469	2.589			0.002512	-2.599971		
AQ 391440.1	91.278	1.960	2.122	0.146	0.001424	-2.846355	-2.891	0.049
AQ 391440.2	145.708	2.163			0.001140	-2.942972		
AQ 391440.3	175.080	2.243			0.001310	-2.882764		
AQ 369998	94.263	1.974	1.802		0.000373	-3.428191	-3.327	
AQ 399903	42.721	1.631			0.000595	-3.225204		
AQ 171736	49.546	1.695	1.800	0.087	0.000414	-3.383052	-3.327	0.119
AQ 330151.1	59.217	1.772			0.000532	-3.274123		
AQ 330151.2	57.032	1.756			0.000719	-3.143256		
AQ 613078.1	74.448	1.872			0.000371	-3.430241		
AQ 613078.2	80.389	1.905			0.000394	-3.404607		
AQ 175557	79.630	1.901	1.901		0.000306	-3.513770	-3.514	
WELT P021009.1	141.791	2.152	2.186	0.112	0.000439	-3.357727	-3.172	0.309
WELT P021009.2	110.860	2.045			0.000310	-3.509019		
WELT P18317.1	197.777	2.296			0.001154	-2.937622		

WELT P18317.2	178.562	2.252			0.001311	-2.882333		
AQ 609021.1	280.740	2.448	2.616	0.233	0.001080	-2.966687	-2.677	0.269
AQ 609021.2	244.224	2.388			0.001437	-2.842399		
AQ 724157.1	728.432	2.862			0.003827	-2.417147		
AQ 724157.2	582.973	2.766			0.003304	-2.480936		
AQ 172719.1	264.417	2.422	2.514	0.212	0.002040	-2.690415	-2.644	0.223
AQ 172719.2	181.052	2.258			0.001147	-2.940503		
AQ 482588.1	510.638	2.708			0.003419	-2.466043		
AQ 482588.2	464.621	2.667			0.003327	-2.477900		
AQ 172619.1	168.707	2.227	2.528	0.206	0.000842	-3.074566	-2.803	0.297
AQ 172619.2	372.302	2.571			0.000949	-3.022571		
AQ 599470.1	484.245	2.685			0.003537	-2.451375		
AQ 599470.2	425.137	2.629			0.002176	-2.662267		
AQ 591610.1	171.278	2.234	2.246	0.029	0.005397	-2.267882	-2.369	0.090
AQ 591610.2	188.088	2.274			0.004415	-2.355085		
AQ 815709.1	183.752	2.264			0.003253	-2.487665		
AQ 815709.2	162.791	2.212			0.004300	-2.366532		
Pace744.1	80.000	1.903	1.881	0.022	0.005618	-2.250418	-2.273	0.033
Pace744.2	72.202	1.859			0.004881	-2.311503		
Pace744.3	75.949	1.881			0.005514	-2.258539		
Holmes4469	23.518	1.371	1.393	0.081	0.000379	-3.421666	-3.001	0.434
Holmes4469	22.955	1.361			0.000556	-3.255312		
Holmes4469	21.277	1.328			0.003579	-2.446272		
Holmes4469	32.494	1.512			0.001320	-2.879538		
AQ 610223.2	179.384	2.254	2.254		0.003210	-2.493462	-2.493	
US 1493831.1	127.334	2.105	2.167		0.000214	-3.669228	-3.621	
US 2018157.1	169.144	2.228			0.000267	-3.573375		
US 3057554.1	103.532	2.015	2.015		0.000363	-3.440140	-3.440	
US 2137259.1	80.683	1.907	1.907		0.000264	-3.577842	-3.578	
US 2254822.1	125.449	2.098	2.052		0.000189	-3.723639	-3.633	
US 2416108.1	101.161	2.005			0.000286	-3.543097		
US 1915638.1	93.119	1.969	1.950	0.055	0.000690	-3.160936	-3.295	0.200
US 547448.1	101.866	2.008			0.000612	-3.212903		
US 547448.2	87.943	1.944			0.000613	-3.212661		
US 547448.3	75.330	1.877			0.000256	-3.592327		
US 1915630.1	47.344	1.675	1.838	0.125	0.004020	-2.395814	-2.986	0.506
US 1915630.2	64.488	1.809			0.002687	-2.570687		
US 1915630.3	82.946	1.919			0.001899	-2.721424		
US 2295026.1	53.016	1.724			0.000734	-3.134600		
US 2295026.2	77.720	1.891			0.000209	-3.680633		
US 2295026.3	101.634	2.007			0.000384	-3.415182		
WELT 35562A.2	79.260	1.899	2.008	0.094	0.000456	-3.341494	-3.545	0.213
WELT 35562B.1	116.906	2.068			0.000171	-3.766451		
WELT 35562B.2	113.817	2.056			0.000296	-3.528519		
WELT P5410d.2	85.683	1.933	1.933		0.000698	-3.156012	-3.156	
US 2293548.1	165.914	2.220	2.220		0.000960	-3.017556	-3.018	
WAIK 18034.1	74.404	1.872	1.872		0.000131	-3.883050	-3.883	
WAIK 18464.1	33.898	1.530	1.711	0.181	0.000404	-3.394101	-3.227	0.167
WAIK 18464.2	38.351	1.584			0.000634	-3.197754		
WAIK 688.1	68.641	1.837			0.000490	-3.310232		
WAIK 688.2	78.264	1.894			0.000982	-3.007899		
WAIK 16249.2	47.569	1.677	1.670		0.001526	-2.816324	-3.017	
WAIK 17589.1	45.947	1.662			0.000607	-3.216936		
Sylva1375	22.503	1.352	1.378	0.067	0.000098	-4.006789	-3.972	0.177
Sylva1375	22.360	1.349			0.000083	-4.082782		
Sylva1375	21.694	1.336			0.000075	-4.124396		
Sylva1375	31.387	1.497			0.000212	-3.673299		
Sylva1375	22.538	1.353			0.000106	-3.973919		
Welt.Perrie 003.1	64.197	1.808	1.781		0.000195	-3.710221	-3.693	
Welt.Perrie 004.1	56.740	1.754			0.000211	-3.675865		
Welt.Perrie 002.1	75.199	1.876	1.876		0.000190	-3.720851	-3.721	
768.1	27.363	1.437	1.895		0.000062	-4.210571	-3.519	
768.2	225.169	2.353			0.001485	-2.828206		
WAIK 7361.1	43.934	1.643	1.702		0.000684	-3.164720	-3.138	
WAIK 7361.2	57.752	1.762			0.000773	-3.111701		
17496.1	204.045	2.310	2.310		0.000765	-3.116368	-3.116	
AQ 145800.1	109.271	2.039	1.999	0.131	0.000380	-3.420618	-3.516	0.228
AQ 145800.2	146.992	2.167			0.000576	-3.239464		
AQ 768558.1	78.577	1.895			0.000188	-3.726261		
AQ 768558.2	78.463	1.895			0.000210	-3.677174		
14294	67.595	1.830	1.942		0.000236	-3.627115	-3.479	

17692	113.513	2.055			0.000467	-3.330847		
Dunton s.n.	14.151	1.151	1.290		0.000755	-3.122216	-3.073	
Dunton s.n.	26.824	1.429			0.000946	-3.023947		
WELT P020856.1	21.994	1.342	1.342		0.000848	-3.071857	-3.072	
Clements154	21.856	1.340	1.251		0.000055	-4.260007	-4.343	
Clements154	14.530	1.162			0.000037	-4.426345		
AQ 841042.1	93.183	1.969	1.969		0.000198	-3.702357	-3.702	
76200	110.150	2.042	2.042		0.000340	-3.469159	-3.469	
AQ 722804.1	44.426	1.648	1.628		0.000572	-3.242579	-3.193	
AQ 722804.2	40.536	1.608			0.000718	-3.143616		
AQ 815191.1	59.166	1.772	1.772		0.000431	-3.365532	-3.366	
AQ 766644.1	193.844	2.287	2.287		0.000628	-3.202002	-3.202	
AQ 149072.1	48.549	1.686	1.645	0.045	0.000583	-3.234550	-3.117	0.090
AQ 149072.2	41.432	1.617			0.000895	-3.048063		
AQ 617250.1	39.344	1.595			0.000898	-3.046866		
AQ 617250.2	47.847	1.680			0.000724	-3.140451		
Welt.Perrie 007.1	44.330	1.647	1.741		0.000249	-3.603990	-3.563	
Welt.Perrie 008.1	68.538	1.836			0.000300	-3.522240		
Hansen4737	19.508	1.290	1.290		0.000208	-3.681750	-3.682	
6232.1	81.336	1.910	1.943		0.001295	-2.887747	-3.064	
6232.2	94.463	1.975			0.000575	-3.240640		
5723	250.000	2.398	2.405		0.000815	-3.089089	-3.037	
5860	257.669	2.411			0.001037	-2.984301		
WELT P020377.1	154.446	2.189	2.141	0.131	0.000949	-3.022669	-2.799	0.179
WELT P020377.2	201.763	2.305			0.001375	-2.861697		
WELT P17575.1	110.497	2.043			0.002155	-2.666544		
WELT P17575.2	106.701	2.028			0.002274	-2.643127		
4710.1	127.999	2.107	2.041		0.000517	-3.286248	-3.206	
4710.2	94.173	1.974			0.000749	-3.125391		
AQ 610223.1	140.913	2.149	2.334	0.161	0.004147	-2.382241	-2.576	0.177
AQ 815694.1	276.541	2.442			0.002423	-2.615720		
AQ 815694.2	256.952	2.410			0.001862	-2.730120		
AQ 368781.1	125.061	2.097	2.134	0.059	0.001123	-2.949765	-2.832	0.236
AQ 368781.2	159.205	2.202			0.001035	-2.985160		
AQ 780974.1	126.516	2.102			0.002751	-2.560435		
5547	95.930	1.982	1.985		0.000666	-3.176410	-3.347	
5547.1	97.080	1.987			0.000303	-3.518358		
AQ 538828.1	145.576	2.163	2.202	0.037	0.000425	-3.372122	-3.177	0.208
AQ 538828.2	172.474	2.237			0.001101	-2.958046		
AQ 782483.1	160.399	2.205			0.000630	-3.200816		
AQ 558360.1	111.815	2.049	2.027		0.001643	-2.784346	-2.932	
AQ 558360.2	101.470	2.006			0.000833	-3.079577		
8045	126.718	2.103	2.277		0.000385	-3.414755	-3.161	
17783	282.650	2.451			0.001237	-2.907729		
AQ 368854.1	97.204	1.988	1.943		0.000414	-3.382867	-3.246	
AQ 368854.2	79.022	1.898			0.000779	-3.108450		
AQ 619389.1	45.013	1.653	1.722	0.081	0.000316	-3.500689	-3.595	0.173
AQ 619389.2	44.736	1.651			0.000163	-3.788917		
AQ 755358.1	62.452	1.796			0.000392	-3.406561		
AQ 755358.2	61.298	1.787			0.000206	-3.685407		
18784	48.278	1.684	1.709		0.000234	-3.630669	-3.595	
18787	54.270	1.735			0.000276	-3.559217		
92939	38.134	1.581	1.581		0.000109	-3.961782	-3.962	
US 530603.1	75.179	1.876	1.876		0.000540	-3.267927	-3.268	
311.1A	148.839	2.173	2.094	0.069	0.001928	-2.714808	-2.406	0.289
US 2415484.1	117.429	2.070			0.007226	-2.141092		
US 2415484.2	109.747	2.040			0.004336	-2.362867		
US 674866.1	102.107	2.009	2.003		0.002179	-2.661692	-2.614	
US 674866.2	99.286	1.997			0.002709	-2.567227		
US 1631813.1	95.942	1.982	2.025		0.006589	-2.181148	-2.429	
US 510789.1	116.729	2.067			0.002108	-2.676194		
US 1919620.1	247.158	2.393	1.981	0.265	0.001513	-2.820205	-3.064	0.297
US 1919620.2	45.397	1.657			0.001430	-2.844602		
US 3346968.1	84.897	1.929			0.000277	-3.557432		
US 3346968.2	85.443	1.932			0.000873	-3.059113		
US 3346968.3	98.981	1.996			0.000919	-3.036829		
US 3227408.1	86.880	1.939	1.943	0.018	0.001043	-2.981818	-3.103	0.310
US 3227408.2	91.846	1.963			0.001345	-2.871204		
US 3227408.3	84.506	1.927			0.000351	-3.454802		

BIBLIOGRAPHY

- Anten, N.P.R., Alcala-Herrera, R., Schieving, F., and Onoda, Y. Wind and mechanical stimuli differentially affect leaf traits in *Plantago major*. *New Phytologist* 188(2): 554-564. doi: 10.1111/j.1469-8137.2010.03379.x
- Arcand, N., Kagawa, A.K., Sack, L., and Giambelluca, T.W. 2008. Scaling of frond form in Hawaiian tree fern *Cibotium glaucum*: Compliance with global trends and application for field estimation. *Biotropica* 40(6): 686-691.
- Brodribb, T.J., Holbrook, N.M., Zwieniecki, M.A., and PaLMA, B. Leaf hydraulic capacity in ferns, conifers, and angiosperms: Impacts on photosynthetic maxima. *New Phytologist* 165(3): 839-846. doi: 10.1111/j.1469-8137.2004.01259.x
- Cornelissen, J.H.C., Lavorel, S., Garnier, E., Diaz, S., Buchmann, N. et al. 2003. A handbook of protocols for standardised and easy measurement of plant functional traits worldwide. *Australian Journal of Botany* 51: 335-380.
- Creese, C. Lee, A., and Sack, L. 2011. Drivers of morphological diversity and distribution in the Hawaiian fern flora: Trait associations with size, growth form, and environment. *American Journal of Botany* 98(6): 956-966.
- Diaz, S., J.G. Hodgson, K. Thompson, M. Cabido, J.H.C. Cornelissen, A. Jalili, G. Montserrat-Marti, et al. 2004. *Journal of Vegetation Science* 15(3): 295-304.
- Enquist, B.J. 2002. Universal scaling in tree and vascular plant allometry: Toward a general quantitative theory linking plant form and function from cells to ecosystems. *Tree Physiology* 22: 1045-1064.
- Karst, A.L. and Lechowicz, M.J. 2007. Are correlations among foliar traits in ferns consistent with those in the seed plants? *New Phytologist* 173: 306-312.
- Niinemets, U. and Fleck, S. 2002. Petiole mechanics, leaf inclination, morphology, and investment in support in relation to light availability in the canopy of *Liriodendron tulipifera*. *Ecophysiology* 132: 31-33. doi: 10.1007/s00442-002-0902-z
- Niinemets, U., Portsmouth, A., Tena, D., Tobias, M., Matesanz, S., and Valladares, F. 2007. Do we understand the importance of leaf size in plant economics? Disproportionate scaling of support costs within the spectrum of leaf physiognomy. *Annals of Botany* 1-21. doi: 10.1093/aob/mcm107
- Niklas, K.J. 1992. Plant biomechanics: An engineering approach to plant form and function. Chicago, USA: University of Chicago Press.

- Niklas, K.J. 1996. Differences between *Acer saccharum* leaves from open and wind-protected sites. *Annals of Botany* 78: 61-66.
- Niklas, K.J. 1999. A mechanical perspective on foliage leaf form and function. *New Phytologist* 143: 19-31.
- Pitterman, J., Limm, E., Rico, C., and Christman, M.A. 2011. Structure-function constraints of tracheid-based xylem: A comparison of conifers and ferns. *New Phytologist* 192: 449-461.
- Read, J. and Stokes, A. 2006. Plant biomechanics in an ecological context. *American Journal of Botany* 93(10): 1546-1565.
- Reich, P.B., Walters, M.B., and Ellsworth, D.S. 1997. From tropics to tundra: Global convergence in plant functioning. *Proceedings of the National Academy of Sciences of the United States of America* 94(25): 13730-13734.
- Reich, P.B., Ellsworth, D.S., Walters, M.B., Vose, J.M., Gresham, C. et al. 1999. Generality of leaf trait relationships: A test across six biomes. *Ecology* 80(6): 1955-1969.
- Renzaglia, K.S., R.J. Dugg, D.L. Nickrent, and D.J. Garbary. 2000. Vegetative and reproductive innovations of early land plants; Implications for a unified phylogeny. *Philosophical Transactions of the Royal Society of London, B* 355: 769-793.
- Royer, D.L., L. Sack, P. Wilf, C.H. Lusk, G.J. Jordan, U. Niinemets, I.J. Wright, et al. 2007. Fossil leaf economics quantified: Calibration, Eocene case study, and implications. *Paleobiology* 33(4): 574-589.
- Royer, D.L., Kooyman, R.M., Little, S.A., and Wilf, P. 2009a. Ecology of leaf teeth: A multi-site analysis from an Australian subtropical rainforest. *American Journal of Botany* 96(4): 738-750.
- Royer, D.L., Meyerson, L.A., Robertson, K.M., and Adams, J.M. 2009b. Phenotypic plasticity of leaf shape along a temperature gradient in *Acer rebrum*. *PLoS ONE* 4(10): e7653. doi:10.1371/journal.pone.007653.
- Royer, D.L., I.M. Miller, D.J. Peppe, and L.J. Hickey. 2010. Leaf economic traits from fossils support a weedy form for early angiosperms. *American Journal of Botany* 97(3): 438-445.
- Schuettelpelz, E. and Pryer, K.M. 2007. Fern phylogeny inferred from 400 leptosporangiate species and three plastid genes. *Taxon* 56(4): 1037-1050.

- Schneider, H., K.M. Pryer, R. Cranfill, A.R. Smith, and P.G. Wolf. 2002. Evolution of vascular plant body plans: A phylogenetic perspective. *In* Developmental genetics and plant evolution, 330-364. Q.C.B. Crock, R.M. Bateman, and J.A. Hawkins (eds.), London, England.
- Smith, A.R., K.M. Pryer, E. Schuettpelz, P. Korall, H. Schneider, and P.G. Wolf. 2006. A classification for extant ferns. *Taxon* 55(3): 705-731.
- Warton D.J., Wright, I.J., Falster, D.S., and Westoby, M. 2006. Bivariate line-fitting methods for allometry. *Biological Reviews* 81(2): 259-291.
- Watkins, J.E.Jr., Holbrook, N.M., and Zwieniecki, M.A. 2010. Hydraulic properties of fern sporophytes: Consequences for ecological and evolutionary diversification. *American Journal of Botany* 97(12): 2007-2019.
- West, G.B., Brown, J.H., and Enquist. B.J. 1997. A general model for the origin of allometric scaling laws in biology. *Science* 276(5309): 122-126. doi: 10.1126/sciences.276.5309.122
- Westoby, M., D.S. Falster, A.T. Moles, P.A. Vesk, and I.J. Wright. 2002. Plant ecological strategies: Some leading dimensions of variations between species. *Annual Review of Ecological Systems* 33:125-159.
- Wright, I.J., P.B. Reich, M. Westoby, D.B. Ackerly, X. Baruch, F. Bongers, J. Caender-Bares, et al. 2004. The worldwide leaf economics spectrum. *Nature* 428: 821-827.
- Wright, I.J., Reich, P.B., Cornelissen, H.C., Falster, D.S., Garnier, E., et al. 2005. Assessing the generality of global leaf trait relationships. *New Phytologist* 166(2): 485-496. doi: 10.1111/j.1469-8137.2005.01349.x