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Species Pools of Seed Plants in Eastern Asia and North America

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SPECIES POOLS

OF SEED PLANTS

in Eastern Asia and North America

Shiyou Li and Kent T. Adair

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of Seed Plants
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Foreword by **R. Scott Beasley**

Arthur Temple College of Forestry
Stephen F. Austin State University
Nacogdoches, Texas

1997

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Published by

Arthur Temple College of Forestry
Stephen F. Austin State University
Nacogdoches, Texas 75962, USA

Printed in the United States of America

Library of Congress Cataloging-in-Publication Data

Li, Shiyou

Species Pools of seed plants in eastern Asia and North America / Shiyou Li and Kent T. Adair; foreword by R. Scott Beasley.

p. cm.

includes bibliographical references and index.

ISBN 0-938361-13-9

1. Plant species pools--East Asia. 2. Plant species pools--East (U.S.) 3. Plant species pools--Canada, Eastern. 4. Phanerogams--Speciation--East Asia. 5. Phanerogams--Speciation--East (U.S.) 6. Phanerogams--Speciation--Canada, Eastern. I. Adair, Kent T. II. Title.

QK341.L5 1997

581.3'5--dc21

97-35153

CIP

ISBN 0-938361-13-9 Hardback

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FOREWORD

When Dr. Shiyu Li and Dr. Kent Adair asked me to write a foreword for their most recent book I was honored to do so. Dr. Li, educated in China and the U.S., is one of the world's foremost botanists. Dr. Adair is former Dean of the College of Forestry at Stephen F. Austin State University, and, more recently occupied the Henry M. Rockwell Chair in the College of Forestry.

Threatened and endangered species, biodiversity, habitat loss, and ecosystem management are phrases that have found their way into the common vernacular, despite efforts among scientists to agree on their precise meanings. The complexities of interactions among biological systems and their abiotic environments defy simple universally applicable explanations. Our understanding is further hampered by the fact that it is impossible to identify the total number of species extant at any given point in time. Scientific and financial resources are simply not adequate, at present, to identify and classify all organisms. Consequently, all studies are limited to samples of unknown intensity and probability.

In their monograph, *Species Pools of seeds plants in Eastern Asia and North America*, Drs. Li and Adair present a comprehensive analysis of data collected during a ten-year study involving 10,000 plant species in eastern Asia and North America. Rigorous taxonomic analyses of species richness distributions, life form

spectra, dispersal ecology and floristic patterns provided a basis for testing commonly accepted hypotheses regarding (1) floristic and ecological similarities among biogeographical regions, (2) convergent evolution, and (3) migration. The authors develop the concept of "Species Pools" in which species diversity and composition in a given region is a function of speciation, immigration, extinction (global extinction), and emigration (local extinction). Furthermore, a given species pool may be a result of historical rather than ecological factors, and a product of chance rather than predictable events.

The authors discuss their findings and conclusions in terms of current concepts of species extinction rates, species preservation, habitat destruction, fossil records, ecosystem management, and the role of humans as an ecological factor.

The book is clearly written and thought provoking. The concepts, questions, and hypotheses posed by the authors are timely in context with current controversies abounding in our society today. They contribute to a clearer understanding of the complexities of our natural ecosystems.

R. Scott Beasley, Ph.D., Dean
Arthur Temple College of Forestry
Stephen F. Austin State University
Nacogdoches, Texas
May 1997

PREFACE

There is a folklore legend. Three blind persons were asked to identify an elephant by the tamer. One stroked the ear of the elephant and shouted "Oh! Elephant looks like a fan." The second, after touching the leg, said "No! It looks like a doorpost". The third touched the body and said "You are all wrong. Elephant, a huge animal. It is really wall-like". The tamer smiled and said "you are all correct, but"

Biodiversity is a central theme of the environment. Human beings have accumulated much data on biodiversity over the past 250 years or so; however, our knowledge is still far from complete, and we are all like blind persons in the legend. Many scientists over-emphasize or over-explain their limited temporal and spatial data on specific taxa or regions to justify given hypotheses on biodiversity. Eastern Asian—eastern North American floristic similarity pattern and concepts of ecological convergence in similar environments are two classic instances of limited information leading to questionable conclusions.

Studies often seem to be structured to provide new evidence for these hypotheses rather than to test them. In this monograph, we test these hypotheses based on a ten-year study (1984-1994). We emphasize the overall floristic relationships between large regions within the same climatic zone. The work is based on the relative uniform species concept for 10,000 species. Our data do not support the current hypotheses. In other words, floristic similarity between eastern Asia and eastern North America, is not greater than other similarities in the northern hemisphere at all family, genus, and species levels and it is valid only to few genera. There is no distinct convergence in

physical structure of plant diversity in similar climates according to our data.

While the data were not sufficient to reject these hypotheses for a few genera, overall it must be concluded that no distinct convergence in the physical structure of plant diversity in similar climates is demonstrated within this large data set. Biodiversity loss is a topic of serious concern of modern society; it is usually equated to spatial loss of specific habitats and ecotypes. However, temperate species usually have wide distribution, good dispersal strategy, and resilience. These factors reduce the loss wherever specific habitats are destroyed. Species recorded over 2000 years ago in Chinese herbal books are all still present today despite enormous changes in available habitats. Further, tropical biodiversity loss may be fact, but often it is associated more with direct taking than destruction of generic habitat. A new concept is needed to accept these observable elements of contemporary reality.

We thus propose concepts of species pools and argue that extant species diversity is an historical artifact rather than an ecologically determinate reality within any given spatial and temporal domain. In the 1990s, the term "ecology", has become common language. People interpret almost all current global crises such as the human population explosion, global warming, energy shortages, biodiversity and habitat loss in terms of their ecological impacts. It often seems that ecology, and only ecology can encompass all of the problems of the Earth. Few people seem to doubt this need to place ecology first among the interests of mankind.

However, it is well to remember that predicted ecological impacts are still only the deductive consequences of stated hypotheses. Where those hypotheses are based on incomplete data limited by spatial, temporal and partial observations, it is appropriate to postulate rather than state, and test rather than predict their consequences.

This book is one such postulation based on a large, but still incomplete, data base of confirmed observations. In the humility of

science, we encourage and look forward to the testing of our hypotheses in the faith that both rejection and failure to reject contribute to our human envelope of knowledge.

S.Y.L. & K.T.A.

Nacogdoches, Texas, U.S.A.

December, 1996

ACKNOWLEDGMENTS

We express our gratitude to the following reviewers for their comments and suggestions: Dr. **R. Scott Beasley** (SFASU), Dr. **David E. Boufford** (Harvard Herbaria), Dr. **Michael S. Fountain** (SFASU), Dr. **Heinz A. Gaylord** (SFASU), Dr. **David L. Kulhavy** (SFASU), **Barney L. Lipscomb** (Botanical Research Institute of Texas, BRIT), Dr. **Hebe R. Mace** (SFASU), Dr. **Darrel L. McDonald** (SFASU), Dr. **Elray S. Nixon** (SFASU), Dr. **Hershel C. Reeves** (SFASU), and the late Dr. **Kenneth G. Watterston** (SFASU).

We are indebted to **Paul R. Blackwell** and **Yujie Wang** (SFASU) for their assistance in preparing the manuscript. We thank the following authors for providing photos: **Yan Yang** (P.15, P.65, and P.95), **Xubai Li** (P.68), and **Jingcheng Ran** (P.99). We appreciate the efforts of Dr. **David E. Boufford** (Harvard Herbaria), Dr. **David L. Creech** (SFASU), **Yonie Hudson** (BRIT), Dr. **Kenneth M. Farrish** (SFASU), **Barney L. Lipscomb** (BRIT), Dr. **Nancy R. Morin** (Missouri Botanical Gardens), and **Katie Northrup** (Northrup Associates, Inc.) for support in providing references.

Thanks are also due to the late leading botanists Dr. **Arthur Cronquist** (New York Botanical Garden) and **Lynn Lowrey** (Anderson Nursery and Landscape) for their great interest in our research project.

We owe appreciation to the curators of the following herbaria for their assistance in specimen examination: A, ASTC, BM, BRIT, C, CDBI, E, FSI, HNUU, IBSC, K, KUN, MO, NEFL, O, P. PE, SZ, US, and WUK.

Special thanks are also due to the hundreds of students of Northeast Forestry University (NEFU) in Harbin and numerous foresters of Guangdong,

Heilongjiang, Hunan, Neimonggu, Shaanxi, Sichuan, and Yunnan provinces, for their aid in the field investigations in China from 1983 to 1987. This work would not have been possible without their cooperation and assistance.

We would like to thank Dr. **R. Scott Beasley**, Dean of the Arthur Temple College of Forestry at SFASU for his support.

The senior author is also grateful to his Chinese friends for their encouragement: Prof. **Xiangwei Chen** (NEFU), Dr. **Limin Dai** (Shenyang Institute for Applied Ecology, China), **Xiaofeng Gao** (Provincial Government of Heilongjiang, China), Dr. **Dezhi Li** (NEFU), Dr. **Jian Li** (NEFU), **Qingzhou Li** (Provincial Government of Heilongjiang, China), **Yanquan Li** (Ministry of Forestry, P. R. China), **Zhongjie Li** (Provincial Government of Heilongjiang, China), **Mengxin Lü** (NEFU), Dr. **Keping Ma** (Biodiversity Committee, Chinese Academy of Sciences), Prof. **Shaoquan Nie** (NEFU), Dr. **Fuchen Shi** (NEFU), Dr. **Xioufeng Yan** (NEFU), Dr. **Dan Yu** (Wuhan University), **Dehui Zhang** (Ministry of Forestry, P. R. China), Dr. **Wanli Zhang** (NEFU), and Dr. **Yuangang Zu** (NEFU). Finally, Shiyu Li appreciates the love, understanding, and support of his wife, **Jie Liang**.

CHAPTER ONE

INTRODUCTION

1.1. Questions

Biodiversity or biological diversity refers to the variety of life forms: the different plants, animals, and microorganisms, the genes they contain, and the ecosystems they form. Thus, biodiversity can be considered at the genetic, species, and ecosystem levels. Genetic diversity usually refers to the variation of genes within species. Species diversity refers to the variety of living species. Ecosystem diversity relates to the variety of habitats, biotic communities, and ecological processes, as well as the tremendous diversity present within ecosystems in terms of habitat differences and the variety of ecological processes underway at any given time and place.

Aspects of species diversity can be classified into three groups: species richness, species abundance/evenness, and taxonomic diversity. We emphasize that species diversity can show geographical, ecological, evolutionary, and developmental patterns of species richness in a given region during a given time period. Thus, species diversity is dynamic with time and space.

Species diversity is a central theme of environmental theory. Scientists have accumulated much data on species diversity over the past 250 years. However, there are still no determinate answers for some basic questions: How many species exist on earth? Or what's the current size of the earth's species pool? The estimated number of extant species ranges from 3 to 100 million (Stebbins 1981, Dayton 1991, Solbrig 1991, Gaston and May 1992, Raven and Wilson 1992). However, to date only 1.4 million species at most have been described (Raven and Wilson 1992) and there are simply not enough scientific and financial resources available at present to classify all

organisms (Heywood in Dayton 1991). An important problem that must be solved before we clearly know how many species are on the earth is the conceptual definition of species. But, it is almost impossible to adopt the same species definition or concept for all organisms because organisms vary greatly in structure and function. The solution to date has been to use a uniform and constant species concept through as large a group of plants as possible (e.g., orders, families, and genera), and thus to attain a classification useful to human society, which is the major purpose of taxonomy.

Secondly, where does maximum species richness exist? In what region? In what habitat? Why there? These questions are critical to species diversity conservation. Studies on regional species richness are numerous, but usually restricted to some group of plants (e.g., trees) in a specific region. More qualitative data, rather than quantitative data, have been recorded on habitat species richness. The common view is that maximum species richness is found in a mesic habitat (Whittaker 1969, Barbour et al. 1980). This statement leads the public's attention about species diversity conservation to mesic habitat and forests in particular.

Thirdly, how many species are being lost and at what rate? The estimated number of species lost varies from one species per hour to one per day (Dayton 1991). Some scientists (Ehrlich and Wilson 1991) claim that within 50 years a quarter of the world's species diversity may vanish forever—more than two million species. However, there are really no hard data based on verifiable statistics. The largest core of data on the decline of species comes from the World Conservation Monitoring Center in Britain which lists 311 scientifically described species that have disappeared since 1600 (Dayton 1991). But some species have been rediscovered after being declared "extinct". Also, new taxa and new distributions of plants are continuously recorded almost everywhere on earth. In fact, it is impossible to establish a firm rate of extinction when scientists have no idea of either the order of magnitude or how many species actually exist on earth (Dayton 1991).

Biogeographically, eastern Asia is widely recognized for developing a great diversity of native species and most of the natural

vegetation types of the Northern Hemisphere due to its highly complicated geological past and physical conditions. In China, for example, 25,500 species of native vascular plants have been identified. This figure gives China the third greatest diversity in identified plant species in the world behind only Malaysia (40,000 species) and Brazil (40,000 species), although species density is very low (**Figures 1.1, 1.2**). Obviously, eastern Asia has a much richer flora than eastern North America, but the areas have been recognized to have remarkable floristic similarity. This eastern Asian and eastern North American floristic similarity pattern is a classical topic in disjunct biogeography (Fernald 1931, Li 1952). It is called Gray's hypothesis, and dilemma, because of Gray's long term great contributions to defining this topic and his inability to explain it satisfactorily.

Based on 14-years (1983-1996) of field observations, herbarium examinations, personal interviews, and literature, the present study systematically compares the floristic and ecological aspects of natural continental forests in eastern Asia and eastern North America. These comparisons are performed in light of larger biogeographical regions of the Northern Hemisphere including western North America, Europe, and Japan, especially in the boreal and temperate forest zones. The purposes of this study are to (1) reveal the regional distribution patterns of species and thus test the classic "Gray's hypothesis"; (2) analyze ecological patterns of species richness; and (3) discuss the development and management of species richness.

FIGURE 1.1. Species richness (number) of flowering plants in selected countries or regions.

FIGURE 1.2. Species density of flowering plants in selected countries or regions.

1.2. Data Collection

Study Area

The study area consists of continental eastern Asia, Japan, and North America, especially the boreal and temperate forest zones. Eastern Asia includes the eastern forest region of China, Far East and eastern Siberia of Russia, and Korea (**Figure 1.3**). North America includes the continental regions of Canada and United States. The forests of North America are naturally divided into those west and those east of the Great Plains (**Figure 1.4**).

The boundary of the boreal zone in the Northern Hemisphere follows Larsen (1980) with modification in eastern Asia. The boreal region in Europe includes the area westward from Ural Mountains (**Figure 1.5:I**). Boreal eastern Asia includes eastern Siberia in Russia and the Da Xingan Ling Mountains of China (**Figure 1.5:II**). The east-west division of the boreal zone in North America follows Daubenmire (1978). The eastern section includes the area east of the Rocky Mountains (100°W) (**Figure 1.5:IV**) and the western or Cordilleran Section includes the area west of the Rocky Mountains (**Figure 1.5:III**).

In eastern Asia, the temperate forest region includes the Xiao Xingan Ling, Wanda, and Changbai mountains in Northeast China, the southern portion of Far East of Russia, and northern Korea (**Figure 1.5:V**). This region is known as the Korean pine conifer and hardwood forest region (Chou and Li 1990). In Japan, the temperate forest region refers to Hokkaido except for the southwestern part, where the southern limit is Kuromatsunai line through Suttsu, Kuromatsunai, and Oshamanbe on the Oshima Peninsula (**Figure 1.5:VI**). This region is often named as the Subarctic/Subalpine evergreen coniferous forest zone (Numata 1974). In western North America, the temperate forest region covers portions or all of the Pacific Northwest states of Oregon, Montana, Idaho, Washington, and southern British Columbia (**Figure 1.5:VII**). This region includes the Pacific Northwest forests (Franklin 1988) and the northern portion of the forests of the Rocky Mountains (Peet 1988).

FIGURE 1.3. Map showing eastern Asia as defined for this study.

FIGURE 1.4. Map showing eastern and western North America as defined for this study.

FIGURE 1.5. Map showing the boreal and temperate forest regions as defined for this study (I-IV---boreal forest zone: I-Europe, II-eastern Asia, III-western North America, IV-eastern North America; V-VII---temperate forest zone: V-eastern Asia, VI-Japan, VII-western North America, VIII-eastern North America).

In eastern North America, the temperate forest region extends from upper Great Lakes region of northern Minnesota and eastward to southern Canada and New England, including, toward the southeast, much of the Appalachian Plateau in New York and northern Pennsylvania (Braun 1967, **Figure 1.5:VIII**). The region is known as the Hemlock–white pine–Northern Hardwoods region (Braun 1967, Vankat 1979) as well as the mixed conifer and deciduous forest region (Bailey 1976).

Data Sources

The study has four main data sources: field investigations, specimen observations, personal communications, and literature (including flora and fossil records). The primary data source for continental eastern Asia is a survey conducted during 1983–1996 by the senior author and his colleagues at Northeast Forestry University (**Figures 1.6, 1.7**). Data for North America is based on literature, supported where possible, by field collections, herbarium investigations, and personal interviews. The observational biases that often plague broad-scale comparisons were minimized by using established methods and the same principal observer in the herbarium and field.

Based on the work of Chou and Li (1990) on eastern Asian forests and Eyre's (1980) on western and eastern North American forests, checklists of forest formations (named after predominant or characteristic tree species) in all three regions were created. Five sheets of voucher specimens of each taxon of seed plants found in the boreal and temperate forests of eastern Asia were collected during the field investigations. The location, life history, growth forms, function of woody plants, vegetative organs, habitats, and other characteristics such as flower color for each species were recorded for each specimen. The voucher specimens were retained in the Institute of Plant Sciences at Northeast Forestry University in Harbin, China. Manuals involving the floras of East Siberia, Far East, Korea, and Japan were also used to identify voucher specimens. Herbarium collections, located in Northeast Forestry University, Beijing Institute of Botany, and Shenyang Institute for Applied Ecology were also used

FIGURE 1.6. Plant inventory was conducted by the senior author (first from right) and his colleagues in Da Xingan Ling Mountains in 1986.

to confirm identification of voucher specimens. Seed plant checklists of the boreal and temperate forests of eastern Asia were created separately from these comparisons. Additional floristic checklists were created separately for boreal Europe, boreal western North America, boreal eastern North America, temperate Japan, temperate western North America, and temperate eastern North America using references, i.e., *Flora of Japan* (Ohwi 1965), *Circumpolar Arctic flora* (Polunin 1959), *Manual of vascular plants of northeastern United States and adjacent Canada* (Gleason and Cronquist 1991), *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1974), and *Flora of Canada* (Scoggin 1978–1979).

FIGURE 1.7. Plant inventory was conducted by the senior author (third from left on back) and his colleagues in Xiao Xingan Ling Mountains in 1987.

The following data for all species in the checklists were collected:

1. Life history (perennial, biennial, and annual);
2. Growth forms (trees, shrubs, lianas, herbs, and epiphytes);
3. Leaf shapes (simple leaves: needle, scale, entire, toothed, lobed, and graminoid, compound leaves) and size;
4. Flower color and size;
5. Vegetative reproductive organs (rhizome, bulb, and tuber);
6. Diaspore syndromes including seed or fruit size and surface characteristics, e.g., barbs, hooks, and sticky liquid of the woody plants and common and vicariant herbaceous plants;
7. Habitat (mainly xeric, mesic, hydric, and epiphytic).

1.3. Data Analysis

Floristic and ecological similarities of eastern Asian and eastern North American forests were evaluated. In whole forest comparisons between eastern Asia, and western and eastern North America, analyses were made by forest cover type. In both boreal and temperate forest comparisons of Europe, eastern Asia, and western and eastern North America, floristic analyses were made at the family, genus, and species levels. Evolutionary analyses of flora were based on the diversification ratios (family and genus size), diversification rate (Eriksson and Bremer 1992), and flower characters. Phylogenetic analyses were made in terms of three categories: primitive—subclasses Magnoliidae and Alismatidae; intermediate—subclasses Caryophyllidae, Hamamelidae, Dilleniidae, Rosidae, Arecidae, Commelinidae, and Zingiberidae; and advanced—subclasses Asteridae and Liliidae [following Cronquist (1988)]. Species richness distributions along ecological gradients of xeric, mesic, hydric, and epiphytic habitats were described by listing the species in each habitat type. Life form spectra were created based on autecological data. The categories of life forms were: (1) big phanetrophytes (trees and big woody vines, evergreen and deciduous); (2) small phanetrophytes (shrubs with buds located higher than 0.25 m above ground); (3) chamaephytes (low shrubs and cushion plants with buds exposed above the ground but below 0.25 m); (4) hemicryptophytes (perennial and biennial herbs with buds located at soil surface); (5) geophytes (plants with rhizomes, tubers, and bulbs located well below the surface of the ground); (6) therophytes (annuals which survive unfavorable periods as seeds); (7) aquatic plants; and (8) epiphytes.

A dispersal analysis using existing fossil records was performed. The dispersal ecology analysis was made in terms of dispersal agencies, including birds, mammals, ants, wind, and ocean currents.

Similarity coefficients of association [following Causton (1988)] were computed for all floristic and ecological comparisons. Species similarity coefficients were calculated based on qualitative data

(presence or absence). A chi-square test was used to describe the degree of floristic association between two areas.

Finally, it must be emphasized that our conclusions are limited to our data. The history of species richness is largely one of advances based on increasing sample size. Because it is not possible to monitor the total species pool, or even identify the total number of species extant at any one point in time, all studies are limited to samples of unknown intensity and probability.

In knowing the environment, the more information, the better! Consequently, this study is based on the largest known species pool data base available to date.

Modern technology, the computer, has made it possible to consider large data sets and it is this capability that has made this study possible.

GEOGRAPHICAL AND TAXONOMIC PATTERNS OF SPECIES POOLS

CHAPTER TWO

HISTORICAL REVIEW

2.1. Plant Biogeographical Relationships between Eastern Asia and Eastern North America

From Carolus Linnaeus to Thomas Nuttall

The first proposition on the floristic similarity between eastern Asia and eastern North America appears in a Linnaean dissertation, *Plantae Camschatcenses Rariores*, published in 1750 by Carolus Linnaeus' student, Johnas P. Halenius (Fernald 1931, Li 1952, Boufford and Spongberg 1983). It listed nine species that occur both in the Kamchatka Peninsula of eastern Russia and in North America. Later, other European scholars (e.g., Pehr Kalm in 1751) found that species of American *Panax*, *Magnolia*, *Illicium*, and *Calycanthus* were similar to members of the same genera of eastern Asia (Boufford and Spongberg 1983).

In 1818, Thomas Nuttall published his nearly 10 years' study, *Genera of North American Plants*. His views on geographic distribution of American plants were remarkably modern although he did not particularly emphasize the floristic similarity between eastern Asia and eastern North America. D. E. Boufford and S. A. Spongberg (1983) acknowledged, particularly, Nuttall's contributions to the study of plant disjunct distributions.

However, the work during this time was fragmentary and principally restricted to the few recorded genera and species common to Japan and eastern North America. Alan Graham (1966, 1972), H.

L. Li (1952, 1955), and Boufford and Spongberg (1983) carefully reviewed the history of this stage in the development of disjunct biogeography.

Asa Gray

Asa Gray has generally been accepted as among the first to study the pattern of floristic similarity between eastern Asia and eastern North America. Indeed, serious comparative research did not occur until Asa Gray re-emphasized the subject in the middle 1800s. Using literature and specimens of 580 species collected from Japan, he demonstrated that the similarity of species was greater between Japan and eastern North America than between Japan and western North America or Japan and Europe. Gray (1846) also listed some genera and species that were common in both Japan and eastern North America. Gray then put aside the topic for about 10 years before he published a series of papers on the subject. He analyzed the materials available to him and laid the foundation for future taxonomic work. Gray's long-term study on disjunct biogeography in eastern Asia (Japan) and eastern North America mark the summit of his career (Dupree 1959). Charles Robert Darwin wrote to Gray in 1856 that nothing had surprised him more than the greater generic and species affinity between the eastern Asian and eastern North American floras, an affinity which surpassed that between eastern and western North American floras (Darwin 1856). He encouraged Gray to contribute further to such biogeographical discussions. But like many others, Gray complained that there was too little knowledge available about Chinese flora (the main part of eastern Asian flora, see Boufford and Spongberg 1983). Thus, in the 19th century, a floristic comparison was never made which included China and eastern North America. However, Gray's contributions stimulated the interest of many leading scientists. The floristic similarity pattern between eastern Asia and eastern North America came to be known as Gray's hypothesis and because it could not be explained, it also came to be known as "Gray's puzzle" (Dupree

1959). Later, based on fossil evidence, Adolph Engler (1879) interpreted the history of this floristic pattern and other vegetation distributions around the world since the Tertiary.

L. Diels and Charles S. Sargent

Numerous foreign missionaries and soldiers entered eastern Asia after the Opium War (1840–1842), especially in the late 1800's and early 1900's. Western naturalists ventured into western and central China while Russian and Japanese botanists surveyed Northeast China, the Far East and eastern Siberian areas of Russia, and Korea. All groups collected plant specimens. The famous collectors included Armand David, Abbe Jean Marie Delavay, Augustine Henry, and Ernest Henry Wilson (Cox 1986). Western botanists used these collections to identify eastern Asian flora and to describe a large number of new genera and species, some named after the collectors mentioned above. Researchers also compared the plants with those of other countries and made significant discoveries about plant relationships.

In Europe, L. Diels during 1900–1901 published "*Die Flora Von Central China*" based on French missionaries and others' collections. He compared the flora of central China to floras of other parts of the world. Diels categorized the flora exhibiting disjunct features between China and North America into four types (Li 1952): (1) genera with members reaching to Malaysia, e.g., *Magnolia*, *Schisandra*, and *Illicium*; (2) genera reaching from the Himalayas to Japan, e.g., *Phryma* and *Panax*; (3) genera reaching only to Japan, e.g., *Caulophyllum*, *Hamamelis*, and *Stewartia*; (4) genera restricted to central China and North America, e.g., *Cypripedium*, *Liriodendron*, and *Gymnocladus*.

Later, in North America, Charles S. Sargent (1913) compared the woody flora of China and North America for the first time based on Wilson's collections of 1900–1910. He found that 92 families are common to eastern continental Asia and eastern North America, 25 occur in eastern continental Asia but not in eastern North America,

and 12 occur in eastern North America but not in eastern continental Asia. Of the 692 genera in the two regions 155 are common to both, while 379 are found in eastern continental Asia and not in eastern North America, and 158 are found in eastern North America and not in eastern continental Asia. Sargent assumed that the number of species of woody plants is probably as great in eastern North America as in eastern continental Asia.

Hui-Lin Li

Later, H. H. Hu (1935, 1936) and Hui-Lin Li (1944, 1948, 1952), two U.S. university-trained Chinese botanists, did further floristic research and published several articles. Li (1952) stated that the floristic relationships between eastern Asia and eastern North America were primarily at the generic, and not the species level, based on inspection of 56 families of angiosperms. His conclusion has been widely accepted by the scientific community. Li is also one of the earliest scholars to describe the ecological similarity between eastern Asia and eastern North America. Li (1952) stated that similar deciduous trees are prominent in both temperate forests of these two regions and that disjunct herbaceous taxa tend to be rhizomatous or tuberous, spring-blooming, early-leaving ephemerals or shade-adapted geophytes. At that time, however, fewer than 5,000 species of woody plants were known in China, in contrast to the more than 8,000 species known today. Floristically important plants, such as the most well-known living fossils *Metasequoia* and *Cathaya*, had not yet been discovered. Thus, some partial and even possibly incorrect conclusions according to the updated data, were made using these incomplete species lists, even though they were the best available at the time.

At the 1969 XI International Botanical Congress (IBC) in Seattle, Washington, a symposium entitled "*Floristics and paleofloristics of Asia and eastern North America*" was organized by Graham (1972). The symposium focused on floristic relationships between Japan and North America. At the meeting, Li (1972)

presented eastern Asia-eastern North America species-pairs in 16 genera. Two years later, the International Organization of Plant Biosystematists (IOPB) meeting was held at Corvallis, Oregon. J. Kornas (1972) from Poland discussed corresponding taxa and rhizomatous or tuberous, spring-blooming, early-leaving ephemerals or shade-adapted geophytes. However, these observations are all based on geographically scattered collections of the early 1900's. At that time fewer than 5,000 species of woody plants were known with their ecological background in the temperate forests of Eurasia and North America. H. Hara (1972), a Japanese botanist, listed some corresponding taxa among North American, Japanese, and Himalayan floras. However, neither this meeting nor the later Japanese-American Conference held at the New York Botanical Garden in 1983 focused on eastern Asian flora.

Recent Scientists

The situation began to improve in the early 1980's when scientific exchanges opened between mainland China and the United States. In 1983, the Missouri Botanical Gardens sponsored a symposium on biogeographical relationships between temperate eastern Asia and temperate eastern North America. Boufford and Spongberg (1983) systematically reviewed the research history of the topic in the 18th and 19th centuries. D. I. Axelrod (1983) discussed the global occurrence of oaks and related taxa of the Arctic-Tertiary flora. A. R. Kruckerberg (1983) discussed the North Pacific connection between the temperate eastern Asian and eastern North American floras. At the meeting B. Bartholomew et al. (1983) introduced the results of the first Sino-American botanical expedition to western Hubei Province of China in 1980. In 1983, P. S. White (White 1983) quantitatively compared the ecological characteristics of 162 species with eastern Asian near-relatives growing in the Great Smoky Mountains National Park of the United States. Although the research is not a direct comparison of the eastern Asian forests with eastern North American, White's analytical method provided important direction for further ecological studies in these areas. T. S.

Ying (1983) discussed woody floras as the dominant element of temperate (actually mainly warm-temperate) forests of China and eastern North America. However, most studies presented at the symposium focused on (1) enumeration and biology of taxa, especially genera and families exhibiting disjunction (e.g. Wu 1983, Hong 1983, Little 1983, Chen 1983, Phipps 1983), and (2) comparison of floras between two administrative regions rather than between natural regions in the two areas (Cheng 1983). Of these works, C. Y. Wu listed 116 disjunct genera between eastern Asia and eastern North America. More recently, D. Y. Hong (1993) reexamined the disjunct genera between eastern Asia and North America and reduced them to a list of 91 genera. H. Qian (1993) systematically analyzed the tundra vegetation in northeastern Asia and he emphasized tundra floristic similarity in eastern Asia and western North America. S. Y. Li and K. T. Adair (Li 1993, Adair and Li 1994, Li and Adair 1994 a, b) discussed the floristic similarity patterns in northern hemisphere based on boreal and temperate data and proposed a new hypothesis on plant biodiversity evolution: species pools.

In Addition, in their works on plant or forest geography, A. Takhtajan (1969, 1986), C. Y. Wu and H. S. Wang (1983), and Chou and Li (1990) discussed the floristic relationship between eastern Asia and eastern North America.

2.2. Origin of the Floristic Similarity Pattern

The origin of modern forest floristic similarity between eastern Asia and eastern North America is not clear and is in dispute. The earliest scholar who dealt directly with the origin of modern floristic affinity between eastern Asia and eastern North America was Gray. Influenced by the theory of natural selection of Darwin and Wallace, Gray (1859, 1878) tried to explain some disjunct distribution patterns based on paleobotanical evidence and geological history. He assumed that species had a common ancestry and a single center of origin and then migrated into geographically separate places. In the Tertiary period, when flowering plants were well established, a

temperate flora covered much of the northern extremes of all the continents in the Northern Hemisphere extending unbroken between Asia and North America through the Bering Strait region. With the advance of glaciers in the Northern Hemisphere, this homogeneous flora was driven southward and divided into great branches, one in North America and another in Asia. Each time the glaciers receded, temperate floras moved northward, mingling across the Bering Strait. With cooling, the flora again moved southward. Gray believed that the interchange between the temperate floras of Europe and the New World had taken place via Asia during these cycles.

Gray's studies brought the observed pattern into the multidisciplinary realm of scientific biogeographical analysis. Since then several explanations of the origin of floristic similarity have been published. However, all hypotheses are based on one of two basic assumptions: (1) *convergent evolution* (two or more sources of origin), under similar environmental conditions taxa become more similar in certain characteristics than their ancestors were; (2) *migration*, when common or closely related taxa are formed through direct floristic exchange between continents or through long distance dispersal.

The first assumption lacks support from modern geology and is now held only by a few scholars including Li (1972). The second assumption is more widely accepted, especially by geologists, and is supported by three concepts: continental drift, land bridges, and long distance dispersal. However, studies on migration are largely restricted to disjunct genera between eastern Asia and eastern North America.

Continental movement is often an important factor in explaining plant distributions. The distribution patterns for Northern genera of conifers (*Pinus*, *Abies*, *Picea*, *Larix*, etc.) and Southern genera (*Podocarpus*, *Araucaria*, *Agathis*, etc.) plus Northern *Fagus* and Southern *Neofagus* of angiosperms existed before the separation of Laurasia and Gondwanaland. Some primitive taxa common to the Northern Hemisphere might have originated before the Eurasian and North American plates separated. But more modern angiosperms evolved after the Eurasian and North American plates drifted apart. The common members of these taxa probably migrated via the

Bering strait or the North Atlantic land bridges. Consequently, two hypotheses proposed by paleobotanists to support the migration via land bridges are, namely, "geofloral hypothesis" (Gray 1878, Axelrod 1966) and "boreotropical flora hypothesis" (Wolfe 1975, 1977). Gray (1878), considered the geographic arrangement of the Northern Hemisphere and proposed that the similarity pattern of eastern Asia-eastern North America developed due to a glacially induced southward movement of an earlier thermophilic flora with polar distributions.

This perspective was developed by Chaney (1947) and refined by Axelrod (1966) as the "geofloral hypothesis". Axelrod (1966, 1983) believed that the Beringia at high latitudes contributed to the uniform Arcto-Tertiary Geoflora at high latitudes in the Northern Hemisphere. The Bering bridge was available throughout the Tertiary, with occasional breaks forced by climatic change (Tiffney 1985a). Mammalian paleoecology provides concomitant convincing evidence that throughout the Cenozoic Era the only continuous migratory route between Eurasia and North America was Beringia (Daubenmire 1978). B. H. Tiffney (1985b) also emphasized the importance of the North Atlantic Bridges as a migration route that led to the floristic similarity of eastern Asia and eastern North America. The northern connection was available for a long period because it lay in the Arctic where a water gap did not occur until the Oligocene. The southern connection extended through Greenland and was open until the early Eocene (McKenna 1983). J. A. Wolfe (1975) proposed that a northern tropical flora called Boreotropical flora extended from North America to Europe and along the Tethys Seaway to eastern Asia during the early Tertiary. D. W. Taylor (1990) postulated that the migration was from southeastern Asia along the Tethys Seaway to North America over the North Atlantic Ocean. Takhtajan (1969) and many Chinese scholars hypothesized that southeastern Asia may have been the evolutionary source of modern angiosperms for the Northern Hemisphere. P. H. Raven and Axelrod (1974) rejected this idea while Tiffney (1985a) suggested poly-sources for North American angiosperms. Consequently, these hypotheses explain some but not all floristic similarities.

H. W. Menard and E. L. Hamilton (1963) once proposed a "stepping stone theory" to modify the land drift theory because the land theory has received inadequate support from modern geology. They emphasized that when the sea-level was at least 100 meters lower in the Pleistocene, many islands were exposed, especially in the Pacific, providing a migration route for plant dispersal. But the study on long distance dispersal is less satisfying intellectually because the evidence cannot be obtained directly. Hong (1993) stated that all 91 genera of vascular plants disjunct between eastern Asia and North America, except *Phryma*, have no special structure favoring long distance dispersal. However, a comprehensive investigation of long distance dispersal of modern plants common to eastern Asia and eastern North America is lacking.

Recorded discoveries of fossil plants are spotty but numerous. J. Hsu and his colleagues have made contributions to Chinese paleoflora. Hsu (1983) reviewed the late Cretaceous and Cenozoic vegetation in China and emphasized the floristic connections with North America, although fossil records are relatively limited in China, especially from the boreal and temperate forest areas. In North America, the fossil plant record of the west is known in much greater detail than the east (Little 1983). Wolfe (1975) and Taylor (1990) also gave effective reviews on American fossil plants. At present, however, the synthesis of available information does not adequately answer all questions as to the origin of taxa and communities in the Northern Hemisphere.

As for the origin of forest similarity in these two areas, listed references are restricted mainly to paleobotanical records with a few modern family or genus descriptions. Systematic analysis, based on modern plants, is scarce although it is imperative in generating a final solution as to the origin of global forest similarity. The best evidence for plant migration over time is based on fossil records. Unfortunately, according to Simpson, only about one percent of all organisms are potentially preservable as fossils, but even of those species, the vast majority of individuals are not fossilized after death (Dodson and Dodson 1985). Consequently, fossil records will always provide partial explanations, even if it were possible to investigate

each and every inch of earth. In other words, very important key fossils potentially will escape discovery. Given the discontinuous fossil record of the world and the bias of fossilization toward certain types of plants, it is not possible to state that the absence of a fossil record in an area indicates that a plant has never grown there (Solbrig 1972). Further, paleobotanists often overlook the morphology and function of modern plants and over-emphasize the importance of fossils. This tendency has moved the study of the origin of floras into a labyrinth of many diverse and often conflicting paths.

In short, the floristic similarity between eastern Asia and eastern North America can be seen as the most important topic in disjunct biogeography of the Northern Hemisphere because it has yet to fully explained . However, direct comparisons of the modern continental forests between eastern Asia and eastern North America are inadequate. Further, quantitative examination of floristic and ecological similarities based on first-hand materials is limited. This study addresses both of these issues.

CHAPTER THREE

FLORISTIC RELATIONSHIPS between Eastern Asia and Eastern North America

The floristic similarity between eastern Asia and eastern North America has been recognized by botanists, geographers, ecologists, and geologists since the time of Linnaeus (Li 1952, Graham 1972, Boufford and Spongberg 1983, Tiffney 1985a, Wu 1994). However, this classical topic may be called Gray's hypothesis because Gray's long-term work (1840–1878) did focus scientific attention on this unique floristic pattern. It is widely accepted that this floristic relationship is valid at the generic, but not the species level (Li 1952). Despite the accumulation of data by leading scientists over the past two hundred years, there is still no complete floristic analysis between eastern Asia and eastern North America (Kato and Iwatsuki 1983, Tiffney 1985a). Consequently, as Tiffney (1985a) pointed out, two basic questions exist: first, is Gray's hypothesis true; or exactly how similar are eastern Asian and eastern North American floras? Second, if it is true, how did such similarity arise? Tiffney (1985a, b) assumed the pattern was real and reviewed paleontological evidence on the second question. But until now the more basic first question has never been directly addressed.

This chapter compares the floristic aspect of natural continental forests in eastern Asia and eastern North America to test Gray's hypothesis. It is based on a 14-year study. These comparisons are performed in light of larger biogeographical regions of the Northern Hemisphere including western North America, Europe, and Japan, especially in the boreal and temperate forest zones.

3.1. Test of Gray's Hypothesis

As mentioned in chapter two, the floristic similarity between eastern Asia and eastern North America can be called Gray's hypothesis because of his long-term contributions to this subject. If Gray's hypothesis is true, then floristic similarity for eastern Asia and eastern North America should demonstrate the following similarity patterns (**Table 3.1**).

TABLE 3.1. Postulates of Gray's hypothesis on floristic similarity patterns in eastern Asia and North America.

-
1. eastern Asia—eastern North America > western—eastern North America;
2. eastern Asia—eastern North America > eastern Asia—western North America;
3. eastern Asia—eastern North America > Europe—eastern North America;
4. eastern Asia—eastern North America > eastern Asia—Europe.
-

If these patterns as predicted by Gray's hypothesis, are not consistent with observations, the hypothesis may be rejected. Further, when these patterns are weaker than other observed ones, it may be concluded that a better hypothesis exists.

Because the fossil records are discontinuous in space and time, the real floristic (phylogenetic) affinity of two floras cannot be directly measured. The best available criterion for assessing the phylogenetic affinity of two floras is their taxonomic affinity, i.e., numbers of species, genera, and families common to the two floras. As Darwin (1857) pointed out, careful taxonomic work is the foundation of accurate understanding of floristic relationships. However, because taxonomists often hold individual concepts of species and because information exchange was limited by many factors until the 1980's, the treatment of floras was often individual within larger biogeographic regions and even in the same region.

To avoid the errors caused by different taxonomists and different taxonomic treatments, in this study taxa in the same genus are treated by the same criteria in all larger biogeographic regions. As a result, a rigorous taxonomic investigation was made on over 10,000 species of seed plants in Europe, eastern Asia, and western and eastern North America in order to test Gray's hypothesis as well as to develop a larger list of the taxonomic structure of the area. Further, a more detailed floristic examination was made in the boreal and temperate zones because Gray's hypothesis was considered to be true at least in these zones (Kato and Iwatsuki 1983).

The one factor that is not recognized in these data on natural floristic patterns is the effect of human actions on the extant flora. However, this impact of humans was minimized by concentrating on less disturbed floras and by including the largest possible number of families, genera, and species in calculating similarity indices. Also, the separate boreal regions which were studied in the Northern Hemisphere have had relatively slight and somewhat similar human impacts on vegetation. This improves comparability and reduces the human factor in the calculated similarity indices. This procedure held in temperate eastern Asia and North America which have similar human impacts. However, the natural temperate European flora has been so greatly modified by human activities that it is not comparable to eastern Asia or North America. Therefore, floristic comparisons of temperate forests in this study did not involve Europe.

TABLE 3.2. Taxonomic richness (number) of the seed plants in the boreal regions.

	Europe	Eastern Asia	Western North America	Eastern North America	Total
FAMILY					
Total	84	95	76	80	104
GENUS					
Trees	18	20	14	20	25
Shrubs	35	44	37	46	59
Lianas	0	5	0	1	5
Herbs	218	315	278	204	385
Total	269	383	326	266	470
SPECIES					
Trees	25	36	28	45	117
Shrubs	84	113	127	100	279
Lianas	0	6	0	1	7
Herbs	601	1023	1015	607	1961
Total	710	1177	1170	753	2360

3.2. Boreal Floras

Family

Totally, 2,360 species have been recognized, representing One hundred and four families and 470 genera in the boreal regions of Europe, eastern Asia, and western and eastern North America (Li 1993, **Table 3.2**).

Western North America has the smallest family number (76). Six of seven families common to all boreal regions but western North America, including Ulmaceae, Fagaceae, Tiliaceae, Celastraceae, Oleaceae, and Rhamnaceae, are all woody families recorded earlier in the fossil record. Among all boreal regions, eastern Asia has the

highest family number (95 families). Of these families in eastern Asia, 11 are found only in northeastern Asia among the boreal regions. Most of these families are tropical in origin and have representatives in the warm region of eastern North America, e.g., Schisandraceae, Menispermaceae, Moraceae, Juglandaceae, Cucurbitaceae, Actinidiaceae, Lythraceae, Vitaceae, and Dipsacaceae. Obviously, this high family diversity in boreal eastern Asia is due to the incursion of tropical elements. This phenomenon is not true in eastern North America and is not present in western North America.

Sixty-five families or 62.5% of the total 104 families in the boreal zone are common to all regions. These families contain about 88% of the total 470 genera and 94.8% of the total 2,360 species in the boreal regions. The 10 largest families in the boreal zone are Asteraceae (216 species), Cyperaceae (205), Poaceae (163), Ranunculaceae (149), Rosaceae (147), Salicaceae (110), Brassicaceae (104), Leguminosae (103), Caryophyllaceae (97), and Crassulaceae (76). Eastern Asia and eastern North America shared more families (76 families) than eastern Asia and western North America (72), Europe and eastern North America (74), Europe and western North America (71), and western and eastern North America (69) (**Table 3.3**). The similarity indices show the same results. However, eastern Asia and eastern North America shared fewer families and lower family similarity than eastern Asia and Europe (80 families).

Obviously, the family data in the boreal zone support postulates 1, 2, and 3 of Gray's hypothesis, but not 4. Thus, Gray's hypothesis is not accepted at the family level in the boreal zone.

TABLE 3.3. Floristic similarities of four boreal regions based on numbers of common taxa and calculated similarity indices.

Region	Common Taxa	Sc	Sr	Sr'	Ss	Rank
FAMILY						
Eastern Asia-eastern North America	76	0.63	0.96	0.92	0.87	4
Eastern Asia-western North America	72	0.55	0.97	0.94	0.84	1
Eastern Asia-Europe	80	0.69	0.98	0.97	0.89	6
Western-eastern North America	69	0.71	0.97	0.97	0.88	2
Europe-eastern North America	74	0.76	0.98	0.96	0.90	5
Europe-western North America	71	0.72	0.97	0.97	0.89	3
GENUS						
Eastern Asia-eastern North America	227	0.56	—	0.88	0.70	1
Eastern Asia-western North America	259	0.50	—	0.90	0.73	5
Eastern Asia-Europe	258	0.73	—	0.93	0.80	6
Western-eastern North America	232	0.70	—	0.96	0.78	4
Europe-eastern North America	202	0.71	—	0.92	0.76	2
Europe-western North America	222	0.68	—	0.93	0.75	3
SPECIES						
Eastern Asia-eastern North America	306	0.42	—	—	0.32	1
Eastern Asia-western North America	494	0.40	—	—	0.42	5
Eastern Asia-Europe	369	0.53	—	—	0.40	4
Western-eastern North America	514	0.61	—	—	0.53	6
Europe-eastern North America	302	0.56	—	—	0.41	3
Europe-western North America	315	0.41	—	—	0.34	2

Notes: Sc—correlation coefficients; Sr—product-moment correlation coefficients (calculated by genus number); Sr'—product-moment correlation coefficients (calculated by species number); Ss—Sorensen's coefficients. Rank: similarity degree increases from 1 to 6.

Genus

About 40% of the total or 186 genera were shared by all boreal regions. Eastern Asia shared 73 additional genera with western North America and 72 additional genera with Europe, but only 41 additional genera with eastern North America. All similarity indices between eastern Asia and eastern North America showed the lowest

values. Apparently, the entire floras in eastern Asia and eastern North America do not show closer genus relationship than other flora-pairs in the boreal zone. However, tree flora present higher similarity in eastern Asia and eastern North America (15 genera in common) than either eastern Asia and western North America (10 genera in common) or western and eastern North America (12 genera) but not than Europe and eastern North America (16) and eastern Asia and Europe (15). Thus, the genus data in the boreal zone do not support any postulate of Gray's hypothesis.

Species

Two hundred and forty-seven species or 10.5% of the total were shared by all boreal regions. Western and eastern North America share 514 species, followed by eastern Asia and western North America (494 species in total), eastern Asia and Europe (369 species in total), Europe and western North America (315 species), eastern Asia and eastern North America (306 species in total), and Europe and eastern North America (302 species). Also, similarity indices for eastern Asia and eastern North America show the smallest values in the boreal zone. Thus, eastern Asia and eastern North America have less species similarity in the boreal regions.

In a nutshell, floras in eastern Asia and eastern North America display the lowest genus and species similarities and only medium family similarity in all boreal region-pairs (**Figure 3.1**). Therefore, the boreal data at any level of family, genus, or species fail to support Gray's hypothesis. Furthermore, boreal floristic similarity decreases from family level through genus to species level for eastern Asia and eastern North America while increasing for other region-pairs. Thus, Gray's hypothesis for boreal flora is rejected at all levels of family, genus, and species.

FIGURE 3.1. Floristic similarities of four boreal regions.

3.3. Temperate Floras

Family

Totally, 6,884 species of native seed plants belonging to 155 families and 1,153 genera have been identified in the temperate forest regions of eastern Asia, Japan, western and eastern North America (Table 3.4). Ninety-one families or 58.7% of all floras are common to all four temperate regions of eastern Asia, Japan, western and eastern North America. Eastern Asia and eastern North America shared more families (111) than either eastern Asia and western North America (97) or eastern and western North America (101) (Table 3.5). This result supports postulates 1 and 2 of Gray's hypothesis. There are no data available to examine postulates 3 and 4 of the hypothesis. Thus, Gray's hypothesis at the family level in the temperate zone cannot be rejected based the current data.

TABLE 3.4. Taxonomic richness (number) of the seed plants in the temperate regions.

	Eastern Asia	Japan	Western North America	Eastern North America	Total
FAMILY					
Total	125	127	106	133	155
GENUS					
Trees	30	36	23	42	61
Shrubs	74	81	54	77	149
Lianas	10	10	2	5	20
Herbs	541	446	577	482	927
Total	651	569	652	605	1153
SPECIES					
Trees	65	58	50	95	229
Shrubs	228	185	235	273	766
Lianas	13	17	9	10	43
Herbs	1738	1190	2872	1521	5846
Total	2044	1450	3163	1899	6884

Genus

Two hundred and sixty-six genera are common to all temperate regions, and 223 genera, or 83.8%, are herbaceous. Most are also commonly found in the boreal regions. Eastern Asia and eastern North America shared slightly more genera (353) than eastern Asia and western North America (340). The similarity indices support this result. Thus, the data support postulate 2 of Gray's hypothesis. But eastern Asia and eastern North America shared much less genera than western and eastern North America (400 genera). This result does not support postulate 1 of Gray's hypothesis.

TABLE 3.5. Floristic similarities of four temperate regions based on numbers of common taxa and calculated similarity indices.

Region	Common Taxa	Sc	Sr	Sr'	Ss	Rank
FAMILY						
Eastern Asia-eastern North America	111	0.59	0.98	0.97	0.86	3
Eastern Asia-western North America	97	0.70	0.96	0.96	0.84	5
Western-eastern North America	101	0.70	0.96	0.94	0.85	4
Eastern Asia-Japan	116	0.79	0.99	0.96	0.92	1
Japan-eastern North America	110	0.53	0.98	0.99	0.85	2
Japan-western North America	94	0.63	0.94	0.91	0.81	6
GENUS						
Eastern Asia-eastern North America	353	0.50	—	0.84	0.56	4
Eastern Asia-western North America	340	0.45	—	0.84	0.52	5
Western-eastern North America	400	0.60	—	0.86	0.63	2
Eastern Asia-Japan	504	0.82	—	0.91	0.83	1
Japan-eastern North America	335	0.56	—	0.93	0.57	3
Japan-western North America	313	0.49	—	0.84	0.51	6
SPECIES						
Eastern Asia-eastern North America	177	0.36	—	—	0.09	6
Eastern Asia-western North America	240	0.28	—	—	0.09	3
Western-eastern North America	591	0.40	—	—	0.23	2
Eastern Asia-Japan	757	0.63	—	—	0.43	1
Japan-eastern North America	167	0.40	—	—	0.10	5
Japan-western North America	227	0.35	—	—	0.10	4

Notes: Sc—correlation coefficients; Sr—product—moment correlation coefficients (calculated by genus number); Sr'—product—moment correlation coefficients (calculated by species number); Ss—Sorensen's coefficients. Rank: similarity degree increases from 1 to 6.

Trees display a similar pattern and show that eastern Asia shared slightly more tree genera with eastern North America (24 genera) than western North America (17 genera).

Species

Only 152 species, 2.2% of the total are shared by three temperate regions, and all of them are herbaceous plants or shrubs. In addition, 439 species are common to western and eastern North America. However, only 25 additional species are shared by eastern Asia and eastern North America so that these two areas represent the smallest species similarity in the temperate zone. Therefore, the data at the species level in the temperate zone fail to support Gray's hypothesis. This result is same as in the boreal region. Herbaceous plants show the same pattern as the entire flora. There is no common tree species between eastern Asia and North America, while 10 tree species are shared by western and eastern North America.

The evolutionary trends of taxonomic similarity in the temperate zone are similar to those boreal zone. Eastern Asia and eastern North America display decreasing similarities from family level to species level, while both eastern Asia and western North America and western and eastern North America display increasing trends from the family level to species level (**Figure 3.2**). The former pattern indicates that eastern Asian and eastern North American taxonomic similarity is decreasing with time. However, the latter pattern indicates that both western and eastern North American taxonomic similarity and eastern Asian and western North American taxonomic similarity are increasing with time.

3.4. Entire Floras

Current statistics on the entire floras of the Northern Hemisphere are incomplete, and overall floristic comparisons among these larger biogeographic regions are not possible at this time. But the distribution pattern of taxa of the eastern Asian flora provides a clue to these floristic relationships.

FIGURE 3.2. Floristic similarities of four temperate regions.

Taxonomic richness in eastern Asia is distinctly greater than that in North America (Table 3.6). Two hundred and thirty-three families of seed plants were present in eastern Asia representing 11 geographic distribution patterns (Table 3.7). Two hundred and three families were in North America and represented 10 geographic distribution patterns. Of these families, 173 are common to both regions, and almost all of these 173 families are available in eastern North America. Sixty families occur in eastern Asia but not in North America, and 30 occur in North America but not in eastern Asia. Eastern Asia and North America shared more families relative to eastern Asia and Europe (110) and Europe and North America (97). Thus, eastern Asia and eastern North America have higher family similarity. The families with restricted distribution display a similar result. Seven families are restricted to eastern Asia and eastern North America, five families are restricted to Europe and eastern North America, but only three are restricted to Europe and eastern Asia.

TABLE 3.6. Comparison of taxon richness of native vascular plants of eastern Asia and North America.

	Eastern Asia *	North America **	World ***
FAMILY			
Ferns	52	15	65
Gymnosperms	10	5	11
Angiosperms	223	198	542
Total	285	218	620
GENUS			
Ferns	204	60	443
Gymnosperms	35	19	58
Angiosperms	2637	2261	12500
Total	2876	2340	13001
SPECIES			
Ferns	2300	341	11820
Gymnosperms	180	118	670
Angiosperms	23000	15827	225000
Total	25480	16285	237490

Notes: * from Li (unpublished, 1988); ** based on checklist of D. E. Moerman (Nancy Morin, per. comm.); *** from Wu and Wang (1983).

Of the total 175 families shared by eastern Asia and eastern North America, 79 families or 45.1% are of a tropical nature, 66 families or 37.7% are cosmopolitan, and only 30 families or 17.1% are restricted to the temperate zone. But very few of the families shared by either Europe and North America, or eastern Asia and Europe, are of tropical nature. Thus, the impact of the tropical feature on the family relationship between eastern Asia and eastern North America is apparent and strong.

TABLE 3.7. A classification of the major distribution types and distribution type spectrum of the seed plant families in the floras of eastern Asia and North America.

Distribution Type	Eastern Asia		North America	
	Number	%	Number	%
Cosmopolitan	66	28.3	66	32.5
Pantropical	82	35.2	63	31.0
Tropical Asia and Tropical America	10	4.3	10	4.9
Eastern Asia and North America	7	3.0	7	3.5
North and South Temperate	8	3.4	8	4.0
North Temperate	19	8.2	19	9.4
Old World Tropical	11	4.7		
Old World Temperate	3	1.3		
New World Tropical			10	4.9
Tropical Asia and Tropical Australia	4	1.7		
Tropical America and Tropical Africa			9	4.4
Tropical Asia	10	4.3		
America and Europe			4	2.0
Eastern Asia	13	5.6		
North America			7	3.4
Total	233	100.0	203	100.0

Note: For definitions of distribution type, see Good (1974).

Cosmopolitan Families

Some families, mainly mesophytes and aquatics, are so widespread that they can be classified as cosmopolitan. Sixty-six cosmopolitan and subcosmopolitan families are found in the forests of eastern Asia and North America. The 33 largest families (**Table 3.8**) dominate the world flora of seed plants (50.8% of the total genera and 58.2% of the total species) as the largest families in the world; in extent of range, they cover the major portions of the world. They are mainly

TABLE 3.8. Major cosmopolitan and subcosmopolitan families in the floras of eastern Asia and North America.

Family	Genus			Species		
	Eastern Asia	North America	World	Eastern Asia	North America	World
Asteraceae	227	296	1000	2323	2233	25000
Poaceae	228	200	620	1202	1478	10000
Fabaceae	172	118	650	1181	1224	18000
Orchidaceae	159	26	735	1000	116	17000
Rosaceae	60	59	124	1000	579	3300
Lamiaceae	94	56	180	793	320	3500
Ericaceae	21	19	60	758	55	2250
Ranunculaceae	42	24	51	736	294	2000
Scrophulariaceae	60	66	220	634	632	3500
Cyperaceae	31	27	90	668	718	4000
Apiaceae	90	79	275	540	319	2850
Primulaceae	13	11	22	550	79	1000
Rubiaceae	75	33	500	477	145	6000
Brassicaceae	102	85	375	443	511	3200
Liliaceae	60	58	250	560	391	3700
Euphorbiaceae	63	33	317	345	264	5000
Caryophyllaceae	29	35	66	316	288	1654
Gentianaceae	22	14	80	440	89	1000
Crassulaceae	12	13	35	262	85	1500
Saxifragaceae	11	34	80	249	261	1250
Urticaceae	20	6	45	223	17	1060
Polygonaceae	11	20	40	210	413	800
Boraginaceae	51	33	100	280	304	2000
Celastraceae	31	11	55	202	28	850
Oleaceae	14	9	29	188	50	600
Verbenaceae	22	16	80	180	90	3000
Rhamnaceae	15	12	58	160	81	900
Campanulaceae	16	19	70	170	110	2000
Convolvulaceae	22	19	56	130	125	1800
Malvaceae	16	32	75	85	213	1000
Onagraceae	6	20	21	100	248	640
Fagaceae	5	5	8	210	61	930
Cupressaceae	6	7	8	30	35	97
TOTAL	1806	1495	6373	16645	11856	131381

Many sources.

herbaceous, and only few families contain woody plants. These 33 families consist 67.6% and 71.8% of the total seed plants in genus and species respectively in eastern Asia, and account for 65.6% and 74.4%, respectively in North America. Most families, with few exceptions, have higher genus and species diversities in eastern Asia than in North America (totally 1.2 and 1.4 times in genus and species diversities, respectively). Therefore, evidently, these major cosmopolitan and subcosmopolitan families greatly contribute to the genus and species diversity anomalies and similarities between eastern Asia and North America.

Asteraceae (Compositae), Poaceae, and Fabaceae, the three largest families of the world, are still the largest ones in either eastern Asia or North America, and each one has more than one hundred genera and one thousand species (see Table 3.8). Unlike most other cosmopolitan families, these three largest families have more or similar species diversities in North America than in eastern Asia. Asteraceae is almost everywhere in both eastern Asia and North America, but rarely forms dominant communities, and the members frequently serve as major forest elements. Poaceae is a chiefly herbaceous family, its members not only reach to the furthest land north and to the borders of Antarctica in the south, but the degree of distribution is usually complete and continuous. The plants of this family are found nearly everywhere. They are more frequent in the open places than in the closed forest. The woody members of Poaceae, sometimes known as "Bambusaceae", comprise about 50 genera and more than 500 species spread throughout the warmer world, but there are no native species in Europe, southwestern Asia, and North Africa. Eastern Asia is rich in bamboo, and more than 30 genera and 250 species have been identified, and most of them dominate the subtropical region in vast areas of bamboo forests. In North America, few species such as *Arundinaria gigantea* are found in the subtropical or warm-temperate forests. Fabaceae, another ubiquitous family contains many forest herbaceous plants and some undergrowth woody plants such as *Sophora*, *Gleditsia*, *Cercis*, *Erythrina*, *Robinia*, *Amorpha*, and *Lespedeza* in eastern Asia and North America. The species of this

family play important roles in nitrogen-fixing and pioneer afforestation in arid and semiarid areas, and some of them are precious medicinal plants and rare wild gene sources for vegetables and crops.

Orchidaceae is another remarkably widespread and economically important family. This family has remarkably greater taxonomic diversity (160 genera and 1,000 species) in eastern Asia than North America (26 genera and 116 species). Most members of Orchidaceae are forest elements particularly in the tropical and subtropical regions, and their infinite variety of fantastic flowers makes the forest colorful.

Rosaceae is predominantly temperate, and it has 60 genera and 1,000 species in eastern Asia and 59 genera and 579 species in North America. The family contains an appreciable number of woody plants (*Crataegus*, *Malus*, *Photinia*, *Prunus*, *Rubus*, and *Sorbus*) common in eastern Asia and North America. These shrubs or small trees are important fruit resource plants and are widely distributed in the boreal, temperate, and warm-temperate zones, and in the mountains of subtropical areas.

Fagaceae contains eight genera and 930 species (Cronquist 1988) throughout the world except South Africa. In eastern Asia, its native five genera and 210 species often dominate the deciduous and evergreen hardwoods from the temperate to the subtropical region. In North America especially in the east, this family has five genera and 61 species and constitutes the dominant canopy of extensive deciduous hardwood forests.

The woody Ericaceae is economically important in both the flower and fragrance industries. This family comprises 21 genera and 758 species in eastern Asia, but only 19 genera and 55 species in North America. *Rhododendron*, the largest genus of this family, is well developed in China particularly in the mountains of Southwest China, which is considered to be the distribution and evolution center of this genus (Wu and Wang 1983).

Oleaceae, Celastraceae, and Rhamnaceae comprise mainly shrubs. The former two are chiefly temperate while Rhamnaceae is primarily tropical. Generally, these families are present in forests as

non-dominant elements except for the genus *Fraxinus* of Oleaceae. Cupressaceae of the gymnosperms shows a more cosmopolitan distribution pattern. Six genera and 30 species of trees and shrubs are widely distributed in eastern Asia, while about seven genera and 35 species are found in North America.

Euphorbiaceae, an essentially tropical family, is economically important in forests. In China, *Sapium*, *Vernicia*, *Hevea*, and other important trees occur mainly in the southern region of the Yangtze River. There are probably no native trees of Euphorbiaceae in North America, however, the shrubs *Drypetes*, *Gymnanthes*, *Hippomane*, and *Sebastiania* are native.

Totally, 58 cosmopolitan herbaceous families are found both in eastern Asia and in North America (**Tables 3.7, 3.9**). Many of these are aquatic, and some species are common to the two regions. Ranunculaceae is a typical herbaceous family. Genus and species diversities in eastern Asia are about twice those of North America. Many genera and species are endemic to eastern Asia, although some are common to both regions. Cyperaceae, another typical large herbaceous family has slightly more genera but fewer species in eastern Asia than North America. The members of this family are important elements of total forest and wetland vegetation. Scrophulariaceae is a predominant herbaceous family in both eastern Asia and North America, but the fast-growing timber tree genus *Paulownia* is also native to subtropical eastern Asia. The family has similar taxonomic diversities in eastern Asia and North America.

TABLE 3.9. Other cosmopolitan herbaceous families except those presented in the table 3.8.

Family	Family
Alismataceae	Menyanthaceae
Butomaceae	Najadaceae
Callitricaceae	Nymphaeaceae
Cerotophyllaceae	Onagraceae
Chenopodiaceae	Oxalidaceae
Clusiaceae (Guttiferac)	Plantaginaceae
Cuscutaceae	Plumbaginaceae
Droseraceae	Polygalaceae
Elatinaceae	Portulacaceae
Geraniaceae	Pottogetonaceae
Haloragaceae	Santalaceae
Iridaceae	Solanaceae
Juncaceae	Thymelaceae
Lemnaceae	Typhaceae
Lentibulariaceae	Violaceae
Linaceae	Viscaceae
Loranthaceae	Zannichelliaceae
Lythraceae	

Pantropical Families

Pantropical families refer to those found in all tropical regions (the Americas, Africa–Madagascar, Asia, and Australia) (**Table 3.10**). 82 pantropical families are known in the forests of eastern Asia. Most reach to the subtropical region and even to the temperate regions, and only six families (Connaraceae, Gnetaceae, Myristicaceae, Ochnaceae, Olacaceae, and Opiliaceae) are restricted to the tropical region. Sixty-three pantropical families are known in North America. For the 15 larger pantropical families, eastern Asia has 365 genera (13.7% of total genera in eastern Asia) and 2750 species (11.9% of the total species in eastern Asia), which are 2.77 and 5.84 times of those in North America, respectively (**Table 3.11**). Therefore, the tropical feature is more significant in eastern Asian than North American flora.

TABLE 3.10. Pantropical families in eastern Asia and North America.

Woody (or mainly woody) Families		Herbaceous (or mainly herbaceous) Families
Acanthaceae	Myrsinaceae	Agavaceae
Aizoaceae	Ochnaceae	Amaranthaceae
Alangiaceae	Olacaceae	Amaryllidaceae
Anacardiaceae	Opiliaceae	Araceae
Annonaceae	Piperaceae	Aristolochiaceae
Apocynaceae	Rhizophoraceae	Asclepidaceae
Aquifoliaceae	Rutaceae	Bataceae
Araliaceae	Sapindaceae	Balsaminaceae
Arecaceae (Palmae)	Sapotaceae	Begoniaceae
Bignoniaceae	Sterculiaceae	Buddlejaceae
Bombaceae	Theaceae	Burmanniaceae
Burseraceae	Tiliaceae	Capparaceae
Buxaceae	Ulmaceae	Chrysobalanaceae
Combretaceae	Vitaceae	Cochlospermaceae
Commelinaceae		Cucurbitaceae
Connaraceae		Dioscoreaceae
Cycadaceae		Eriocaulaceae
Dilleniaceae		Gesneriaceae
Ebenaceae		Hippocrateaceae
Elacocarpaceae		Hydrocharitaceae
Erythroxylaceae		Hydrophyllaceae
Flacourtiaceae		Hypoxidaceae
Gnetaceae		Iridaceae
Grossulariaceae		Menispermaceae
Hamamelidaceae		Molluginaceae
Lauraceae		Nyctaginaceae
Loganiaceae		Passifloraceae
Malpighiaceae		Phytolaceae
Melastomaceae		Podostemaceae
Meliaceae		Pontederiaceae
Moraceae		Rafflesiaceae
Musaceae		Simaroubaceae
Myristicaceae		Xyridaceae
Myrtaceae		Zingiberaceae

TABLE 3.11. Major pantropical families in eastern Asia and North America.

Family	Genus			Species		
	Eastern Asia	North America	World	Eastern Asia	North America	World
Acanthaceae	52	19	250	146	66	2500
Apocynaceae	43	15	180	169	35	1500
Aquifoliaceae	1	2	2	168	17	400
Araceae	28	13	115	194	16	2000
Araliaceae	22	4	55	177	10	700
Asclepidaceae	36	10	130	231	97	2000
Cucurbitaceae	29	21	110	141	47	640
Gesneriaceae	37	5	120	231	63	2000
Lauraceae	20	9	32	422	12	2500
Melastomaceae	25	2	244	134	10	3360
Moraceae	17	7	53	159	19	1400
Myrsinaceae	6	3	35	129	4	1000
Rutaceae	24	15	150	145	37	900
Theaceae	18	3	24	195	4	700
Vitaceae	7	4	12	109	34	700
Total	365	132	1512	2750	471	22300

Many sources.

This pantropical distribution type consists of 48 woody families or families dominated by woody plants (**Table 3.10**). These families are important elements of the tropical and subtropical forests in eastern Asia, many members are constructive species of forests. Some genera of these 48 families are often distributed in the temperate regions. For example, *Acanthopanax*, *Aralia*, *Kalopanax*, and *Panax* and five species of Araliaceae occur in the temperate mixed forest in the northeastern portion of eastern Asia. They are very important medicinal plants in eastern Asia. Tiliaceae,

containing 50 genera, is distributed in the tropical and temperate regions, chiefly in southeastern Asia and Brazil. *Tilia* (50 species) is widely found in the Northern temperate regions as the important hardwood species of the temperate mixed forests, eastern Asian and North American species numbers are not definite because of great differences in taxonomic treatment; another woody genus *Grewia* is also distributed in the northeastern eastern Asia. Other families such as Moraceae, Anacardiaceae, Sapindaceae, and Ebenaceae contain a majority of temperate members. However, Rhizophoraceae and Aizoaceae are important elements of the mangroves in the tropical coasts especially in eastern Asia.

Some pantropical herbaceous families are elements of tropical and subtropical forests or wetlands. Of these, Hypoxidaceae, Pontederiaceae, and Xyridaceae can extend north to Canada and south to New Zealand. Agavaceae reaches between 40–45°N in North America and most parts of Japan, but not to Australia and New Zealand, while Rafflesiaceae is absent from parts of Malaysia and Australia.

Tropical Asian and Tropical American Families

Of 10 families, eight are primarily restricted to both Asia and America: Basellaceae, Chloranthaceae, Clethraceae, Magnoliaceae, Meliosmaceae, Staphyleaceae, Symplocaceae, and Taxaceae. Most of these are predominantly found in the tropics. These families contain many genera and species with disjunct distributions between eastern Asia and North America, but they generally have more members in Asia than in America. Magnoliaceae, containing 12 genera, include 10 genera in eastern Asia, and only two genera are found in North America. Symplocaceae includes two genera and 500 species in the world. One genus and 125 species are known in eastern Asia with most of them occurring in tropical and subtropical forests. In the Meliosmaceae, one species *Meliosma alba* is well known for its disjunct distribution between eastern Asia and North America. Clethraceae are distributed in eastern North America and tropical

America, Madeira, eastern Asia reaching to New Guinea, and about 15 species of *Clethra* grow in subtropical and tropical China.

Of the other two families, Leonticaceae occurs mainly in Eurasia and eastern North America and has few species in eastern Asia. Styracaceae have both American and Eurasian distribution.

Eastern Asian and North American Families

In eastern Asia, seven families have disjunct distribution between eastern Asia and North America, namely, Calycanthaceae, Nyssaceae, Penthoraceae, Phrymaceae, Saururaceae, Stemonaceae, and Taxodiaceae. Saururaceae contain four genera and six species scattered in eastern Asia and North America. In these two areas, there are genus- and species-pairs of this family; *Houttuynia* (one species) in eastern Asia corresponds to *Anemiopsis* (one species); *Saururus chinensis* (Lour.) Baill. in eastern Asia corresponds to *S. cernua* in North America. *S. chinensis* predominates in China and reaches to Viet Nam and the Philippines. The family Saururaceae is believed to have a tropical source in the Tertiary (Wu and Wang 1957, Wu and Wang 1983). Nyssaceae contains two genera and 12 species. Four species of *Nyssa* are distributed in eastern North America and Mexico, and six other species occur in eastern Asia, reaching to Java and Sumatra. Another genus *Camptotheca* is native to China and found predominantly along the streams south of the Yangtze River (Ying et al. 1993). It contains only three species *C. acuminata* Decaisne, *C. yunnanensis* Dode, and *C. lowreyana* Li as the promising anti-tumor and anti-viral trees (Li and Adair 1994c, Li 1997, Li, et al. in press). Penthoraceae, a monotypic family, has only one genus *Penthorum* and one species *P. sedoides* Pursh, which disjuncts between eastern Asia, reaching to Indochina (subsp. *chinense*), and North America (subsp. *sedoides*) (Li and Adair 1994a). Another monotypic family, Phrymaceae. Its only species, *Phryma leptostachya* L. is found from the Himalayas to Japan in eastern Asia and eastern North America. Calycanthaceae consist of two genera in eastern Asia and North America.

North and South Temperate Families

Eight families have disjunct or continuous distribution between the north and the south temperate regions. Empetraceae is disjunct between the north temperate and South America and Tristanda Cunha; only one species is found in the high mountains of northeastern Asia. Species of Frankeniaceae are with disjunct distribution among North America, western Eurasia, Africa, South America, Australia, and Tasmania. Only one species is present in eastern Asia. Valeriaceae has distribution in the north temperate zone and ranges from North to South in America; South Africa and parts of Malaysia. In eastern Asia, this family is concentrated chiefly in the subtropical regions. Cornaceae and Myricaceae are widely distributed in both the temperate and subtropical regions.

Herbaceous Fumariaceae extends south in both parts of the old world but not in the new, and covers all Africa as well as parts of tropical Asia (Good 1974). Members of this family are scattered in eastern Asia. Other families with this distribution are Juncaginaceae, and Sparganiaceae.

North Temperate Families

Nineteen predominantly north temperate zone families are known in eastern Asia and North America, namely, Aceraceae, Adoxaceae, Berberidaceae, Betulaceae, Cannabaceae, Caprifoliaceae, Diapensiaceae, Elaeagnaceae, Hippocastanaceae, Hippuridaceae, Juglandaceae, Monotropaceae, Orobanchaceae, Papaveraceae, Pinaceae, Polemoniaceae, Pyrolaceae, Salicaceae, and Scheuchzeriaceae (**Table 3.12**). Usually, these families have slightly more genera, but species diversities in eastern Asia are almost twice those in North America.

TABLE 3.12. The larger north temperate families in the forest flora of eastern Asia and North America.

Family	Genus			Species		
	Eastern Asia	North America	World	Eastern Asia	North America	World
Aceraceae	2	1	3	140	19	220
Adoxaceae	3	2	3	20	15	60
Berberidaceae	12	7	14	200	29	575
Betulaceae	5	5	5	80	32	150
Caprifoliaceae	12	7	13	207	77	500
Elaeagnaceae	2	2	3	60	8	80
Hippocastanaceae	1	1	2	11	7	20
Hippuridaceae	1	1	1	1	3	3
Juglandaceae	7	3	8	27	30	60
Monotropaceae	1	8	8	2	9	15
Orobanchaceae	9	4	14	40	18	150
Pinaceae	10	6	11	94	40	250
Polemoniaceae	3	15	15	27	237	300
Pyrolaceae	7	4	7	40	12	60
Salicaceae	3	2	3	320	132	620
Scheuchzeriaceae	1	1	1	1	1	1
Total	79	69	111	1270	669	3064

Many sources.

Of these, Aceraceae, Betulaceae, Caprifoliaceae, Pinaceae, and Salicaceae, are woody families widespread throughout the north temperate zone. Aceraceae and Pinaceae reach into the tropical mountains in the Northern Hemisphere, and Betulaceae, Caprifoliaceae, and Salicaceae occur in South America and/or Africa on a smaller scale. Of three genera and 220 species of Aceraceae, two genera and 140 species have been recorded in eastern Asia. These tree species are largely distributed in the mountains of the

subtropical regions. Betulaceae often serves as a constituent of the temperate deciduous forests from the boreal region to the high mountains of Southwest China. Its five genera and 80 species are found in eastern Asia, and all these genera, but only 32 species, occur in North America. Pinaceae is one of the most important forest families in the Northern Hemisphere. It has 10 genera and 94 species in eastern Asia and six genera and 40 species in North America. Salicaceae, common in the north temperate zone, reach to the south in America and Africa, but are absent from much of Malaysia and Australia. Eastern Asia is one of the concentration areas for this family. All three genera and 50 percent of the species are found in this region. But only two genera and 132 species are distributed in North America.

Elaeagnaceae is mainly distributed in the Northern Hemisphere, but also extends to Australia. Asian members occur mainly in the western region and the mountains of Southwest China. This family has two genera and 80 species in eastern Asia and only eight species of the two genera in North America. Juglandaceae is principally a north temperate and subtropical family, but some species extend south in both America and Malaysia. In eastern Asia, the total seven genera and 27 species of this family are found predominantly in the subtropical regions, only two species exist in the temperate zone. The family has fewer genera (3) but more species (30) in North America. Berberidaceae, a family including 14 genera and about 575 species of woody and herbaceous plants in the world, also extends far to the south in America and across the equator in both Africa and Asia (Good 1974). Hippocastanaceae contains two genera and 15 species of trees or large shrubs. *Aesculus* is confined to the north temperate region (one species in Southeast Europe, five in India and eastern Asia, and seven in North America). The species of *Billia* are native in Central and South America (Cronquist 1988).

Adoxaceae is a small typical northern temperate family, with three genera and 30 species (see **Table 3.12**). However, it contains woody and herbaceous plants. The herbaceous group including *Adoxa* and *Sinadoxa* has circum north-temperate distribution with five species, and both genera and four species are known in eastern

Asia (Li and Ning 1987). *Adoxa* subgenus *Tetradoxa* (*A. omeiensis* Hara) is restricted to wet sites of the Omei Mountains in Sichuan, China. *Sinadoxa*, a new genus discovered by Wu in 1981 has changed the monotypic feature of this well known monotypic family, is endemic to the high mountains of Qinghai (Wu et al. 1981). The woody group containing only *Sambucus* is widely distributed in the northern temperate region and similar areas in the Southern Hemisphere.

Other families are almost all north temperate families. Polemoniaceae, chiefly distributed in North America, contains a few species in South America, Europe, and northern Asia. This family contains three genera and seven species in eastern Asia and is widely distributed. Orobanchaceae is virtually absent south of the tropical zone, however, as parastic plants, the members of this family are widely scattered in eastern Asia. Papaveraceae is chiefly a north temperate family, but some members reach to the Andes, South Africa, and Australia. The Asian members are distributed mainly in western and southwestern China.

Old World Tropical Families

Eleven families with distribution in Asia, Africa, and Australia, and the Pacific islands are found in the forests of eastern Asia.

The families with typical distribution include Alangiaceae, Lecythidaceae, Leeaceae, Pandanaceae, Pittosporaceae, Podocarpaceae, Sonneratiaceae, and Trapaceae. Generally, they display fewer genera and not many species in eastern Asia and are primarily restricted to tropical and subtropical regions. The members of Dipterocarpaceae and Pandanaceae often serve as the important elements of tropical forests. Sonneratiaceae are elements of mangroves along tropical coasts. Lardizabalaceae is distributed in eastern Asia and Chile. In eastern Asia it mainly occurs in the subtropical regions.

Three other families (Ancistrocladaceae, Pandaceae, and Salvadoraceae) are distributed in tropical Asia and tropical Africa,

but do not occur in Australia. These families are monotypic and grow in the tropical forest of eastern Asia.

Old World Temperate Families

Dipsaceae, Hydrocaryaceae, and Tmaricaceae are largely distributed in the temperate regions of the Old World.

New World Tropical Families

Ten families in North America have tropical distributions (**Table 3.13**). These families have 34 genera and 206 species in North America. Of these, Cactaceae is chiefly distributed in the semi-desert regions of tropical and subtropical America.

TABLE 3.13. New World tropical families in North America.

Family	Genus		Species	
	North America	World	North America	World
Achatocarpaceae	1	1	1	10
Bixaceae	1	1	1	4
Cactaceae	22	130	180	1650
Calyceraceae	1	1	1	35
Cannaceae	1	1	3	55
Cyrillaceae	2	2	4	13
Krameriaceae	1	1	5	25
Sarraceniaceae	2	3	9	15
Theophrastaceae	1	1	1	100
Tropaeolaceae	1	1	1	2
Total	34	142	206	1909

Many sources.

Tropical Asian and Tropical Australian Families

Four families, Cardiopteridaceae, Cycadaceae, Myoporaceae, and Xanthophyllaceae with tropical Asian and tropical Australian distribution are found in eastern Asian forests. Most of them are small in total number of species. For example, Myoporaceae present in tropical Asia Australia, Mascarenes, South Africa, and West Indies, has only one species in the tropical regions of China.

Tropical American and Tropical African Families

Ten families are principally tropical African, but are found in North America (**Table 3.14**). Aponogetonaceae, Cannellaceae, and Turneraceae are also found in Madagascar; while Loasaceae and Mayacaceae are not distributed in Madagascar; Bromeliaceae and Marantaceae are chiefly found in tropical America and the West Indies. A few members are distributed in Tropical Africa. Goodeniaceae are chiefly confined to Australia, however, a few reach tropical Africa and America. One species, *Scaevola plumieri*, is common to Florida and tropical Africa; Haemodoraceae are also found in New Guinea and Tasmania.

Tropical Asian Families

Of the tropical Asian families, seven members are known in the forests of eastern Asia, Actinidiaceae, Crypteroniaceae, Daphniphyllaceae, Lowiaceae, Pentaphragmataceae, Rhodoleiaceae, and Tetramelaceae. Most families represent small taxonomic diversity in eastern Asia and mainly grow in subtropical and tropical forests. For example, *Pentaphylax* and *Bischofia* are the constructive trees of the evergreen forests in the mountains, while *Arerrhoa*, *Crypteronia*, and *Tetrameles* are important trees of the tropical rain and seasonal forests.

TABLE 3.14. The tropical American and tropical African families in North America.

Family	Genus		Species	
	North America	World	North America	World
Aponogetonaceae	1	1	1	44
Bromeliaceae	5	45	20	2000
Cannellaceae	1	5	2	16
Caricaceae	1	3	1	31
Goodeniaceae	1	14	1	320
Haemodorraceae	3	14	4	75
Loasaceae	5	15	51	260
Marantaceae	2	30	3	400
Mayacaceae	1	1	2	4
Turneraceae	2	10	3	110
Total	22	138	88	3260

Many sources.

American and Western Eurasian Families

Two families Cistaceae and Datisceae, have American and western Eurasian distribution (Table 3.15). Resedaceae and Ephedraceae reach Africa. Cistaceae occurs mainly in the Americas and western Eurasia with only one species (*Helianthemum songoricum* Schrenk) in eastern Asia. It has five genera and 39 species in North America.

Eastern Asian Families

Thirteen families in the forests of eastern Asia are mainly present in the subtropical and tropical regions (Table 3.16). They are largely monotypic woody families with one genus and one (or few) species scattered in subtropical forests. Many families are the relicts of the Cretaceous or early Tertiary, they or ancestral taxa were widely distributed in the world. For example, *Tsukada*, a leaf genus found

in the middle Eocene in Washington, the United States (Wolfe and Wehr 1987) is very close to Davidiaceae.

TABLE 3.15. The American and western Eurasian families in North America.

Family	Genus		Species	
	North America	World	North America	World
Cistaceae	5	7	39	160
Rosedaceae	2	6	5	75
Datisaceae	1	3	1	4
Ephedraceae	1	1	9	30
Total	9	17	54	269

Many sources.

TABLE 3.16. The eastern Asian families.

Family	Genus	Species	Family	Genus	Species
Bretschneideraceae	1	1	Eupteleaceae	1	1
Cephalotaxaceae	1	7	Ginkgoaceae	1	1
Cercidiphyllaceae	1	1	Sargentodoxaceae	1	1
Circaeasteraceae	1	1	Stachyuraceae	1	1
Davidiaceae	1	1	Tetracentraceae	1	1
Dipentodontaceae	1	1	Trochodendraceae	1	1
Eucommiaceae	1	1	Total	13	19

Many sources.

North American Families

Seven families are endemic to North America, namely, Crossosometaceae (1 genus/3 species), Fouquieriaceae (1/1),

Garryaceae (1/10), Leitneriaceae (1/1), Lennoaceae (2/2), Limnanthaceae (2/2), and Simmondsiaceae (1/1, in the west).

3.5. Disjunct Genera and Species

As mentioned above, floras at the family level in the Northern Hemisphere do not exhibit the greatest similarity between eastern Asia and eastern North America. The analysis of geographic distribution of genera provides similar results (**Table 3.17**). Seventy-seven genera are restricted to eastern Asia and eastern North America. However, more genera (155) are restricted to eastern Asia and Europe. This fails to support the statement on close generic similarity between eastern Asia and eastern North America (Li 1952).

TABLE 3.17. A classification of the major distribution types and distribution type spectrum of the seed plant genera in the flora of eastern Asia.

Distribution Type	Number of Genus	% of Total Flora
Cosmopolitan	68	2.6
Pantropical	472	17.7
Tropical Asia and Tropical America	64	2.4
Tropical Asia and Tropical Australia	150	5.6
Eastern Asia and eastern North America	77	2.9
Eastern Asia and western North America	31	1.2
North Temperate	320	12.0
Old World Tropical	158	5.9
Old World Temperate	155	5.8
Tropical Asia	637	23.9
Eastern Asia	450	21.0
Total	2671	100.0

However, it should be mentioned that some taxa have close relationships between eastern Asia and eastern North America. For example, *Penthorum* and *Phryma* each contain only one species restricted to eastern Asia and eastern North America (Table 3.18, Li and Adair 1994). But there are still 31 genera with disjunct distribution between eastern Asia and western North America (e.g., *Pseudotsuga*, *Hyderia*, *Heterocodon*, *Therorhodon*, *Phyllospadix*, *Boschniakia*, *Alchlys*, *Kelloggia*, *Orthocarpus*, and *Glehnia*). Also, there are some extant genus-pairs and species-pairs between eastern Asia and western North America. Moreover, some taxa have close relationships between subtropical or tropical eastern Asia and northern Mexico. But these similarities have rarely been published because a careful floristic comparison has never been made between these two areas.

TABLE 3.18. Disjunct species in eastern Asia and North America.

Species	Eastern Asia	Western North America	Eastern North America
<i>Brachyelytrum erectum</i>	var. <i>japonicum</i>		var. <i>erectum</i>
<i>Caulophyllum thalictroides</i>	var. <i>robustum</i>		var. <i>thalictroides</i>
<i>Chamaerhodos erecta</i>	ssp. <i>erecta</i>	ssp. <i>nuttallii</i>	
<i>Diphylleia cymosa</i>	var. <i>grayi</i>		var. <i>cymosa</i>
<i>Glehnia littoralis</i>	ssp. <i>littoralis</i>	ssp. <i>leiocarpa</i>	
<i>Mitchella repens</i>	ssp. <i>undulata</i>		ssp. <i>repens</i>
<i>Mitella nuda</i>	<i>nuda</i>	<i>nuda</i>	<i>nuda</i>
<i>Onoclea sensibilis</i>	var. <i>interrupta</i>		var. <i>sensibilis</i>
<i>Penthorum sedoides</i>	ssp. <i>chinense</i>		ssp. <i>sedoides</i>
<i>Phryma leptostachya</i>	var. <i>asiatica</i>		var. <i>leptostachya</i>
<i>Symplocarpus foetidus</i>	var. <i>latissimus</i>		var. <i>foetidus</i>
<i>Trautvetteria caroliniensis</i>	var. <i>japonicum</i>		var. <i>caroliniensis</i>

3.6. Origin of Floristic Similarity Patterns

Of 152 species common to the temperate regions of eastern Asia, western and eastern North America, 133 species or 87.5% are herbaceous plants. Of these intercontinental herbs, annuals make up 17.3% (23 species), which is characteristically higher than in any of the study areas [i.e., eastern Asia (12.5%); western North America (16.5%); and eastern North America (11.7%)]. One hundred and ten species are perennials and biennials, of which 75.5% (or 83 species) have rhizomes, bulbs or stolons and the rest have either small seeds or propagules suitable for bird or animal dispersal. This finding is consistent with Li's (1952) conclusion: intercontinental disjunct herbaceous taxa tend to be rhizomatous or tuberous. More interestingly, 114 species or 85.7% of the total 133 of the common herbaceous species grow in hydric habitats. Of these hydrophytes, 89 species grow in wet soils adjacent to habitats with standing or flowing water, and 25 species are found in standing or flowing water, which includes floating, suspended, submerged anchored, and floating-leaved anchored plants. Only 30 herbaceous species are found in xeric habitats and 12 species in mesic habitats. Also, most of the total 19 common shrubby species identified in this study grow in either hydric or xeric habitats.

A natural question arises as to why these common species are less numerous in mesic than in hydric and xeric habitats? First, environmental stress in hydric or xeric habitats is greater than in mesic habitats and trees are less able to compete with annuals or perennials with rhizomes, or even with shrubby species, and thus these habitats are relatively devoid of trees. Without a tree canopy, wind-adapted herbaceous and shrubby species can spread widely and become established throughout hydric or xeric habitats. *Epilobium angustifolium* L., *E. glandulosum* Lehm., *E. palustre* L., *Salix scouleriana* Barra, *S. bebbiana* Sarg., and *Hieracium umbellatum* L. are good examples. They produce a large number of small, light seeds and are initial pioneers in open sites. Thus, long distance dispersal by wind is one reason for the more taxa common

in hydric and xeric habitats. Second, of common species in all three temperate regions, berries are the main fruit type of shrubby species and seeds or fruits with propagules are primary in the herbaceous species. These seeds are associated with animal and bird (especially waterfowl) dispersal. The seeds of several shrubby species of *Sambucus*, *Lonicera*, *Rubus*, and *Bryonia* are consumed by birds in the early autumn, whereas *Rosa*, *Prunus*, and *Euonymus* are eaten by birds in the late autumn (Howe 1986). The diaspores of the herbaceous species *Menyanthus trifoliata* L. are dispersed over long distances by a few species of birds especially geese, plus its seeds also have great buoyancy in water and are transported by both normal and flood water flows (Olesen 1987). Species of *Juncus*, *Carex*, *Polygonum*, *Glyceria*, *Cyperus*, and *Alisma* have diaspores present in the mud, which stick to the feet of waterfowl, and thus these hydrophytes have more species in common among the separate temperate regions of the world.

In short, the extant species common to the temperate regions of eastern Asia and western and eastern North America might have attained their present ranges (recent in geologic terms) as a result of long distance dispersal after glaciation. But common genera may have more complicated histories. Some probably originated through long distance dispersal and some might have migrated when eastern Asia was close to western North America. The long distance dispersal of species common to eastern Asia and North America may be through both the Pacific and Atlantic oceans. But there are more species common to eastern Asia and western North America (403 species in the boreal zone and 240 species in the temperate zone) than in eastern Asia and eastern North America (256 species in the boreal zone and 177 species in the temperate zone). Almost all species common in eastern Asia and eastern North America are also found in western North America. This indicates that the relatively recent connections between eastern Asia and eastern North America are probably largely via the Pacific Ocean rather than the Atlantic Ocean. Most families and genera now absent from western North America, but still present in eastern Asia and eastern North America, are recorded in the fossils in the Tertiary or earlier periods

of western North America. This fact indicates that Pacific connections were important for Tertiary exchanges between eastern Asia and North America. Even though the higher similarity at the family level and more common relicts between eastern Asia and eastern North America fail to reject the use of the Atlantic Ocean in floristic exchanges during the Tertiary. In short, Pacific connections seem to be important for both paleofloristic and extant floristic similarities between eastern Asia and western North America, while Atlantic connections seem important only for early floristic exchanges between eastern Asia and eastern North America. This conclusion is consistent with the geological and geographic features in eastern Asia and North America.

3.7. Summary

As in the boreal region, western North America has the highest species diversity (3,161 species, see **Table 3.2**) but the smallest family diversity, while eastern North America has the smallest species diversity and highest family diversity in the biome.

In both boreal and temperate zones as well as the entire flora of the large biogeographical areas of the Northern Hemisphere, there is no substantial evidence at the genus and species levels to support Gray's hypothesis of close floristic relationships between eastern Asia and eastern North America. Floristic similarity between eastern Asia and eastern North America is restricted to the family level and tree flora as a relict pattern of the Tertiary. The main reason is that the related floras of eastern Asia and eastern North America have been evolving in isolation for approximately 47–44 million years since the separation of Europe from North America at the middle Eocene (Raven 1972). In contrast, the floristic affinity is closer between eastern Asia and western North America particularly at the species level. From the family level to the species level, the floristic similarity tends to increase between eastern Asia and western North America due to more recent connections and the decrease between

eastern Asia and eastern North America is due to less recent connections.

The conclusion above is based on overall comparison of floras. Some eastern Asian taxa, however, have their closest relatives in eastern North America. But the relatively recent floristic contact is between eastern Asia and western North America through Pacific Oceans via long distance dispersal.

ECOLOGICAL PATTERNS OF SPECIES POOLS

CHAPTER FOUR

HABITAT SPECIES POOLS

Which habitat supports maximum species richness? This frequently asked question has never been examined in large biogeographical regions although the answer is critical to species diversity conservation. Studies are numerous, but usually restricted to some group of plants (e.g., trees) in a specific region, and more qualitative rather than quantitative work. The common view is that maximum species richness is found in a mesic habitat (Whittaker 1969, Barbour et al. 1980). This statement leads public attention about species diversity conservation to the forests which dominate mesic habitats.

However, our examination of about 10,000 species in the northern portion of Northern Hemisphere shows that maximum richness is primarily found in hydric habitats (**Figure 4.1**) and occasionally in xeric habitats (**Figures 4.2, 4.3, 4.4, 4.5**). These patterns challenge the widely held view of maximum species richness in mesic habitats as mentioned above. However, different strata of plant communities show different species richness distributions, but not the independent patterns as stated by Whittaker (1969). Tree and liana species richness is maximum in the mesic habitats, whereas herbaceous species richness is lowest in the mesic in all studied areas. Shrub species richness does not exhibit any interpretable soil moisture gradient patterns.

Although it does not support maximum species richness, mesic habitats have similar species richness for entire flora from region to region in the same climatic zone (see **Figures 4.2, 4.4**).

FIGURE 4.1. Hydric habitats often have the maximum species richness in the boreal and temperate regions. The picture shows the boreal forest region of Da Xingan Ling Mountains, China. (photo by Xubai Li)

But other habitats support distinctly different species richness from region to region in the same climatic zone. In other words, regional variation of species richness in both boreal and temperate zones is largely determined by both hydric and xeric, rather than mesic, habitat species richness. The results imply that mesic habitats have a priority for species colonization. However, this significant phenomena was often overlooked as mesic habitat was cited for maximum species richness based on partial data.

The variation of species diversity along a habitat gradient, or mesic habitats first phenomena, can be largely explained as the result of chance first and then habitat selection. Trees and giant lianas need more energy and are highly sensitive to increasing stress (e.g., drought, frost, and flood). Stress in hydric or xeric habitats is

FIGURE 4.2. Species number (of entire flora) by habitat and region in the boreal zone.

greater than in the mesic habitats and thus these habitats are relatively devoid of trees. The boreal and temperate forests are largely dominated by conifers, especially evergreen conifers. Evergreen leaf litter decomposes slowly in these areas, and soil conditions can be less favorable in a number of ways than soils supporting deciduous forests. Also, once trees colonize in the mesic habitats, the canopy reduces the seasonal variability of those light conditions on which many herb species depend. However, apparently not all shade-tolerant species favorable to mesic habitats have a chance to migrate into this community. Consequently, herb diversity is low in the mesic habitats. Thus total regional species diversity becomes low because herbs dominate the entire flora.

FIGURE 4.3. Species number by habitat for each stratum of floras in the boreal regions.

FIGURE 4.4. Species number (of entire flora) by habitat and region in the temperate zone.

Another interesting result supports the notion of chance first and habitat selection second. About 131 species (85%) of the total 152 species that are common to the temperate regions of eastern Asia, western and eastern North America are found in hydric habitats. Of these hydrophytes, 106 species grow in wet soils adjacent to habitats with standing or flowing water, and 25 species are found in standing or flowing water, which includes floating, suspended, submerged anchored, and floating-leafed anchored plants. Only 30 species are found in xeric habitats and 12 species in mesic habitats. As mentioned above, long distance dispersal by wind is a main reason for some herbaceous common taxa in hydric habitats, whereas bird and animal migration is the force for many common shrubby species. Both wind and bird/animal dispersals are

FIGURE 4.5. Species number by habitat for each stratum of floras in the temperate regions.

greatly influenced by chance factors. In other words, distribution of common species of seed plants in the northerly regions is not determined primarily by favorable physiological habitats, but largely by chance factors associated with seed and spore dispersal.

It can be argued that plant diversity is a product of genetic variability within the species and that plant diversity is a reflection of that rather than chance. However, without going into great detail, we argue that genetic diversity itself is a product of chance rather than a deterministic selection process. This means that species are a product of the habitat selection process (i.e. chance) and not a product of convergence. In short, the habitat came first and the species reflect chance in the habitat selection process.

CHAPTER FIVE

CONVERGENCE

5.1. Introduction

Convergence has long occupied the interest of scientists. During the middle of the 19th century, European scientists discovered that structurally similar vegetation was found in regions with similar climate, even though the plants were members of distantly related families (Gristebach 1845, Humboldt 1849). This climate-vegetation hypothesis is the foundation of the theory of vegetation convergence which is also important to the general theory of ecology. The establishment of a life form system (Raunkiaer 1934) stimulated research on convergence. Consequently, almost all current ecology texts have paired maps of world climates and vegetation and, at the level of plant life forms, the descriptive aspects of convergence have been well documented (Orians and Solbrig 1977). Recently, increasing efforts have been made to detect, measure, and understand the process of convergent evolution. Ecologists used convergence not only at the community structure level but also in defining ecosystem function (Orians and Solbrig 1977, Stevenson and Wyman 1991, Simeone et al. 1992, Mares 1993). The implications of convergent evolution are not only important to evolutionary and ecological theories, but also in vegetation management. For example, if plant communities converge, managers can identify goals consistent with convergence and work toward them in harmony with, rather than against, nature. Simply, convergence makes it possible to predict future plant communities.

However, several major problems are associated with current investigations of convergence. It is evident that convergence of

individual taxa or communities occurs only when they become more similar than their ancestors under similar and stable environmental conditions (Schluter 1986). But the convergence hypothesis can rarely be tested directly because the ancestral characteristics are usually unknown. Thus, studies usually are cross-sectional in design and emphasize the absolute similarity between two taxa or communities, rather than linear and designed to measure the degree of similarity relative to ancestral states. Indeed, a high degree of similarity may falsely indicate convergence, because similarity can derive from either convergent or parallel evolution (Table 5.1, Figure 5.1). Plant taxa often have gene exchanges with other taxa when possible and display complicated morphological and physiological variation patterns within their geographical distribution. Plant communities are open systems and they usually have biological and physical connections with neighboring communities. However, such connections are often neglected in studies because of a lack of data. Moreover, environmental similarity of the communities being compared is usually assumed rather than measured. There are no quantitative data available on all, or even major environmental elements, of plant individuals or communities being compared. As we know, in fact, physical environment varies temporally and spatially on the earth.

TABLE 5.1. Evolution patterns of plant taxa and communities.

Historical Communities	Present Communities	Evolution Pattern
1. similar	similar	parallel
2. similar	dissimilar	divergent
3. dissimilar	similar	convergent
4. dissimilar	dissimilar	independent

FIGURE 5.1. **Evolution patterns of plant taxa and communities** (A and B represent extant taxa/communities, and A' and B' represent ancestors of A and B, respectively).

Previous studies indicate a striking forest convergence in eastern Asia and eastern North America (Li 1952, White 1983, Ying 1983, Burger and Zhao 1988). However, a systematic analysis is not available due to inadequate data. We compared the structures of forests in all large regions in the Northern Hemisphere especially in the boreal and temperate zones based on data collected from 1984 to 1994. We assume ancestral characteristics of species and communities in eastern Asia and eastern North America were dissimilar. We then tested the convergence hypothesis through relative similarities in current forest structures including species richness, life forms, leaf features, and community richness. Thus, if the observed similarity between regions with similar environment is lower relative to other region-pairs, the community convergence hypothesis can be rejected.

5.2. Species Richness

Current ecological theory predicts that similar environments in different parts of the world, in which biological communities have developed independently, will ultimately support similar number of species (Recher 1969, Cody 1975, Orians and Paine 1983, Ricklefs 1987, Ricklefs and Latham 1992, Latham and Ricklefs 1992). The boreal regions of Europe, western and eastern North America have subarctic climate without a dry season, while eastern Asia has subarctic climate with a dry winter (Akin 1991, **Table 5.2**).

TABLE 5.2. Comparison of the climates in boreal and temperate regions.

Regions	Europe	Eastern Asia	Japan	Western North America	Eastern North America
Boreal Region					
T (coldest month, °C)	-20 - -10	-38 - -22	---	-30 - -22	-30 - -20
T (warmest month, °C)	15 - 20	15 - 20	---	15 - 20	15 - 20
Growth season (days)		80 - 100	---		
Annual rainfall (mm)	500 - 1000	350 - 700	---	350 - 1000	500 - 1000
Climate type	Dcf	Dew	---	Dcf	Dcf
Temperate Region					
T (coldest month, °C)	---	-28 - -14	-8 - -5	-5 - 0	< 0
T (warmest month, °C)	---	20 - 24	17 - 22	15 - 20	< 22
Growth season (days)	---	120-150	120-150	60-240	90 - 180
Annual rainfall (mm)	---	500 - 800	850 - 1150	700 - 1900	600 - 1150
Climate type	---	Dbw	Dbf	Cbf, BSk	Dbf

Notes: BSk: dry climate, semiarid, middle latitude steppe; Cbf: humid mesothermal climate, marine, no dry season; Dbf: humid microthermal climate, continental cool summer, no dry season; Dbw: humid microthermal climate, continental cool summer, dry winter; Dcf: humid microthermal climate, subarctic, no dry season; Dew: humid microthermal climate, subarctic, dry winter.

FIGURE 5.2. Family, genus, and species richness (number) of four boreal regions note especially the three-dimensional differences between areas.

According to convergence hypothesis, the former three regions should have similar plant taxonomic richness. Similar plant taxonomic richness is observed in Europe and eastern North America (**Figure 5.2**). But taxonomic richness in western North America is less similar to either that in Europe or that in eastern North America. In contrast, eastern Asia and western North America, with different climates, represent similar total taxonomic richness. Thus, the observation of total taxonomic richness distribution patterns does not support the convergence hypothesis. Tree taxonomic richness shows a similar pattern in the boreal regions (**Figure 5.3**). Species richness displays higher similarity than either family or genus

FIGURE 5.3. Tree genus–species richness (number) of four boreal regions.

richness in most region–pairs with an exception in eastern Asia and western North America as measured by a ratio based on total taxonomic richness (**Figure 5.4**). Europe and eastern North America have no distinct change from family to species, and all other region–pairs show significant similarity decreases from family richness to species richness. As we know, family is older in evolution than species. The similarity change patterns from family level to species level reflects development of taxonomic richness in these regions. Thus, from this point of view, species richness does not tend to be more similar than the family richness in the boreal regions of Europe, western North America and eastern North America with similar climate. In other words, the data fail to show taxonomic richness convergence in boreal regions with similar climate. The convergence hypothesis is rejected.

FIGURE 5.4. Ratios of taxonomic richness (number) between four boreal regions (Ratio = smaller taxonomic richness/greater taxonomic richness).

The temperate regions of Japan and eastern North America have the same climate type and are similar to eastern Asia, but different from western North America (see Table 5.2). However, Japan and eastern North America do not have more similar total taxonomic richness than other region-pairs (Figure 5.5). Also, tree richness does not exhibit any pattern consistent with the convergence hypothesis (Figure 5.6). Moreover, no region-pair exhibits a similarity increase from family level to species level (Figure 5.7). Thus, there is no evidence of taxonomic richness convergence among the temperate regions with similar climate.

The humid subtropical climate of the world is found only in eastern Asia and eastern North America (Akin 1991). However, these regions of similar climate have distinctly different species richness: more than 15,000 species in subtropical eastern Asia and less than 10,000 species in the subtropical eastern North America. Evidently, subtropical regions fail to converge in species richness in eastern Asia and eastern North America.

FIGURE 5.5. Family, genus, and species richness (number) of four temperate regions note especially the three-dimensional differences between areas.

Thus, our data show that taxonomic richness does not converge in the eastern Asia and eastern North America regions with similar climates. This is consistent with the conclusion drawn from mangrove floras by Ricklefs and Latham (1992). Moreover, species richness does not converge ecologically. Species richness varies from region to region in the same habitats (either xeric or hydric) in both boreal and temperate zones (see **Figures 3.1, 3.3**). However, mesic species richness is relatively stable from region to region in the same climate zone. This result is very important in understanding the evolution of species richness in a region.

FIGURE 5.6. Tree genus–species richness (number) of four temperate regions.

FIGURE 5.7. Ratios of taxonomic richness (number) between four temperate regions (Ratio = smaller taxonomic richness/greater taxonomic richness).

The "diversity anomalies" in similar environments challenge the convergence hypothesis. Indeed, species richness is not a product of modern environments alone. The current authors once proposed the concept of a species pool to explain the development of regional species richness (Li 1993, Adair and Li 1994). A species pool is the product of evolution, immigration, and extinction and thus postulates extant species richness to be an historical artifact rather than an ecologically determinate reality. Great species richness in subtropical eastern Asia is the effect of a long history with low extinction and speciation rates, while great richness in northwestern North America is due to recent rapid speciation.

5.3. Life Form

Life form of a plant community is believed to represent a perfect correlation with climate and thus it is a typical topic in discussing community convergence. But almost all life form spectra have been created from local community studies or from samples of a large region assumed to represent the whole. Alternatively, life form spectra of each boreal and temperate region exhibited in this study are the result of all known species found in that region rather than a portion of them (**Figures 5.8, 5.9**). The results show that the variation of life form among climatic zones, and those among regions in the same climatic zone, cannot be explained in terms of climate.

Life form does not represent any climate-explainable pattern among different climatic zones. Phanerophytes are not sensitive to the climatic differences between boreal and temperate zones (10.46–16.5% in the boreal regions and 7.8–16.3% in the temperate regions). Both hemicryptophytes and geophytes with perennating buds near or below the ground are believed to be well adapted to low temperature and dry seasons. They represent similar proportions in the boreal and temperate zones (66.6–73.4% in the boreal regions and 65.5–70.8% in temperate regions), although the boreal zone has much lower temperatures than the temperate zone. Even though

FIGURE 5.8. Life form spectra of boreal vegetation in four regions

geophytes alone are more frequent in the boreal region than in the temperate region, this is largely from the adaptation to frequent fires in the boreal regions.

FIGURE 5.9. Life form spectra of temperate vegetation in the four regions.

Further, climate cannot explain significant differences of life form spectra among large biogeographic regions in the same climatic zone. In the temperate zone, big phanerophytes, which varied from 1.9% in western North America to 5.3% in eastern North America, are intermediate in eastern Asia at 3.8%. Small phanerophytes show a similar pattern. This variation seems to be the result of moisture, principally annual precipitation, as many scientists (e.g., Withrow

1932) expected: the greater the amount of available moisture, the greater the number and size of the phanerophytes. Eastern North America has a moist climate, eastern Asia has a dry winter, but western North America has a dry summer in the temperate region. As a result, phanerophytes represent higher proportions in the moist areas of eastern North America and smaller proportions in the dry areas of eastern Asia and western North America.

The boreal pattern, however, cannot be explained by the moisture hypothesis alone. In the boreal zone, big phanerophytes represent the smallest proportion (2.5%) of total species in western North America, the greatest proportion (6.2%) in eastern North America, and intermediate in Europe (3.6%) and eastern Asia (3.9%). The marine climate does not show distinct differences between western and eastern North America (or Europe) across moisture gradients.

The question then is why big phanerophytes vary by geographic region. Clearly, western North America has the smallest proportion of phanerophytes whereas eastern North America shows the greatest proportion in phanerophytes. One explanation is that this difference is largely a product of extinction. Western North American flora was greatly influenced by the rise of the Rocky Mountains and Pleistocene glaciation, and the extant flora now is relatively young after extinction of those earlier flora. Meanwhile, the eastern North American flora was less influenced by these geological processes and thus contains more relicts. Phanerophytes, are largely the products of early evolution and evolved in large biogeographical regions before the most recent glaciation. As a result, fewer phanerophytes remained in western North America. This explanation does not mean that the prevailing climate has no influence on phanerophytes. Climate is one of the most important controlling factors for development of phanerophytes, but probably influences only the maximum number of phanerophytes in a given area. This result indicates that the correlation of life form with climate is not independent of plant phylogeny or major disturbances.

Geophytes make up 31.6% of the entire flora in eastern Asia, 21.7% in western North America, and 20.3% in eastern North

America in the temperate zone. The higher proportion of geophytes in eastern Asia seems to be the effect of cold climate because eastern Asia has a lower annual temperature and colder mean monthly temperature than eastern North America. However, the same reasoning can not be used to explain why there are fewer geophytes in western North America. Nor does it fully explain the situation in eastern Asia where fire and evolution largely influenced the higher proportion of geophytes present in these boreal regions.

Moreover, the frequencies of both therophytes and aquatics can not be explained in terms of climate alone. They also are a function of soil moisture and other environmental factors such as available sunlight. Therophytes, the annuals, are somewhat more abundant in the temperate regions of western North America (16.5%) than in eastern North America (10.3%). They are able to persist in habitats that restrict the establishment of perennials, and as explained earlier, may be absent or of modest representation in closed forests. Aquatic plants are more abundant in eastern North America (5.1% in the boreal region and 5.4% in the temperate region) than in any other region.

In short, life form is adapted to many environmental factors rather than climate alone. Thus, there is no perfect correlation between life form and climate. This result at the community level fails to support the convergence hypothesis between eastern Asia and eastern North America. In fact, life form is not independent of the phylogeny of plants or of major physical disturbance.

5.4. Leaf Features

Features of leaves including size class, the proportion of simple and compound leaves, and blade margins are also distinctive factors contributing to the physiognomy of the community. These are often cited in support of convergence and thus provide a third test of this hypothesis. Leaf size has no positive relation with temperature although large leaf size increases remarkably from temperate to

tropical zones. Eastern Asia and eastern North America do not exhibit more similar patterns in leaf size composition than other regions in both the boreal and temperate zones (**Figures 5.10, 5.11, 5.12**).

Leaf type (simple or compound) displays a different pattern; apparently largely independent of climate. The simple leaf is dominant in boreal, temperate, and subtropical regions and no significant difference can be shown between these climatic zones (Li 1993). Also, leaf type spectrum in eastern Asia is more similar to western North America than to eastern North America (**Figure 5.13, 5.14**). The leaf margin shows a pattern similar to leaf type in both temperate and subtropical climates. Apparently, the convergence hypothesis cannot explain such *convergence* under different climates.

FIGURE 5.10. Leaf size features of four boreal floras.

FIGURE 5.11. Leaf size features of three temperate floras.

FIGURE 5.12. Leaf size features of three subtropical floras, China.

FIGURE 5.13. Leaf type features of four boreal floras.

FIGURE 5.14. Leaf type features of three temperate floras.

It should be mentioned that tropical forests have leaf features different from both temperate and subtropical forests. In the tropics (New Guinea), compound leaf species comprise up to 23%, and entire-leaf species up to 85%, of the extant flora (Qu et al. 1985). Therefore, simply in terms of climate, it is impossible to explain the distribution patterns of leaf types and margins in different climatic zones and in different regions of the same climatic zone. However, it is not difficult to conclude that these data fail to support the convergence hypothesis.

5.5. Community Richness

To continue testing the convergence hypothesis requires a comparison of the similarity of community types. The main forest vegetation types in eastern Asia and western and eastern North America and the similarity coefficient indices based on these checklists is presented in Li (1993). The result based on these similarity indices is summarized in Table 5.2.

TABLE 5.2. Observed forest community similarities of eastern Asia, western and eastern North America.

Region-pairs	Coniferous Forests	Deciduous Hardwoods	Overall
Eastern Asia and eastern North America	+	+	+
Eastern Asia and western North America	++	++	++
Western and eastern North America	+++	+	+++

Notes: Similarity Level: +++ similar; ++ somewhat similar; + less similar.

For coniferous forests: +++ Ss > 0.85; Sc > 0.85; ++ Ss 0.65–0.85; Sc 0.50–0.85; + Ss < 0.65; Sc < 0.50. For deciduous hardwoods: ++ Ss > 0.65; Sc > 0.70; + Ss < 0.65; Sc < 0.70. For overall: +++ Ss > 0.60; Sc > 0.70; Sr > 0.70; ++ Ss < 0.60; Sc 0.50–0.70; + Ss < 0.60; Sc < 0.50.

First, overall forest communities show the highest similarity between western and eastern North America and lowest between eastern Asia and eastern North America. This observation rejects the widely accepted view that there is great similarity between eastern Asian and eastern North American forests. The reasons for this high similarity in forest vegetation between western and eastern North America are mainly: These two areas are on the same continent and have relatively more floristic exchanges; and this high similarity is largely due to coniferous forests adapted to mountainous environments.

Eastern Asia and eastern North America show very low similarity indices in evergreen hardwoods. This phenomenon can not be explained in terms of climate or the current physical environment. Evergreen hardwoods developed under a humid subtropical climate. According to Koppen's system of climatic classification modified by Trewartha (1954, see Akin 1991), both areas belong to humid mesothermal climates (Caf), or humid subtropical climates without a dry season (Akin 1991). But forest vegetation is distinctly different in these two areas. In subtropical eastern Asia, well developed evergreen hardwood forests are dominated by many families and genera, while in the subtropical region of eastern North America extensive coniferous forests and deciduous hardwoods are principally dominated by pines and oaks.

Clearly climate was not a limiting factor in the development of evergreen hardwoods in eastern North America. Several factors cloud the determinacy of climate in these regions. First, the isolated stands of evergreen oak and magnolia and associated evergreen hardwoods cover fairly wide lowland areas extending from eastern Texas to coastal South Carolina. Second, certain plant genera of eastern Asia may not be present in the southeastern United States, no matter how favorable the climate and habitat. Alternatively, some introduced species from eastern Asia often successfully reproduce and even tend to replace the native species in eastern North America. They are not limited by climate.

A main reason for the common view that high similarity exists in vegetation type between eastern Asia and eastern North America is the high similarity of the pine and oak forest types in these two regions. However, pine and oak forests are usually not typical dominants in the late successional forests and their stability is largely maintained by fire (Abrams 1992), not climate. Thus, disturbance, not convergence, has produced the similarities observed in the two regions.

5.6. Summary

Forest convergence between eastern Asia and eastern North America has long been widely accepted by ecologists and biogeographers. This study revealed that there are strikingly different structures (life form, leaf features, taxonomic richness, and community diversity) under similar environments in the two regions. Such diversity anomalies challenge the convergence hypothesis. Also, forests exhibit relatively high similarities between eastern Asia and western North America under less similar environments. Evidently, these results fail to support the hypothesis of convergence in forest vegetation. At the very least, these results lead to the conclusion that plant physiognomy and biodiversity are not the product of physical environments, especially climate, alone. Geological history and fire seem important to the development of forest vegetation in large regions.

The message for sustaining biodiversity under these conditions is quite clear and can be summed as "keep it hydric or xeric and if mesic, keep it disturbed" Alternatively, the data in this study show quite clearly, that biodiversity is a dynamic response to environmental processes. It can be managed. It cannot be preserved over the larger time periods or large biogeographic regions described in this study.

**DEVELOPMENT
AND NATURE
OF SPECIES POOLS**

CHAPTER SIX

DEVELOPMENT OF REGIONAL SPECIES POOLS IN EASTERN ASIA AND NORTH AMERICA

6.1. Eastern Asia: A Long Evolutionary History with Low Extinction and Speciation Rates

To date, 25,480 species of native vascular plants have been identified in eastern Asia, representing 300 families and 2,875 genera (Li 1993). This amounts to 10.7% of the total known species in the world and about 1.6 times the figure for North America (see **Table 1.5**). Eastern Asia includes a host of taxa that are presumed to be phylogenetically primitive, with many occurring as monotypic taxa in the subtropical or tropical regions. These factors have led to the concept that eastern Asia was the evolutionary source of modern flora in the Northern Hemisphere (Takhtajan 1969, Latham and Ricklefs 1992).

Ferns are primitive vascular plants. 2,300 species of ferns and fern-like plants, representing 52 families and 204 genera, are found in eastern Asia. The families, genera, and species account for 80.0%, 46.0%, and 19.5% of the total flora in the world and are 3.5, 3.4, and 6.7 times those in North America. Gymnosperms, another primitive group of plants, are represented by 10 families in eastern Asia, but

only five in North America. Eastern Asia contains almost all primitive monotypic families, including Ginkgoaceae, Cycadaceae, and Gnetaceae.

Ginkgo (**Figure 6.1**) is the oldest of all trees, in the sense that as a species it has existed for the longest period of time without changing (veritable "living fossils"). *Ginkgo*, dates back to the Triassic, some 200 million years ago (Flora of North America Editorial Committee 1993). The family Ginkgoaceae once contained many genera with a vast number of species and was quite widespread in the world during the Cretaceous (Hsu 1983). But after the Quaternary, all species but *Ginkgo biloba* L. became extinct. *G. biloba* survives and is now endemic to southern eastern Asia. Cycads are the rarest relics of a flora that dominated the world during the Mesozoic, c. 225 to c. 64 million years ago. Eight species of the genus *Cycas* are known in eastern Asia, all in relic areas and some of them such as *C. szechuanensis* Cheng et Fu and *C. panzhihuaensis* Zhou et Yang form pure stands in small areas.

Conifers may have appeared in the late Carboniferous but evolved and developed during the Tertiary when they were widely distributed in both Northern and Southern Hemisphere. They began to retreat south in the Paleocene or Eocene. During the Pleistocene some conifers became extinct because of glaciation. Distribution of relic taxa after glaciation indicate that conifers could not recover their original distribution because of climate changes and topographic conditions (Wu and Wang 1983). Conifers are distributed among Europe, eastern Asia, and western and eastern North America, respectively, approximately in the ratio 1.0 : 3.4 : 2.1 : 1.6 by genus and 1.0 : 5.9 : 2.4 : 1.2 by species (**Table 6.1**). The greatest taxonomic diversity among conifers is in eastern Asia.

Pinaceae, the largest and most economically important member of the seven families of conifers, contains 11 genera and 250 species. These species are restricted almost entirely to the Northern Hemisphere at present and as fossils with the single exception of *Pinus merkusii* Jungh et De Veriese, which is native to Indochina south of the Equator in Sumatra. The oldest members of this family date from the early Cretaceous. More than two dozen species of

FIGURE 6.1. *Ginkgo biloba* L., a well known living fossil species endemic to China. The picture shows the tree in natural condition in Pingtang, Guizhou. (photo by Jingcheng Ran)

Cretaceous seed cones are known, some of these are *Pinus*. Modern genera, other than *Pinus*, appeared at the onset of the Cenozoic (Muller 1988). Ten genera and 94 species of the total 11 genera and 280 species of Pinaceae are found in eastern Asia. Five genera and 19 species are known in eastern North America and 6 genera and 38 species in western North America (Table 6.1).

Takhtajan considered *Abies* and *Keteleeria* to be the most primitive genera in Pinaceae (Wu and Wang 1983). *Abies* is widely

distributed in the north temperate zone. Twenty-two species and three varieties are recorded in eastern Asia, of which 19 species are endemic. Seven species of *Abies* are found in western North America and two species in eastern North America. In the genus *Keteleeria* nine of all 11 species are restricted to eastern Asia, predominantly in the south to the Qinling Mountains and the lower reaches of the Yangtze River of China. According to fossil records, this genus was widely distributed in western North America, Central Europe, and Japan during the Tertiary (Axelrod 1976). *Pseudotsuga* is a typical genus with disjunct distribution between eastern Asia and western North America. Six of 19 species are endemic to eastern Asia, one to Japan and the other two species to western North America. *Tsuga* is of moderate size with about 14 species. The eastern Asian-North American disjunction pattern in this genus is expressed by paired species. Two monotypic relic genera of the Tertiary, *Cathaya* and *Pseudolarix*, are endemic to the subtropical region of eastern Asia and are found south to the Yangtze River. According to the fossil records, however, *Cathaya* was widely distributed in Europe, East Siberia, and North America. *Larix*, *Picea*, and *Pinus* are common dominant genera of the conifer forests in the Northern Hemisphere, where they flourished during the Tertiary. These genera tend to have more species in eastern Asia than in North America.

Podocarpaceae is mainly distributed in the Southern Hemisphere; it had evolved by the onset of the Mesozoic. It contains 6-15 genera and 125-175 species, of which two genera and 14 species are known in eastern Asia. *Podocarpus*, the most primitive genus in this family, has 13 species in the southern regions to the Yangtze River and Taiwan. Cephalotaxaceae, a family very close to the Podocarpaceae, is represented in eastern Asia by one genus, but the fossil record suggests that this family occurred in England during the Jurassic. Of nine living species in the genus *Cephalotaxus*, seven species occur in the southern regions to Qinling-Lushan Mountains. Taxaceae, another family closely related to the Podocarpaceae, evolved by the middle Jurassic, *Torreya* and *Taxus* of this family were described as from the Jurassic in Europe by Florin (1958).

TABLE 6.1. Distribution of conifer species among Europe, eastern Asia, and western and eastern North America.

Family/genus	Europe	Eastern Asia	Western North America	Eastern North America
Cephalotaxaceae				
<i>Cephalotaxus</i>	0	7	0	0
Taxaceae				
<i>Amentotaxus</i>	0	4	0	0
<i>Pseudotaxus</i>	0	1	0	0
<i>Taxus</i>	1	6	1	2
<i>Torreya</i>	0	3	1	1
Taxodiaceae				
<i>Cryptomeria</i>	0	1	0	0
<i>Cunninghamia</i>	0	2	0	0
<i>Glyptostrobus</i>	0	1	0	0
<i>Metasequoia</i>	0	1	0	0
<i>Sciadopitys</i>	0	0	0	0
<i>Sequoia</i>	0	0	1	0
<i>Sequoiadendron</i>	0	0	1	0
<i>Taiwania</i>	0	2	0	0
<i>Taxodium</i>	0	0	0	2
Cupressaceae				
<i>Chamaecyparis</i>	0	1	2	2
<i>Calocedrus</i>	0	2	1	0
<i>Cupressus</i>	0	7	12	0
<i>Juniperus</i>	6	19	5	5
<i>Thuja</i>	0	2	1	1
<i>Thujopsis</i>	0	0	0	0
Pinaceae				
<i>Abies</i>	5	22	7	2
<i>Cathaya</i>	0	1	0	0
<i>Cedrus</i>	1	0	0	0
<i>Keteleeria</i>	0	9	0	0
<i>Larix</i>	1	10	2	1
<i>Nothotsuga</i>	0	1	0	0
<i>Picea</i>	3	16	6	1
<i>Pinus</i>	9	23	19	13
<i>Pseudolarix</i>	0	1	0	0
<i>Pseudotsuga</i>	0	5	2	0
<i>Tsuga</i>	0	6	2	2
Total Genera	7	24	15	11
Total Species	26	153	63	32

Four genera and 20 species are widely distributed in the Northern Hemisphere, of which four genera and 14 species are known in eastern Asia and two genera and four species are known in North America. *Torreya* contains six species, three from eastern Asia, one from Japan, one from western North America, and one from eastern North America. The extant *Amentotaxus* and *Pseudotaxus* genera of this family are mainly native to eastern Asia. The first genus contains four species mainly in the southern part of eastern Asia, but it was widely distributed in Eurasia and North America during the late Cretaceous (Florin 1963).

In the family Taxodiaceae, 10 genera and 17 species have been recorded to date, all are relics of the Tertiary (Wu and Wang 1983). *Metasequoia*, *Glyptostrobus*, *Cryptomeria*, and *Cunninghamia* were widely distributed in the Northern Hemisphere during the late Cretaceous (Florin 1963, Hsu 1983). The extant Taxodiaceae is disjunct between eastern Asia and North America. Five genera and seven species of this family are found in eastern Asia, two genera and two species in western North America, and one genus and two species in eastern North America.

Two thousand six hundred and seventy-one genera and 23,000 species of angiosperms belonging to 238 families are native to eastern Asia. The diversity of family, genus, and species in eastern Asia is 1.4, 1.2, and 1.6 times that in North America, respectively. According to fossil records, almost all ancestral families of angiosperms were rich in eastern Asia. Chloranthaceae, as the earliest angiosperm (the early Cretaceous, Muller 1981) has three genera in eastern Asia and only one in eastern North America. Aquifoliaceae, one of the earliest woody angiosperm families represents 168 species in eastern Asia and only 17 species in North America. Moreover, many phylogenetically primitive families of angiosperms are concentrated in eastern Asia, e.g., Magnoliaceae, Hamamelidaceae, Calycanthaceae, Schisandraceae, Illiciaceae, Nyssaceae, Tetracentraceae, Trochodendraceae, and Cerciphyllaceae. Magnoliaceae is the most primitive woody family of angiosperms (Hutchinson 1973). This family contains 12 genera and 250 species ranging from Asia to North America (Wu and Wang 1983). Ten

genera and 100 species of this family are known in eastern Asia, but only two genera and nine species are known in North America (primarily in the east). Hamamelidaceae, another primitive family, has 25 genera and 90 species widely distributed in eastern and southeastern Asia and North America with some reaching south to Australia and Africa; Seventeen or 18 genera and 70 species of this family are known in eastern Asia. *Disanthus*, *Exbucklandia*, and *Rhodoleia*, ancestral genera of the family (Takhtajan 1969), are all found in southern China.

The evidence above indicates that eastern Asian flora has a long evolutionary history. The geological records fail to support the existence of continental Quaternary glaciers in most of eastern Asia and thus extinction seems less important in eastern Asian flora. Further, the analysis of diversification rates (R , see Eriksson and Bremer 1992) of families based on fossil records suggests that species diversification in eastern Asia is low relative to North America. R refers to the speciation rate minus the extinction rate and is measured as the number of extant species over the time since the first appearance of a family. For example, 20.7% of the total species in eastern Asia belong to families with low diversification rates ($R < 0.15 \text{ my}^{-1}$), while only 11.2% of the total species in North America belong to the same families.

Thus, we conclude that the great taxonomic richness of eastern Asia is largely the result of a lengthy evolutive history coupled with low extinction and low diversification rates rather than the result of a favorable present environment and high speciation.

6.2. Northwestern North America: A Short Evolutionary History with High Speciation Rates

Northwestern North America has the highest species diversity among all northerly regions, but is clearly less rich at the family level (see **Tables 2.1, 2.3**). In the temperate zone, for example, western North America has a total 3,161 species, which is about 50% of the total

species of all three temperate floras and about 1.5 times that of either eastern Asia or eastern North America. However, this flora has 19 families fewer than in eastern Asia and 27 families fewer than in eastern North America. Therefore, families of temperate floras, on average, have more species in western North America (roughly 30 species per family) than in eastern Asia (roughly 17) and eastern North America (5) (**Table 6.2**). Theoretically, the larger the family (containing more species), the more evolved (Stebbins 1981) because family is parental to species. From this point of view, the temperate flora in western North America is young because the family number is low.

The evolutionary analysis of flowers shows a similar pattern. The solitary flower, both terminal and axillary, is the initial form of arrangement for flowers, while inflorescence is more advanced and of a greater biological advantage (Takhtajan 1991). In the temperate zone, western North America contains the highest proportion of inflorescence (87.8% of the entire flora, compared with 80.4% in eastern Asia and 79.1% in eastern North America). Flower color is an important factor affecting pollination of plants. Green flowers are largely pollinated by wind, and thus the anemophilous plants are claimed to be primitive in evolution (Takhtajan 1991). Alternatively, bright colored flowers are usually pollinated by insects, and entomophilous plants are considered more advanced in evolution. In western North America, only 21.8% of the total species have green flowers, a lower percentage than in either eastern Asia (27.8%) or eastern North America (33.6%). However, colorful flowers (white, yellow, pink, rose, purple, blue, and red) are more frequent in western North America and comprise 78.2% of the total species. The same colors account for 72.2% of the total species in eastern Asia and 66.4% in eastern North America.

Life history reflects the long-term adaptation of a plant to its environment. Annuals are unknown in primitive ferns and gymnosperms, but their sexual reproduction processes enable them to persist in habitats that restrict the establishment of perennials. Therefore, annuals are believed to arise relatively late in the evolution of terrestrial plants (Bazzas and Morse 1991). Annuals are

TABLE 6.2. Comparisons of evolutionary levels of the temperate and boreal floras based on the ratios of genera/family, species/family, and species/genus.

Regions	Europe	Eastern Asia	Western North America	Eastern North America
Genus No./Family				
Temperate		5.2	5.3	4.6
Boreal	3.2	4.0	4.3	3.4
Species No./Family				
Temperate		16.7	29.8	15.0
Boreal	8.4	12.2	15.4	9.5
Species No./Genus				
Temperate Zone				
Trees		2.2	2.2	2.2
Shrubs		3.1	4.3	3.4
Lianas		1.3	4.5	2.0
Herbs		3.3	5.0	3.3
Total		3.2	4.9	3.3
Boreal Zone				
Trees	1.4	1.8	2.0	2.3
Shrubs	2.4	2.6	3.4	2.2
Lianas	0.0	1.2	0.0	1.0
Herbs	2.8	3.2	3.6	3.0
Total	2.7	3.1	3.6	2.8

distributed among eastern Asia, western and eastern North America at the ratio of 1.0:2.5:1.0. Alternatively, as the early evolved group, trees are distributed among eastern Asia, western and eastern North America at ratios based on total numbers of both genus and species as follows: 1.3:1.0:1.9. Obviously, the temperate flora in western

North America is relatively young in evolution relative to the other two temperate floras even though it does have the greatest species richness.

Further phylogenetic data strengthen the argument. Magnoliidae and Alismatidae are the most primitive taxa of flowering plants in Cronquist's system (1988). They, together with gymnosperms represent the lowest diversity in temperate western North America (16 families and 56 genera) and the highest in temperate eastern Asia (23 families and 72 genera). But Asteridae and Liliidae, the most advanced taxa in Cronquist's system have the highest diversities in temperate western North America (243 genera, compared with 233 genera in temperate eastern Asia and 199 in temperate eastern North America respectively).

Therefore, all evidence from the taxonomic structure of flora, flower, life history, and phylogeny show that northwestern North American flora is relatively young in evolution. Data on diversification rates (R) for families supports this statement. A total of 14 families with low diversification rates ($R < 0.10 \text{ my}^{-1}$) are recorded in the boreal regions of Europe, eastern Asia, western and eastern North America (**Table 6.3**). The boreal flora of western North America has the lowest species diversities in families with low diversification rates (20 species within 7 families vs. 21–35 species in other regions) among all boreal floras. In contrast, western North America has the highest species diversity in families with high diversification rates ($R > 0.60 \text{ my}^{-1}$) (108 species within 7 families vs. 42–83 species in other regions) among all boreal floras. Similarly, in the temperate regions, western North America has the lowest species diversities ($R < 0.10 \text{ my}^{-1}$) in families with low diversification rates (42 species within 11 families vs. 77 and 111 species in eastern Asia and eastern North America, respectively) among all temperate floras (**Table 6.4**). However, western North America has the highest species diversity in families with high diversification rates ($R > 0.60 \text{ my}^{-1}$) (258 species within 9 families vs. 91 and 95 species in eastern Asia and eastern North America, respectively) among all temperate floras. Further, three genera with the highest diversification rates, *Astragalus*, *Senecio*, and *Carex* display maximum species richness in

TABLE 6.3. Evolutionary levels of boreal floras based on diversification rates (R).

Family	R	Age* (mybp)	Europe	Eastern Asia	Western North America	Eastern North America
$R < 0.10 \text{ my}^{-1**}$			Species Number			
Typhaceae	0.04	60	1	1	1	1
Myricaceae	0.05	80	1	1	1	2
Ulmaceae	0.05	92	2	2	0	2
Betulaceae	0.06	80	7	10	7	10
Hamamelidaceae	0.06	76	0	0	0	1
Juglandaceae	0.06	73	0	1	0	0
Nymphaeaceae	0.06	67	1	3	4	2
Schisandraceae	0.06	67	0	1	0	0
Aceraceae	0.08	60	1	4	2	4
Droseraceae	0.08	52	1	1	2	2
Moraceae	0.08	90	0	1	0	0
Urticaeae	0.08	90	2	7	2	2
Cornaceae	0.09	52	2	2	3	3
Fagaceae	0.09	80	3	1	0	6
Family Number			10	13	7	11
Species Number			21	35	20	35
% of total species			3.0	3.0	1.7	4.6
$R > 0.60 \text{ my}^{-1**}$			Species Number			
Lentibulariaceae	0.69	8	5	5	5	5
Plantaginaceae	0.69	8	1	2	4	2
Polemoniaceae	0.70	8	2	3	5	1
Linaceae	0.71	8	2	1	1	1
Portulacaceae	0.75	8	2	3	12	0
Geraniaceae	0.82	8	7	7	4	1
Brassicaceae	1.00	8	26	59	74	30
Orobanchaceae	1.36	4	0	3	3	2
Family Number			6	8	7	6
Species Number			45	83	108	42
% of total species			6.4	7.1	9.3	5.5

Notes: mybp---million years before present; R ---species per million years.

TABLE 6.4. Evolutionary levels of temperate floras based on diversification rates (*R*).

Family	<i>R</i>	Age* (mybp)	Eastern Asia	Western North America	Eastern North America
<i>R</i> < 0.10 my ⁻¹ **			Species Number		
Nelumbonaceae	0.02	31	1	0	1
Platanaceae	0.02	100	0	0	1
Nyssaceae	0.03	60	0	0	1
Chloranthaceae	0.04	100	1	0	0
Typhaceae	0.04	60	5	2	2
Myricaceae	0.05	80	1	2	3
Ulmaceae	0.05	92	7	1	6
Betulaceae	0.06	80	14	9	19
Hamamelidaceae	0.06	76	1	0	1
Juglandaceae	0.06	73	1	0	8
Magnoliaceae	0.06	92	2	0	4
Nymphaeaceae	0.06	67	4	5	7
Schisandraceae	0.06	67	1	0	0
Staphyleaceae	0.06	52	1	0	1
Aquifoliaceae	0.07	92	0	0	3
Theaceae	0.07	92	0	0	1
Aceraceae	0.08	60	8	4	7
Droseraceae	0.08	52	2	2	5
Haloragidaceae	0.08	60	4	4	7
Moraceae	0.08	31	4	0	1
Sapindaceae	0.08	100	1	0	0
Symplocaceae	0.08	60	1	0	1
Urticaceae	0.08	100	12	6	8
Cornaceae	0.09	60	3	4	11
Fagaceae	0.09	80	3	3	13
Family Number			21	11	22
Species Number			77	42	111
% of total Species			3.7	1.3	5.6

Notes: mybp---million years before present; *R*---species per million years.

TABLE 6.4. (continued).

Family	<i>R</i>	Age* (mybp)	Eastern Asia	Western North America	Eastern North America
<i>R</i> > 0.60 my ⁻¹ **			Species Number		
Lentibulariaceae	0.69	8	6	5	10
Plantaginaceae	0.69	8	5	8	7
Polemoniaceae	0.70	8	2	69	7
Linaceae	0.71	8	2	5	3
Portulacaceae	0.75	8	2	19	6
Capparaceae	0.81	8	0	5	1
Geraniaceae	0.82	8	13	7	2
Brassicaceae	1.00	8	60	135	51
Orobanchaceae	1.36	4	5	5	4
Family Number			8	9	9
Species Number			95	258	91
% of total species			4.5	8.2	4.6

Notes: mybp---million years before present; *R*---species per million years.

western North America and exceed that of any other region (279 species relative to 51–145 species in the other temperate regions).

There is little doubt that the data indicate that the northwestern North American flora is relatively recent in evolution. This statement is consistent with the notion of a young geological history of western North America. Considering that the species-rich northerly flora of western North America has a short evolutionary history and with over 50% of the total species restricted to this region, we conclude that this great species richness in northwestern North America is largely the effect of rapid speciation and only supplemented, rather than caused by immigration.

6.3. Current Hypotheses on Species Richness

The basic arguments of the dominant energy hypothesis are: (1) species richness is a measure of available energy, and (2) the product

of a race between immigration and extinction which causes richness to approach its theoretical maximum over time (MacArthur and Wilson 1967). Therefore, this hypothesis is that species richness in similar environments is the inevitable result of convergence. In general, tree species richness supports this and increases in direct relation to precipitation or evapotranspiration, suggesting that a positive relationship exists between diversity and productivity of the habitat (Latham and Ricklefs 1992). But this is not always true. There are many examples of species richness decline at high habitat productivity levels (Ricklefs 1987, Rohde 1992, Latham and Ricklefs 1992, Latham and Ricklefs 1993). The total number of plants within a community may reflect total productivity, but species richness does not. Different species have different individual size, population and distribution patterns and thus have different energy needs and different biological roles in an ecosystem. Some species, known as keystone species, affect the survival and abundance of many other species in the community in which they live. In contrast, the presence of some species may be caused by, and be largely dependent on, the existence of other species. Thus, species is not an energy or ecological unit, but only a biological artifact.

Based on the energy hypothesis, Wilson (1988) emphasizes that the successful introduction of exotic species into other regions of the world has reduced local species diversity. In subtropical eastern Asia, however, where tree species richness is about four times that of subtropical eastern North America, about one-half of 100 species of trees introduced from eastern North America have successfully colonized without the compensating disappearance of the native species. For example, *Robinia pseudoacacia* L., *Campsis radicans* (L.) Seem., *Sabina virginiana* (L.) Antoine, *Pinus elliottii* Engelm., *P. taeda* L., *P. rigida* Mill., *Magnolia grandiflora* L., *Carya illinoensis* (Wangenh.) Koch, and *Liriodendron tulipifera* L., all now grow well in China and do even better locally than their eastern Asian species pairs. Of them, *Robinia pseudoacacia* and *Campsis radicans* have escaped from plantations and gardens and became naturalized species in China (He and Gu 1990). In these cases, competition between exotic and native species has lead to increased diversity

rather than extinction and loss of species in the area. Thus, a climate or energy hypothesis alone cannot explain this fact of additional species richness; both neglect historical plant evolution and migration.

Consequently, there is reason to assume that nowhere in the world have resources been fully utilized by plants because the establishment of a site-specific species pool is largely influenced by chance. A measure of energy availability cannot even allow prediction of the maximum number of species in a region because plants have the ability to expand local environmental and habitat constraints during colonization.

Theoretically, every species has a unique niche because every species has at least one physical or behavioral characteristic that limits its adaptability and defines it from other species (Solbrig 1991). But, this competition seems less important as a determinant of species richness throughout a large scale biogeographic region than on a local site. The problem is that current measures of environmental parameters are too rough to distinguish all differences among species. Currie (1991) reports that total vascular plants species diversity has the same relationship to productivity as that observed for trees. Consequently, he postulates that tree richness is a reasonable surrogate for total vascular plant richness. But taxonomic richness displays varied regional distribution patterns by strata for floras in the northerly regions of the Northern Hemisphere (Li 1993). Thus, the hypothesis of trees as surrogate for entire flora is rejected.

The disparities in species diversity among the temperate forest regions cannot be explained as an area effect because these regions cover ecologically similar areas. Our data show that species richness has failed to converge under similar large scale physical environments (see chapter 5). Thus, hypotheses regarding area effects and convergence are also rejected.

The reason for such "diversity anomalies" can be traced to several historical periods of large scale extinction. The geological evidence shows that even natural selection cannot prevent extinction of a species. White (1983) claimed that the differences in taxon

richness among eastern Asia, North America, and Europe resulted from differing Pleistocene extinction rates in the three areas. Western North America has a young geological history. The rapid rise of the Rocky Mountains in the Tertiary and extensive glaciation in the Pleistocene caused widespread extinction in western North America. According to White's hypothesis, western North America should have small species diversity because of high rates of extinction. However, this study reveals that in the northerly regions of the Northern Hemisphere, western North America has the greatest species richness for entire flora of all three areas. This result is not consistent with the hypothesis that species richness increases over time (Piank 1966, Whittaker 1969, 1977).

The great species richness of eastern Asia had a different development process. There was no mass extinction due to dramatic geological changes, and extant species pools include many plants which are primitive in evolution as shown by a great number of monotypic genera and relicts. Thus, the great species richness of eastern Asia is largely due to a long evolutionary history with low extinction rates.

CHAPTER SEVEN

SPECIES POOLS, A NEW HYPOTHESIS

7.1. Concept of Species Pools

Based on this study, we argue that species exist in pools in a given region at a given time. This regional species pool is a relatively quiet spot in a dynamic river of species diversity development and changing genetic information over time. It is a function of two run-in processes: speciation and immigration and two run-out processes: extinction (global extinction) and emigration (local extinction) (**Figure 7.1, Table 7.1**) and thus has largely a historical rather than an ecological basis for its existence.

Speciation is the formation of new species from pre-existing ones usually by a process of improved adaptation of survivors to the environment and not just a selection process. New dominant genotypes are constantly cropping up in a population through mutation, recombination, and related genetic phenomena (Solbrig 1991). However, these new genotypes must survive natural selection. Therefore, the rate of speciation depends not only on environmental diversity within the pool, especially under conditions of geographic or ecological isolation, but also on chance. Thus, being an indeterminate process, it is impossible to predict the speciation rate or species richness for a region.

Immigration, however, does not involve global genetic variability, but does contribute to regional changes. The process includes invasion of gametes, propagules, and even individuals.

FIGURE 7.1. **Species pool in a given region at a given time** (after Li 1993).

During immigration, however, species may evolve. If genetic change makes it possible to taxonomically distinguish a new species from the original, the process is evolutionary (speciation) even though the total genetic information carried forward may remain unchanged, be increased or, in fact, reduced! Both natural selection and chance play roles in immigration of species to a region. This also means that the absence of a species in a region may result purely from chance rather than from deterministic natural processes of immigration, speciation, emigration, and extinction. Unlike Island Biogeographic theory of MacArthur and Wilson (1967), and assuming there is a mainland as the source for an island, there are unlimited sources for the migration of species pools.

TABLE 7.1. Basic patterns of development of regional species pool.

Environmental Pattern								
Dramatic Changes	+	+	+	+	-	-	-	-
Heterogeneity in Pool	+	+	-	-	+	+	-	-
Barriers around Pool	-	+	-	+	-	+	-	+
Process								
Extinction/Emigration	+	+	+	+	-	-	-	-
Speciation	+	+	-	-	+	+	-	-
Immigration	+	-	+	-	+	-	+	-
Species Diversity	M	M*	L	L	H	H*	L	L
Example	CI	NW	NE	EE	X	SEA	NEA	SP

Notes: "+" represents great and "-" represents weak; L---low, M---median, H-high; * represents more endemic species. CI---some continental islands; NW---northerly western North America; NE---northerly eastern North America; EE---extreme environment; X---unidentified region; SEA---southerly eastern Asia; NEA---northerly eastern Asia; SP---specialized habitat.

Emigration (local extinction) of a species occurs locally, in which the population of a species vanishes in a region but others survive elsewhere, while extinction occurs globally, in which all members of the species population everywhere in the world vanish. Both emigration and extinction of a species are natural processes, and they may represent the final failure of the species to adapt to changing conditions in local or global scales, respectively. The fossil record indicates that most, if not all, species have a finite life span, averaging between one and ten million years (Solbrig 1991). Drastic environmental change is a major cause of species extinction especially on a global scale. Because the environment is in a constant state of transformation, some species are always being lost while others are added. Some changes in the physical environment are cyclic and periodical, while others are less predictable. Thus, it is impossible to establish a natural rate of species change and based on the data presented in this study, it may be impossible to establish any rate at all. On local scale, however, immigration and emigration may be the

main processes for species pool development, at regional and global scales, whereas speciation and extinction may be the main processes accounting for the dynamics of species pools globally.

7.2. Nature of Species Pools

A species pool refers to all species in a given area at a given time, whether they can persist there or not. The dynamic state of a species pool in continuous time can be described by the following model which is similar to the Levins' metapopulation model (1970).

$$dp / dt = (S + I) p (1 - p) - (E_1 + E_2) p \quad (1)$$

S is speciation rate, I is immigration rate, E_1 is extinction rate, and E_2 is emigration rate. The variable p is a fraction of the colonized species indicating the progressive status of species pool (between 0 and 1).

The equilibrium fraction of the colonized species, denoted p_0 , is easily shown to be

$$p_0 = 1 - (E_1 + E_2) / (S + I) \quad (2)$$

If we let Δd represent the net increase of species $[(S + I) - (E_1 + E_2)]$ within species pool, then equation (2) can be written as

$$p_0 = \Delta d / (S + I) \quad (3)$$

$\Delta d > 0$ means colonization rates (S and I) greater than outgoing rates (E_1 and E_2), and the species pool is progressive; otherwise, $\Delta d < 0$ means a species pool is retrogressive.

However, no model can simultaneously satisfy the quest for generality, realism, and precision (Levins 1966). In this analysis, we must have several simplifying assumptions: The first is that all species have the same probabilities of speciation, immigration, extinction, and emigration. Species evolve, immigrate, go extinct, and

emigrate independently; Secondly, speciation, immigration, extinction, and emigration are independent of each other. However, these assumptions greatly simplify what happens in nature. The inter-specific variation asimplified is usually far greater than the intra-specific variation. A species pool is not just species richness or a simple collection of species, but a system of diversity of life. Therefore, a species pool has the following main characteristics in time and space.

Liquidity and Irreversibility

A species pool is a dynamic flow of species through a storage area. Extinction and emigration processes have not stopped and speciation and immigration are still occurring. Extinction is a natural process like the other three processes, taking the form of a modest background rate with occasional accelerations (mass extinction). Adapted to new environments, species that have become locally extinct (emigration) may re-migrate to a region. However, the natural process from speciation to extinction is irreversible. Species that have become globally extinct cannot be recovered naturally. Thus, conservation management of some threatened species is needed on a global level.

It is impossible, however, for humans to interrupt the natural extinction process and store all species on the global scale. Man can temporarily store as many species as possible in regional species pools, but even these are present only on a dynamic basis. There is growing evidence that some taxa are more extinction prone than others. These species, especially of small populations can die out entirely by chance even when its members are healthy, the environment favorable and they are under protection. From this point of view, the "save all species" ethic is unattainable.

Also, a species pool is not the accumulation of species over long evolutionary time spans, and species-rich communities may not always be the oldest as Whittaker (1977) has stated. The northerly

flora of western North America, which is both young and species-rich, is a striking example that fails to support Whittaker's hypothesis. Thus, it is not realistic to target on static ecosystems for preservation of maximum species richness, but instead create species pools that dynamically expand species richness on both local and regional levels. In short, if people wish to preserve a species or expand species diversity, they must work to do so and accept the results of such efforts. The species contained in a pool of maximum diversity will probably not be charismatic and attractive to people, but it will be species rich.

Stochasticity and Non-equilibrium

Nature is not in balance. Disturbances and irregularities of all sorts are not aberrations, but integral parts of nature (Solbrig 1991). Both chance and natural selection produce the steady coming and going of species through a pool. Speciation, immigration, extinction and emigration function continuously. Demographic and environmental stochasticity always influence these four processes. Demographic stochasticities, such as viability, age distribution, and sex ratio of the population of any species, are the effect of chance (Caughley and Gunn 1996). They are vital factors influencing the existence of the population particularly when the population is small in size. Genetic factors, including genetic drift, selfing, and mating, may reduce the genetic diversity and fitness of species and thus also strongly influence the existence of a species. Environmental fluctuations, including catastrophic factors, particularly in weather and nutrients, influence all individuals of a population and the four processes of species pools. Environmental stochasticity plays an important role in a large population for the existence of a species. However, because of the impact of demographic and environmental stochasticity, species with small populations are probably at a high risk of extinction.

Needless to say, even knowing the present size of a species pool including absolute speciation, immigration, emigration, and extinction rates (S , I , E_1 , and E_2 , respectively), it would be not

possible to predict the future of a species pool because S , I , E_1 , and E_2 are all chance effects. Simply, the size, pattern, and structure of a species pool are indeterminate and unpredictable. The theory of species equilibrium, namely, that the steady-state number of species, found on an island or isolated patch of habitat due to a balance between the immigration of new species and the extinction of old residents (MacArthur and Wilson 1967, Wilson 1992) is inadequate because it denies the realities of both change and chance.

Heterogeneity and Non-saturation

Species is not an energy or ecological unit. The ecological inequality of species indicates that the number of species present is not a function of the physical environment. Most species can survive in more than one habitat although they may favor some specific one. As a result of chance or competition, many species may never colonize their best habitats. Even when the current habitat (whether the best for species or not), is stable, a species may migrate and colonize other habitats within the limits of its adaptation plasticity. Also, all regions exhibit heterogeneity and patchiness and no environment is completely homogeneous in either time or space. This variability and patchiness in the environment provides a foundation for the coexistence of species. Most species, except during their infancy or extinction or emigration, exist as a metapopulation where habitat heterogeneity reduces the risk of extinction because all populations are unlikely to be exposed to the same event simultaneously. Therefore, species which become extinct locally may still persist on a regional scale (Levins 1969, Caswell 1978, Hanski and Gilpin 1991, Antonovics 1994). However, species richness does not always tend toward its potential maximum largely due to the effect of chance. In the northern (boreal and temperate) regions of the Northern Hemisphere, plant species number varies from region to region even in the same habitat. One exception is those species pools in mesic habitats which tend to be stable from region to region.

We have no reason to assume the physical environment in a given region is fully used by species. If species saturated biological communities exist within limits set by local conditions, new species could not join the community without the compensating disappearance of others (Ricklefs 1987). But many successful introductions of exotic species cannot be shown to have caused an apparent loss of native species. Previous studies have usually concentrated on a small taxonomic group of organisms and thus failed to provide generalization theory as an explanation for the existence of species pools.

One final point, because species pools are the result of life processes, their temporal and spatial boundaries are plastic and indeterminate in Nature. Man can establish artificial boundaries for his own purposes, but Nature will ultimately determine them over the longer-term. Thus, maintenance of specific species pools is a management task that must work in harmony with Nature and natural processes. The problem, of course, is that those processes are a matter of chance making it highly probable that Man cannot ultimately know what Nature will do in a specific species pool.

CHAPTER EIGHT

SPECIES EXTINCTION

8.1. How Many Species Have We Lost?

Recently, some conservationists have declared that a worst fear "global species extinction crisis" exists. According to the Nature Conservancy, today, species are becoming extinct at a rate faster than at any time in the Earth's history—one species per day (Jablonski 1995). It is claimed that there will be mass extinction caused by human activities over next 30 to 50 years: a quarter of the world's species diversity may be vanish forever—more than 2 million species or, on average, 100–200 per day (Raven 1988, Wilson 1989, Ehrlich and Wilson 1991). However, there are no hard figures based on valid global statistics. The largest core of data on the decline of species comes from the World Conservation Monitoring Center (WCMC) in Cambridge, Britain: a list of 600 species, or 0.25% of the total scientifically described vascular plants have disappeared since c. 1600 (Smith et al. 1992; **Table 8.1**). The WCMC also estimates that 22,137 species, about 9.22% of the total vascular plants in the world, are in threatened status, with gymnosperms more threatened than other class of plants (31.93%) (**Table 8.2**). These authoritative statements are important, but not perfect. For example, *Castilleja cruenta* Standl. on the 600 extinct species list of WCMC list was recently rediscovered in Arizona (Egger 1993). Because most threatened species lists are based on non-quantitative criteria and definitions, they cannot be used to make predictions about extinction rates (Mace 1995).

Table 8.1. Number of recorded plant and animal species extinction since c. 1600 by geographical region (data from Smith et al. 1993).

Region	Plants	Animals
North America and Caribbean	127	120
South America	19	2
Europe and CIS	35	6
North Africa and Middle East	5	2
Sub-Saharan Africa	45	2
Asia	26	13
Australasia	185	40
Pacific Ocean islands	118	169
Indian Ocean islands	36	75
Atlantic Ocean islands	9	42
Southern Ocean islands and Antarctica	1	7
Islands	219	367
Continents	380	124

Table 8.2. Number and percentage of plant species extinctions since c. 1600 and current threatened with extinction in the world (data from Smith et al. 1993)

Taxonomic Group	Total Number of Species	Extinctions		Threatened	
		number	(%)	number	(%)
Fern allies	1600	4	0.25	---	---
True ferns	10000	12	0.12	---	---
Gymnosperms	758	2	0.26	242	31.93
Monocotyledons	52000	120	0.23	4421	8.50
Dicotyledons	190000	462	0.24	17474	9.20
Total	240000	600	0.25	22137	9.22

FIGURE 8.1. Growth of the endangered and threatened species in the United States from 1976 to 1995.

As of February 1994, 404 native U.S. taxa of vascular plants have been formally protected under the provisions of the U.S. Endangered Species Act of 1973 (USFWS 1994). By September 1995, the listed number increased to 524 (**Figure 8.1**). Of these, about 200 vascular plant species may be extinct, according to records of the U.S. Fish and Wildlife Service (USFWS) and the Nature Conservancy (Russell and Morse 1992). Recent studies of the genetics of small populations indicated that the minimum population for long term survival of a species is at least 10,000, not the 500 randomly mating individuals as suggested in the early 1980s (Culotta 1995). Therefore, it is expected that more endangered and threatened species will be listed because many unlisted species have current populations of less than 10,000 mating individuals.

8.2. Rediscovery of Some Presumed Extinct Species

Many taxa described decades or a century ago, but unstudied or poorly studied since, are not found today and therefore are considered extinct. However, extensive studies often "rediscovered" such claimed extinct species. The following examples were largely selected from only three journals: *Sida*, *Madroño*, and *Brittonia* from 1975 to 1995.

Astragalus columbianus Barneby (Fabaceae) was described in 1964 on the basis of the only two previous collections: one in 1883 and the other in 1922. It had no other collections and was declared extinct by the USFWS in 1975. In 1976, the species was found on a strip of land about 0.1 by 10 km in size and vigorous in persisting at Priest Rapids on the Columbia River in Yakima County, Washington (Sauer et al. 1979). Therefore, the species is not in immediate danger of global extinction.

Calamovilfa curtissii (Vasey) Scribn (Poaceae) was rediscovered after about 50 years of "disappearance" in two distinct regions of Florida (Johnson and Blyth 1988).

Castilleja cruenta Standl. (Scrophulariaceae) was originally collected by J. W. Blumer in 1907 in the Chiricahua Mountains in Cochise, Arizona and was named in 1909 on the basis of a single specimen. The USFWS listed the species as category 3A species, a taxon for which the service has persuasive evidence of extinction. In 1992, the species was rediscovered in the type locality (Egger 1993).

Clarkia mosquinii Small was listed as presumed extinct due its disappearance since 1971. In 1993, it was found in a number of sites in Butter, California (Gottlieb and Janeway 1995).

Hymenoxys texana (Coulter and Rose) Cockerell was first collected from Hockley, Texas in 1889-1890 by F.W. Thurow. The species had not been seen alive until 1981 when 3 populations were found in the prairies near Houston, Texas (Mahler 1983)

Lesquerella lyrata Rollins (Crutiferae) had not been collected since it was named in 1955 and thus considered by USFWS as possibly extinct. It was found in several localities in northwestern Alabama with some thousands of plants in 1984 and 1985 (Webb

and Kral 1986). *L. pallida* (Torrey and Gray) Watson was initially collected in 1830s on small prairies near San Augustine, Texas. Until 1983, no additional collections appeared to have been made anywhere. However, it has now been found in several localities with several thousands of plants since it was rediscovered in 1981 by E. Nixon and his colleagues (Nixon et al. 1983).

Lomatium peckianum was collected in Oregon in 1983 for the first time in more than 50 years (Morse et al. 1995).

Machaeranthera aurea (Gray) Shinnery was first collected by C. Wright in 1840s near Houston, Texas. It was presumed extinct until it was rediscovered in the vicinity of Cypress in 1980 (Mahler 1983).

Pleuropogon oregonus Chase (Poaceae) was first collected in 1886 by W. C. Cusick in Hog Valley, Oregon. It had not been collected for nearly half a century (since 1936) and was reported as extinct. The species was rediscovered in 1979 (But et al. 1985).

Potamogeton floridanus Small (Potamogetonaceae) had not been seen alive since 1886 and was subsequently listed in the Federal Register as possibly extinct in 1973. The species was rediscovered on four sites in Santa Rosa, Florida during 1981–1984 (Wilhelm and Mohlenbrock 1986).

Sprianthes parksii Correll (Orchidaceae) is a rare Texas endemic. It had not been seen alive since it was named in 1947 and thus was presumed extinct. It was rediscovered in two localities with 20 plants in Brazos, Texas in 1978 (Catling and McIntosh 1979).

Trifolium stoloniferum Muhl. ex A. Eaton (Fabaceae) was considered as possibly extinct by the USFWS. The last collection was in 1907. It was rediscovered in West Virginia in 1983 (Bartgis 1985) and has been found subsequently in Indiana, Kentucky, Missouri, and Ohio (Cusick 1989, Homoya et al. 1989). *T. microcephalum* Pursh, a species not seen since it was first collected in 1805, was rediscovered in 1985 (Hoy 1993).

Ziziphus celata Judd and D. Hall (Rhamnaceae) is a rare Florida endemic. The last collection was made in 1955 and since then it was presumed extinct. It was rediscovered in Highlands and adjacent polk counties in 1987 and 1988 (Delaney et al. 1989).

The discoveries of additional populations and new distributions have changed some endangered species' federal status. Therefore, we cannot be certain that some species are extinct. The reasons for so many species being claimed as extinct are numerous, but largely include: (1) misidentification, (2) mislocality, and (3) unawareness or inadequate field searches. Some species were first described on the basis of a single or few specimens and no living plants from the type locality were seen by the authors. Usually, the specimens were collected during either flower, fruiting or asexual periods. Consequently, incomplete and incorrect morphological descriptions (e.g., color characters) are not uncommon. For example, *Ziziphus celata* was described based on only a single flowering specimen. *Lesquerella pallida* has questionable flower color not adequately shown by the type specimen and thus it was considered as a slightly anomalous specimen of *L. gracilis* (hook.) Watson (Nixon et al. 1983). The second possibility for misidentification is that some species are not distinctive from their related species. Only experts can distinguish them. For example, *Potamogeton floridanus* was not recognized as a distinct species by taxonomists because of its non-distinctiveness from other species.

Some species had no clear type locality records or habitat descriptions when they were collected and published and thus were difficult to relocate in the field. *Castilleja cruenta*, *Clarkia mosquinii*, *Pleuropogon oregonus*, and *Ziziphus celata* are examples.

Some species are inconspicuous and easily overlooked in the field. Many orchids like *Spiranthes parksii* are small plants and are often overlooked in the field. Inadequate, non-extensive surveys almost never uncover such plants. Some other species like *Astragalus columbianus* that are commonly present in some restricted areas, may be presumed "extinct" simply because of inadequate investigations.

8.3. Cultural Preservation

Many species are extirpated from the wild, but still exist in cultivation, with even more variations created in new environments. *Franklinia alatamaha* Marsh., a small tree known historically only near the Altamaha River in southeastern Georgia, is now widely cultivated as an ornamental in eastern states (Morse et al. 1995). *Ginkgo biloba* L., considered extinct in the wild, is commonly cultivated worldwide with many cultural varieties.

8.4. New Species and New Distribution Records

New taxa or new distributions of plants are continuously recorded throughout the world. In the United States, between 1940 and 1995, for example, 718 new taxa of seed plants were reported in several journals [*Annals of Missouri Botanical Gardens* (1985–1995), *Brittonia* (1940–1995), *Madroño* (1940–1995), *Novon* (1991–1995), *Rhodora* (1958–1995), and *Sida* (1962–1995)]. This averaged about 13 species every year. Obviously, there is no decreasing trend in the new taxon number in the United States according to the data (**Figure 8.2**).

New distributions and new records of plants have been reported from time to time. Almost all issues of *Sida*, *Rhodora*, *Madroño*, and *Brittonia* have such reports. Even places like Concord, Massachusetts, which has about a two century of history of intensive botanical survey, still continuous to report new findings. For example, *Ledum groenlandicum* Oeder, considered extinct locally, later was rediscovered (Angelo 1979).

However, non-natives and inconspicuous natives are often overlooked by plant collectors and thus are less well documented (Morin 1995).

Figure 8.2. New taxa of plants discovered in the United States from 1940 to 1995 according to the following journals: Annals of Missouri Botanical Gardens (1985–1995), Brittonia (1940–1995), Madroño (1940–1995), Novon (1991–1995), Rhodora (1958–1995), and Sida (1962–1995).

This evidence suggest that knowledge of species pools is still incomplete both regionally and globally. Thus, current knowledge about the fate of endangered species is mostly theoretical because we rarely witness the demise of specific species. Assuming there are 3 to 80 million living species with a modest total of 30 million (Stebbins 1982, Solbrig 1991, Gaston and May 1992), there still are simply not enough scientific reasons nor financial resources available at present to classify all organisms (Heywood in Dayton 1991). So far, in fact, only 1.4 million species at most have been described (Raven and Wilson 1992). Plant studies on any taxonomic group or geographic region may be categorized as: poor, fair, or extensive. Taxonomic groups or geographical regions that have been thoroughly studied show a relatively high proportion of extinctions, while those receiving little attention show relatively few extinctions (Smith et al. 1993). However, often extensive studies provide more encouraging data. For most taxa and regions, present studies are either poor or fair.

Extensive studies are few in number. At present, therefore, it is impossible to establish a firm current extinction rate when scientists do not even have a valid count of how many species are extant on the earth (Dayton 1991).

It is even more difficult to estimate earlier species pools and ancient extinction rates. The fossil records, the basis of such estimates, are incomplete in distribution, identification, and dating so that calculations of background extinction rates are crude and unreliable. Further, direct comparison of ancient extinctions to the present-day situation is difficult. Because quantitative palaeontological data come primarily from marine invertebrates, which means fossilized species are usually drawn from the more abundant and widespread taxa (Jablonski 1995).

8.5. Habitat Destruction and Species Extinction

A current dominant conservation theoretical assumption is that man-caused habitat destruction is the most prevalent cause of species extinction today because when habitats are destroyed, populations and, eventually, species inevitably go extinct (Wilson 1992, Ehrlich 1995).

However, most species have sufficient adaptation plasticity to survive in broad habitats, although they may thrive best in specific habitats. When the current habitat (whether best for the species or not) changes, species may migrate and colonize other habitats when viable propagules are available. Some endangered species, especially those of Crutiferae, Fabaceae, and Rosaceae establish well on sites such as fields when their original habitats are changed.

Alternatively, some species are more extinction-prone than others; and they may still die out, even when protected (Lawton 1995). Usually, species of gymnosperms and Orchidaceae seem more susceptible to extinction than many others. But there are examples of rediscovery of these plants after their apparent disappearance due to habitat change. *Cypripedium reginae* Walt., reported from only one

station in New Hampshire, was last collected in 1891. Early in this century, habitat of the plant (open water bog) was converted to a spruce shrub community in this location. Since then the orchid was considered "possibly extinct" in the state because there was no new collection of it (Storks and Crow 1978). In 1979, numerous plants were found in two swamps around the spruce community (Brackley 1979).

Hunting rather than habitat destruction is often responsible for some species disappearance. Many species have been threatened or eliminated completely because of their medicinal and economic values. For examples, some cacti and butterflies have become threatened because of the activity of collectors (Jordan 1995). In China, more than one third of the species on the national endangered list have medicinal uses. The most significant examples include *Acanthopanax senticosus* (Rupr. et Maxim.) Harms, *Antiaris toxicaria* (Pers.) Lesch., *Astragalus membranaceus* (Fisch.) Bunge, *A. mongolicus* Bunge, *Boschniakia rossica* (Cham. et Schltdl.) Fedtsch et Flerov., *Cistanche deserticola* Ma, *C. tubulosa* (Schrenk) Wight, *Coptis chinensis* Franch, *Eucommia ulmoides* Oliv., *Fritillaria pallidiflora* Schrenk, *F. ussuriensis* Maxim., *F. walujewii* Regel, *Gastrodia elata* Bl., *Magnolia officinalis* Rehd. et Wils., *Panax ginseng* C. A. May, and *Phellodendron amurense* Rupr.. Some species in China have become endangered because of their economic value, for uses such as timber or other products, e.g., *Metasequoia glyptostroboides* Hu et Cheng, *Pinus* spp., and *Fraxinus mandshurica* Rupr. For almost all of these species, the habitats still exist, but regeneration takes a long time. To complicate the situation, the demand for a species may even increase when it is in short supply.

Finally, the extinction rate is not the best measure of the health of the planet's species pools. "Extinction" as an issue is easier to exploit politically than speciation! Extinction is based on historical records (either fossil or literature) of the existence of species. But the absence of fossil records does not indicate that there were no such species because fossil records and historical evidence are incomplete. This implies that (1) so called extinction rate of species is not valid;

and (2) we cannot determine the exact time of appearance of a new species, and thus cannot tell the speciation rate.

Species richness in a region at a given time is a dynamic, flowing pool of species; and is the product of speciation, immigration, emigration, and extinction (Li 1993). It is a species pool. One might therefore conclude that at present life on earth is at comparatively little risk of extinction (Smith et al. 1993) to which we add that life will go on. But just how and in what form is a matter of chance based on the probabilities of Nature.

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APPENDICES

Appendix I Synopsis of native seed plants in the boreal regions.

Family	Europe		Easton Asia		Western North America		Eastern North America		Total	
	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.
GYMNOSPERMS										
Pinaceae	4	5	4	7	5	10	5	10	5	28
Cupressaceae	1	1	1	2	2	2	3	5	3	7
Taxaceae	1	1			1	1			1	2
Ephedraceae	1	1							1	1
MAGNOLIIDAE										
Schisandraceae			1	1					1	1
Nymphaeaceae	1	1	3	3	3	4	2	2	3	5
Ranunculaceae	11	33	19	93	10	46	8	34	19	149
Ceratophyllaceae	1	1	1	1	1	1			1	1
Berberidaceae			1	2					1	2
Menispermaceae			1	1					1	1
Fumariaceae	1	3	1	7	1	3	1	2	1	12
Papaveraceae	2	5	3	3	1	5			3	11
HAMAMELIDAE										
Ulmaceae	1	2	1	2			1	2	1	6
Urticaceae	1	2	3	7	2	2	2	2	4	8
Hamamelidaceae							1	1	1	1
Moraceae			1	1					1	1
Juglandaceae			1	1					1	1
Myricaceae	1	1	1	1	1	1	2	2	2	2
Fagaceae	2	3	1	1			2	6	2	9
Betulaceae	4	7	4	10	2	7	5	10	5	25
CARYOPHYLLIDAE										
Chenopodiaceae	5	6	10	22	5	7	2	18	11	40
Portulacaceae	2	2	3	3	4	12			4	13
Caryophyllaceae	8	32	13	55	10	49	10	23	13	97
Polygonaceae	4	21	4	38	4	15	5	11	5	54
Plumbaginaceae	1	1	1	1	1	1	1	1	1	1
DILIENIIDAE										
Actinidiaceae			1	2					1	2
Guttiferae	1	3	1	3					1	5
Tiliaceae	1	1	1	1			1	1	1	3
Droseraceae	1	1	1	1	1	2	1	2	1	2
Cistaceae	1	1					1	1	2	2
Cucurbitaceae			1	1					1	1
Violaceae	1	12	1	10	1	10	1	7	1	26

Appendix I (continued).

Family	Europe		Eastern Asia		Western North America		Eastern North America		Total	
	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.
Salicaceae	2	29	3	36	2	56	2	36	3	110
Brassicaceae	11	26	21	59	19	72	12	30	25	105
Empetraceae	1	1	1	1	1	1	1	1	1	1
Ericaceae	12	18	11	17	14	27	13	21	16	42
Pyrolaceae	4	7	5	9	4	8	3	5	5	11
Monotropaceae	1	1	1	1	1	1	1	1	1	1
Diapensiaceae	1	1	1	1	1	1	1	1	1	1
Primulaceae	5	13	6	19	7	24	5	8	7	35
ROSAIDAE										
Crassulaceae	2	8	2	12	2	4	2	5	2	19
Saxifragaceae	4	17	7	35	10	48	5	21	12	76
Rosaceae	16	36	21	78	18	61	14	46	23	147
Leguminosae	6	31	12	52	6	38	5	18	13	105
Elaeagnaceae	1	1			2	2	1	1	2	3
Haloragaceae	2	3	2	3	2	4	2	3	2	4
Lythraceae			1	1					1	1
Onagraceae	2	10	2	11	2	9	2	7	2	15
Comaceae	1	2	1	2	1	3	1	3	1	5
Santalaceae			1	4	1	1	1	1	2	5
Loranthaceae					1	1			1	1
Celastraceae	1	1	2	4			1	1	2	6
Euphorbiaceae	1	7	1	3	1	1	1	2	1	11
Rhamnaceae	1	1	1	2			1	1	1	4
Vitaceae			2	2					2	2
Linaceae	1	2	1	1	1	1	1	1	1	3
Polygalaceae	1	2	1	2					1	4
Aceraceae	1	1	1	4	1	2	1	4	1	11
Rutaceae			2	2			1	2	2	4
Anacardaceae							1	1	1	1
Oxaliaceae	1	1	1	1			1	1	1	3
Geraniaceae	1	7	1	7	1	4	1	1	1	15
Balsaminaceae	1	1	1	1	1	1	1	1	1	2
Araliaceae			3	3	2	2	2	3	4	6
Apiaceae	5	6	9	21	10	17	5	10	12	38
ASTERIDAE										
Gentianaceae	3	6	3	11	4	13	3	8	4	18

Appendix I (continued).[illegible]

Appendix I (continued).

Family	Europe		Eastern		Western		Eastern		Total	
	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.
LILIIDAE										
Liliaceae	12	19	20	42	13	22	8	13	21	61
Iridaceae	1	1	1	5	2	3	1	1	2	9
Orchidaceae	12	16	13	24	12	27	16	39	21	63
Total 104 families	269	710	383	1177	326	1170	266	753	470	2360

Appendix II Synopsis of native seed plants in the temperate regions.

Family	Eastern Asia		Japan		Western North America		Eastern North America		Total	
	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.
GYMNOSPERMS										
Pinaceae	4	11	3	6	6	19	5	11	6	43
Cupressaceae	3	4	3	4	4	7	2	4	6	15
Taxaceae	1	1	1	1	1	1	1	1	1	3
MAGNOLIIDAE										
Magnoliaceae	2	2	2	2			4	4	4	8
Annonaceae							1	1	1	1
Calycanthaceae							1	1	1	1
Chloranthaceae	1	1	1	1					1	1
Saururaceae							1	1	1	1
Aristolochiaceae	2	2			1	1	2	3	2	6
Schisandraceae	1	1	1	2					1	2
Nymphaeaceae	5	5	4	5	3	5	4	8	5	12
Ceratophyllaceae	1	2	1	1	1	1	1	1	1	2
Ranunculaceae	21	126	17	45	16	105	19	61	27	281
Berberidaceae	6	7	5	5	3	5	4	4	9	17
Lardizabalaceae	1	1	1	1					1	1
Menispermaceae	3	3	2	2			1	1	3	4
Coriariaceae			1	1					1	1
Papaveraceae	4	5	1	1	4	7	3	3	9	15
Fumariaceae	2	9	2	5	2	9	3	8	3	28
HAMAMELIDAE										
Cercidiphyllaceae			1	1					1	1
Platanaceae							1	1	1	1
Hamamelidaceae	1	1	1	1			1	1	1	3
Daphniphyllaceae			1	1					1	1
Ulmaceae	3	7	2	4	1	1	2	6	3	14
Moraceae	2	4	2	2			1	1	2	6
Urticaceae	6	12	5	13	2	6	6	8	7	32
Juglandaceae	1	1	2	2			2	8	3	11
Myricaceae	1	1	1	1	1	2	2	3	2	4
Fagaceae	1	3	3	5	2	3	3	13	4	22
Betulaceae	5	14	5	15	3	9	5	19	6	38

Appendix II (continued).

Family	Eastern Asia		Japan		Western North America		Eastern North America		Total	
	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.
CARYOPHYLLIDAE										
Nyctaginaceae					2	9	1	1	2	9
Aizoaceae	1	1			1	1			1	2
Cactaceae					3	5	1	3	3	8
Chenopodiaceae	9	27	4	7	10	38	5	16	13	69
Amaranthaceae	1	3	1	1	1	5	1	3	1	12
Portulacaceae	2	2	2	2	8	19	4	6	8	24
Caryophyllaceae	16	53	15	40	12	65	9	39	18	137
Polygonaceae	3	70	3	35	6	83	4	36	7	175
Plumbaginaceae	1	1	1	1	1	1			1	1
DILIENIIDAE										
Theaceae							1	1	1	1
Actinidiaceae	1	3	1	3					1	3
Elatinaceae	1	2			2	5	1	2	2	7
Guttiferae	2	5	2	5	1	5	2	18	2	28
Tiliaceae	2	5	1	2			1	2	2	9
Sarraceniacae					1	1	1	1	2	2
Dosereae	1	2	1	2	1	2	1	5	1	5
Cistaceae							3	11	3	11
Violaceae	1	37	1	22	1	24	2	34	2	95
Passifloraceae							1	2	1	2
Cucurbitaceae	3	3	3	3	2	2	1	1	7	7
Salicaceae	3	45	3	24	2	40	2	29	3	122
Loasaceae					1	5			1	5
Capparaceae					3	5	1	2	3	7
Brassicaceae	27	60	15	31	36	134	16	51	47	224
Clethraceae			1	1			1	1	1	2
Empetraceae	1	1	1	1	1	1	2	2	2	2
Ericaceae	8	16	17	38	19	48	19	59	33	123
Pyrolaceae	5	14	5	12	4	14	4	10	5	27
Monotropaceae	2	2	2	2	2	2	3	3	3	3
Diapensiaceae			2	2			1	1	2	2
Ebenaceae							1	1	1	1
Styraceae	1	1	1	2			2	2	2	4
Symplocaceae	1	1	1	1			1	1	1	2
Mysinaceae			1	1					1	1
Primulaceae	6	22	7	16	8	29	9	19	11	65

Appendix II (continued).

Family	Eastern Asia		Japan		Western North America		Eastern North America		Total	
	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.
ROSAIDAE										
Crassulaceae	2	22	2	8	2	11	2	4	2	36
Penthoraceae	1	1					1	1	1	1
Saxifragaceae	12	47	11	27	22	101	13	41	30	189
Rosaceae	29	114	23	68	32	123	23	113	46	331
Leguminosae	27	84	17	38	13	227	31	72	46	382
Elaeagnaceae			1	1	2	3	2	3	2	4
Podostemaceae	2	2					1	1	3	3
Haloragaceae	2	4	2	3	1	4	2	7	3	12
Lythraceae	2	3	1	1	3	5	5	6	5	9
Thymelacaceae	3	4	1	2			1	1	4	6
Onagraceae	3	15	3	18	8	56	6	22	9	91
Trapaceae	1	6	1	1					1	6
Melastomaceae							1	1	1	1
Garryaceae					1	2			1	2
Alangiaceae			1	1					1	1
Cornaceae	1	3	3	5	1	4	1	11	3	19
Nyssaceae							1	1	1	1
Santalaceae	1	2	1	1	1	2	1	2	2	4
Loranthaceae	1	1	1	1	2	6	2	2	3	8
Celastraceae	3	10	2	8	3	3	2	5	5	24
Malvaceae	2	3			5	18	3	5	6	23
Aquifoliaceae			1	4			2	3	2	7
Buxaceae			1	1					1	1
Euphorbiaceae	4	12	2	5	2	5	4	15	6	32
Rhamnaceae	1	7	2	4	2	7	2	4	3	18
Vitaceae	3	3	3	4			2	3	3	8
Linaceae	1	2	1	2	1	5	1	3	1	9
Polygalaceae	1	4	1	1	1	3	1	7	1	14
Staphylaceae	1	1	1	1			1	1	1	2
Hippocastanaceae			1	1			1	1	1	2
Aceraceae	1	8	1	9	1	4	1	7	1	25
Sapindaceae	1	1							1	1
Anacardaceae	1	2	1	3	1	4	1	7	1	12
Simaroubaceae	1	2	1	1					1	2

Appendix II (continued).

Family	Eastern Asia		Japan		Western North America		Eastern North America		Total	
	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.
Rutaceae	3	4	3	3			2	2	5	7
Oxaliaceae	1	3	1	5	1	7	1	6	1	12
Geraniaceae	2	13	1	5	1	7	1	2	2	22
Limnanthaceae					2	3	1	1	2	3
Balsaminaceae	1	3	1	2	1	5	1	3	1	9
Araliaceae	5	7	5	8	2	2	3	7	5	18
Apiaceae	30	57	22	32	24	114	22	32	52	202
ASTERIDAE										
Gentianaceae	10	29	7	19	9	20	9	19	16	68
Appcynaceae	1	1	1	1	1	6	1	3	2	7
Asclepidaceae	4	14	3	6	1	3	1	5	6	23
Solanaceae	4	5	3	6	5	7	2	6	7	19
Convolvaceae	4	12	2	6	2	17	5	10	5	36
Polemoniaceae	1	2	1	2	13	70	3	7	13	79
Hydrophyllaceae					7	36	3	4	7	39
Boraginaceae	13	24	11	14	14	85	6	16	21	119
Verbenaceae	3	4	2	2	1	3	2	5	5	9
Phrymaceae	1	1	1	1			1	1	1	1
Lamiaceae	26	59	21	35	18	41	20	41	41	144
Hippuridaceae	1	1	1	1	1	2	1	1	1	2
Callitrichaceae	1	2	1	2	1	7	1	3	1	10
Plantaginaceae	1	5	1	2	1	8	2	7	2	17
Buddlejaceae	1	1	1	1	1	1			1	2
Oleaceae	3	7	3	5	1	1	1	4	4	15
Scrophulariaceae	19	51	17	35	24	188	23	50	40	283
Acanthaceae	1	1					1	1	1	2
Lentibulariaceae	2	6	2	7	2	5	2	10	2	15
Orobanchaceae	4	5	4	4	2	5	3	4	6	12
Campanulaceae	7	21	6	11	8	23	3	9	13	49
Rubiaceae	4	19	5	18	2	10	4	19	8	45
Caprifoliaceae	6	20	4	15	4	16	6	22	8	54
Adoxaceae	2	4	2	2	2	3	2	3	2	6
Valerianaceae	2	7	2	5	3	10	2	4	4	21
Dipsacaceae	2	2	1	1					2	2
Asteraceae	55	213	40	94	89	442	46	189	124	811

Appendix II (continued).

Family	Eastern Asia		Japan		Western North America		Eastern North America		Total	
	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.	gen.	sp.
ALISMATIDAE										
Alismaceae	2	7	2	6	3	6	3	16	4	24
Hydrocharitaceae	5	6	2	2	2	6	4	7	8	15
Scheuchzeriaceae	2	2	2	3	3	5	2	3	3	5
Potamogetonaceae	2	15	2	16	3	26	3	32	3	53
Najadaceae	1	3	1	2	1	3	1	4	1	7
Zosteraceae	1	2	2	5	2	4	1	1	2	7
Triuridaceae	1	1							1	1
ARECIDAE										
Lemnaceae	2	3	2	3	4	6	4	9	4	10
Araceae	5	8	5	10	1	1	5	6	7	20
Xyridaceae							1	3	1	3
Commelinaceae	1	1	1	1			2	3	2	4
Eriocaulaceae	1	3	1	8			1	3	1	13
Juncaceae	2	29	2	29	2	56	2	29	2	102
Cyperaceae	9	121	8	161	9	193	12	128	13	486
Poaceae	58	134	55	115	56	246	45	150	90	487
Sparganiaceae	1	6	1	6	1	5	1	7	1	12
Typhaceae	1	5	1	2	1	2	1	2	1	5
LILIIDAE										
Pontederiaceae	1	1	1	1	1	1	3	3	4	5
Iridaceae	1	11	2	7	2	9	2	8	2	30
Liliaceae	26	74	29	62	22	94	21	44	45	228
Dioscoreaceae	1	1	1	3					1	3
Orchidaceae	26	46	29	58	14	36	20	62	40	143
Total	651	2044	569	1450	652	3163	605	1899	1153	6884
Number of family	125		127		106		133		155	

APPENDIX III
TOTAL NATIVE SPECIES LIST OF SEED PLANTS IN
THE BOREAL REGIONS OF EUROPE, EASTERN
ASIA, AND WESTERN AND EASTERN NORTH
AMERICA.

1. Only Latin names are listed to avoid ambiguities caused by varying scopes of taxonomic characterers employed in species indentification by different authors.
2. Absence means no species grow naturally in that region.
3. Main references: Hulten (1958); Polunin (1959); Polunin (1969); Scoggan (1978); Larsen (1980); Li (unpublished, 1988).

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<u>GYMNOSPERMS</u>				
Pinaceae				
<i>Abies</i>	<i>sibirica</i>	<i>nephrolepis</i>	<i>amabilis</i> <i>grandis</i> <i>lasiocarpa</i>	<i>balsamea</i>
<i>Larix</i>	<i>decidua</i>	<i>gmelini</i>	<i>laricina</i>	<i>laricina</i>
<i>Picea</i>	<i>abies</i> <i>fenica</i>	<i>jezoensis</i> <i>koraiensis</i>	<i>stichensis</i> <i>mariana</i> <i>glauca</i>	<i>rubens</i> <i>mariana</i> <i>glauca</i>
<i>Pinus</i>	<i>sylvestris</i>	<i>sylvestris</i> <i>pumila</i> <i>hingensis</i>	<i>contorta</i>	<i>banksiana</i> <i>resinosa</i> <i>rigida</i> <i>strobus</i>
<i>Tsuga</i>			<i>heterophylla</i> <i>mertensiana</i>	<i>canadensis</i>
Cupressaceae				
<i>Chamaecyparis</i>			<i>nooikatensis</i>	<i>thyoides</i>
<i>Juniperus</i>	<i>communis</i>	<i>communis</i> <i>dahurica</i>	<i>communis</i>	<i>communis</i> <i>horizontalis</i> <i>occidentalis</i> <i>plicata</i>
<i>Thuja</i>				
Taxaceae				
<i>Taxus</i>	<i>baccata</i>		<i>brevifolia</i>	
Ephedraceae				
<i>Ephedra</i>	<i>distachya</i>			
<u>ANGIOSPERMS</u>				
MAGNOLIIDAE				
Schisandraceae				

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Schisandra</i>		<i>chinensis</i>		
Nymphaeaceae				
<i>Brasenia</i>		<i>schreberi</i>	<i>schreberi</i>	<i>schreberi</i>
<i>Nuphar</i>		<i>pumilum</i>	<i>polysepalum</i> <i>variegatum</i>	
<i>Nymphaea</i>	<i>tetragona</i>	<i>tetragona</i>	<i>tetragona</i>	<i>tetragona</i>
Ranunculaceae				
<i>Aconitum</i>		<i>maximum</i> <i>delphinifolium</i>	<i>maximum</i> <i>delphinifolium</i>	
	<i>septentrionale</i>	<i>ambiguum</i>		
	<i>vulparia</i>	<i>alboviolaceum</i> <i>ciliare</i> <i>coreanum</i> <i>excelsum</i> <i>fischeri</i> <i>kanunculoides</i> <i>kirinense</i> <i>kusnezoffii</i> <i>macrorrhynchum</i> <i>sczukinii</i> <i>umbrosum</i>		
<i>Actaea</i>	<i>spicata</i>	<i>spicata</i>	<i>rubra</i>	<i>rubra</i>
<i>Adonis</i>	<i>vernalis</i>	<i>sibiricus</i>		
<i>Anemone</i>		<i>richardsonii</i> <i>narcissiflora</i>	<i>richardsonii</i> <i>narcissiflora</i> <i>parviflora</i> <i>multifida</i>	<i>richardsonii</i> <i>parviflora</i> <i>multifida</i>
	<i>ranunculoides</i>	<i>raddeana</i> <i>dichotoma</i>	<i>drummondi</i> <i>deltioidea</i>	<i>cylindrica</i> <i>canadensis</i>
	<i>nemorosa</i>	<i>silvestris</i> <i>amurensis</i> <i>udensis</i> <i>umbrosa</i> <i>viridiflora</i>		<i>quinquefolia</i> <i>patens</i> <i>riparia</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Aquilegia</i>	<i>vulgaris</i>	<i>oxysepala</i> <i>japonica</i> <i>parviflora</i>	<i>brevistyla</i>	<i>canadensis</i>
<i>Caltha</i>	<i>palustris</i>	<i>palustris</i> <i>natans</i> <i>mambranacea</i>	<i>palustris</i> <i>natans</i>	<i>palustris</i> <i>biflora</i> <i>leptosepala</i>
<i>Cimicifuga</i>		<i>dahurica</i> <i>simplex</i>		
<i>Clematis</i>	<i>alpina</i>	<i>heracleifolia</i> <i>aethusifolia</i> <i>brevicaudata</i> <i>fusca</i> <i>hexapetala</i> <i>macropetala</i> <i>mandshurica</i> <i>sibirica</i> <i>terniflora</i>		
<i>Coptis</i>		<i>trifolia</i>	<i>trifolia</i> <i>asplenifolia</i>	<i>trifolia</i>
<i>Delphinium</i>		<i>crassifolium</i> <i>cheilanthum</i> <i>hingense</i> <i>korshinskyanum</i> <i>grandiflorum</i> <i>maackianum</i>	<i>brachycentrum</i> <i>glaucum</i>	
<i>Enemion</i>		<i>raddeanum</i>		
<i>Eranthis</i>		<i>stellata</i>		
<i>Isopyrum</i>		<i>manshuricum</i>		
<i>Leptopyrum</i>		<i>fumarioides</i>		
<i>Paeonia</i>		<i>obovata</i> <i>laciflora</i>		
<i>Pulsatilla</i>	<i>pratensis</i> <i>vernalis</i> <i>vulgaris</i>	<i>ambigua</i> <i>chinensis</i> <i>cernua</i>		<i>patens</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
		<i>dahurica</i>		
		<i>sukaczewii</i>		
		<i>turczaninowii</i>		
<i>Ranunculus</i>	<i>acris</i>	<i>acris</i>	<i>acris</i>	<i>acris</i>
	<i>aquatilis</i>	<i>aquatilis</i>	<i>aquatilis</i>	<i>aquatilis</i>
	<i>flammula</i>	<i>flammula</i>	<i>flammula</i>	<i>flammula</i>
	<i>nivalis</i>	<i>nivalis</i>	<i>nivalis</i>	<i>nivalis</i>
	<i>pygmaeus</i>	<i>pygmaeus</i>	<i>pygmaeus</i>	<i>pygmaeus</i>
	<i>sceleratus</i>	<i>sceleratus</i>	<i>sceleratus</i>	<i>sceleratus</i>
	<i>sulphureus</i>	<i>sulphureus</i>	<i>sulphureus</i>	<i>sulphureus</i>
	<i>glacialis</i>	<i>glacialis</i>	<i>glacialis</i>	
		<i>cymbalaria</i>	<i>cymbalaria</i>	<i>cymbalaria</i>
		<i>gmelini</i>	<i>gmelini</i>	<i>gmelini</i>
		<i>pedatifidus</i>	<i>pedatifidus</i>	
			<i>lapponicus</i>	<i>lapponicus</i>
			<i>pallasii</i>	<i>pallasii</i>
			<i>sabinii</i>	<i>sabinii</i>
			<i>hyperboreus</i>	<i>hyperboreus</i>
			<i>macounii</i>	<i>macounii</i>
	<i>bubosus</i>	<i>flaccidus</i>	<i>kamtschaticus</i>	<i>allenii</i>
	<i>auricomus</i>	<i>amurensis</i>	<i>cooleyae</i>	<i>laxicaulis</i>
	<i>trichophyllus</i>	<i>kauffmannii</i>	<i>eschschoitzii</i>	<i>uncinatus</i>
	<i>repens</i>	<i>monophyllus</i>	<i>gelidus</i>	
	<i>arvensis</i>	<i>natans</i>	<i>occidentalis</i>	
	<i>lingua</i>	<i>radicans</i>	<i>orthorhynchus</i>	
	<i>petaliatus</i>	<i>smirnovii</i>	<i>pacificus</i>	
	<i>sceleratus</i>	<i>ruthenicus</i>	<i>turnei</i>	
			<i>uncinatus</i>	
<i>Thalictrum</i>	<i>alpinum</i>	<i>alpinum</i>	<i>alpinum</i>	<i>alpinum</i>
	<i>minus</i>	<i>minus</i>	<i>minus</i>	
	<i>aquilegifolium</i>	<i>aquilegifolium</i>		
		<i>spaesiflorum</i>	<i>sparsiflorum</i>	
	<i>flavum</i>	<i>baicalense</i>	<i>occidentale</i>	<i>dasycarpum</i>
		<i>squarrosus</i>		
		<i>petaloideum</i>		
		<i>foetidum</i>		

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Trollius</i>	<i>europaeus</i>	<i>simplex</i> <i>tuberiferum</i> <i>riderianus</i> <i>macropetalus</i> <i>ledebourii</i>	<i>riderianus</i>	
Ceratophyllaceae				
<i>Ceratophyllum</i>	<i>demersum</i>	<i>demersum</i>	<i>demersum</i>	
Berberaceae				
<i>Berberis</i>		<i>amurensis</i> <i>sibirica</i>		
Menispermaceae				
<i>Menispermum</i>		<i>dahuricum</i>		
Fumariaceae				
<i>Corydalis</i>			<i>aurea</i> <i>sempervirens</i> <i>pauciflora</i>	<i>aurea</i> <i>sempervirens</i>
	<i>solida</i> <i>bulbosa</i> <i>intermedia</i>	<i>pauciflora</i> <i>speciosa</i> <i>mpatiens</i> <i>ochotensis</i> <i>sibirica</i> <i>pallida</i> <i>thurtschaninovii</i>		
Papaveraceae				
<i>Chelidonium</i>	<i>majus</i>	<i>majus</i>		
<i>Hylomecon</i>		<i>erectum</i>		
<i>Papaver</i>	<i>radicatum</i>	<i>nudicaule</i>	<i>radicatum</i> <i>macounii</i> <i>alaskanum</i> <i>alboroseum</i> <i>walpolei</i>	
	<i>argemone</i> <i>dubium</i> <i>rhoeas</i>			

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
HAMAMELIDAE				
Ulmaceae				
<i>Ulmus</i>	<i>glabra</i> <i>laevis</i>	<i>japonica</i> <i>macrocarpa</i>		<i>americana</i> <i>rubra</i>
Urticaceae				
<i>Laportea</i>		<i>bulbifera</i> <i>micrantha</i>		
<i>Parietaria</i>			<i>pennsylvanica</i>	<i>pennsylvanica</i>
<i>Pilea</i>		<i>pumila</i>		
<i>Urtica</i>	<i>dioica</i> <i>urens</i>	<i>dioica</i> <i>urens</i> <i>angustifolia</i> <i>fissa</i>	<i>dioica</i>	<i>dioica</i>
Hamamelidaceae				
<i>Hamamelis</i>				<i>virginiana</i>
Moraceae				
<i>Humulus</i>		<i>scandens</i>		
Juglandaceae				
<i>Juglans</i>		<i>amurensis</i>		
Myricaceae				
<i>Comptonia</i>				<i>peregrina</i>
<i>Myrica</i>	<i>gale</i>	<i>gale</i>	<i>gale</i>	<i>gale</i>
Fagaceae				
<i>Fagus</i>	<i>sylvatica</i>			<i>sylvatica</i>
<i>Quercus</i>	<i>petraea</i> <i>robur</i>	<i>mongolica</i>		<i>alba</i> <i>bicolor</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
				<i>macrocarpa</i> <i>rubra</i> <i>velutina</i>
Betulaceae				
<i>Alnus</i>	<i>viridis</i> <i>incana</i>	<i>viridis</i> <i>incana</i>	<i>viridis</i> <i>incana</i> <i>rubra</i>	<i>viridis</i> <i>incana</i>
<i>Betula</i>	<i>pendula</i> <i>pubescens</i> <i>nana</i>	<i>dahurica</i> <i>platyphylla</i> <i>ermanii</i> <i>fruticosa</i> <i>microphylla</i> <i>rotundifolia</i>	<i>papyrifera</i> <i>occidentalis</i> <i>glandulifera</i> <i>glandulosa</i>	<i>alleghaniensis</i> <i>papyrifera</i> <i>populifolia</i> <i>glandulifera</i> <i>glandulosa</i> <i>caroliniana</i>
<i>Carpinus</i>	<i>betulus</i>	<i>cordata</i>		<i>cornuta</i>
<i>Corylus</i>	<i>avellana</i>	<i>heterophylla</i>		<i>virginiana</i>
<i>Ostrya</i>				
CARYOPHYLLIDAE				
Chenopodiaceae				
<i>Atriplex</i>	<i>littoralis</i>	<i>littoralis</i> <i>gmelini</i>	<i>gmelini</i>	
<i>Axyris</i>		<i>amaranthoides</i>		
<i>Chenopodium</i>	<i>glaucum</i> <i>rubrum</i>	<i>glaucum</i> <i>rubrum</i> <i>acuminatum</i> <i>hybridum</i> <i>bryoniaefolium</i> <i>album</i>	<i>glaucum</i> <i>rubrum</i> <i>capitatum</i>	<i>glaucum</i> <i>rubrum</i> <i>murale</i> <i>ambrosioides</i> <i>bonushenricus</i> <i>bushiumum</i> <i>capitatum</i> <i>foggii</i> <i>gigantospermum</i> <i>macrocalycium</i> <i>opulifolium</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
				<i>polyspermum</i> <i>salinum</i> <i>standleyanum</i> <i>strictum</i> <i>urbicum</i> <i>vulvaria</i>
<i>Corispermum</i>	<i>algidum</i>	<i>elongatum</i> <i>chinganicum</i> <i>sibiricum</i>		
<i>Eurotia</i>			<i>lanata</i>	
<i>Kochia</i>		<i>prostrata</i> <i>scoparia</i>		
<i>Obione</i>		<i>fera</i> <i>sibirica</i>		
<i>Salicornia</i>	<i>europaea</i>	<i>europaea</i>	<i>europaea</i>	
<i>Salsola</i>		<i>collina</i> <i>ruthenica</i> <i>foliosa</i>		
<i>Suaeda</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>
<i>Teloxys</i>		<i>aristata</i>		
Portulacaceae				
<i>Claytonia</i>		<i>acutifolia</i>	<i>acutifolia</i> <i>arctica</i> <i>tuberosa</i>	
<i>Lewisia</i>			<i>pygmaea</i>	
<i>Montia</i>	<i>fontana</i>	<i>sarmentosa</i>	<i>fontana</i> <i>sarmentosa</i> <i>sibirica</i> <i>bostockii</i> <i>chamissoi</i> <i>parvifolia</i> <i>scammaniana</i>	
<i>Portulaca</i>	<i>oleracea</i>	<i>oleracea</i>	<i>oleracea</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
Caryophyllaceae				
<i>Arenaria</i>	<i>sajanensis</i>	<i>sajanensis</i>	<i>sajanensis</i>	<i>sajanensis</i>
	<i>laricifolia</i>	<i>laricifolia</i>	<i>laricifolia</i>	
	<i>serpyllifolia</i>	<i>serpyllifolia</i>		
		<i>capillaris</i>	<i>capillaris</i>	
		<i>chamissionis</i>	<i>chamissionis</i>	
		<i>physodes</i>	<i>physodes</i>	
		<i>rossii</i>	<i>rossii</i>	
			<i>humifeusa</i>	<i>humifeusa</i>
			<i>obtusiloba</i>	<i>obtusiloba</i>
			<i>rubella</i>	<i>rubella</i>
	<i>ciliata</i>	<i>junceae</i>	<i>arctica</i>	<i>groehlandica</i>
	<i>trinervia</i>		<i>peplodes</i>	
			<i>macrocarpa</i>	
<i>Cerastium</i>	<i>arvense</i>	<i>arvense</i>	<i>arvense</i>	<i>arvense</i>
	<i>alpinum</i>	<i>alpinum</i>		
	<i>cerastoides</i>	<i>cerastoides</i>		
		<i>beeringianum</i>	<i>beeringianum</i>	
		<i>fischerianum</i>	<i>fischerianum</i>	
		<i>jenisejense</i>	<i>jenisejense</i>	
	<i>glomeratum</i>	<i>dahuricum</i>	<i>pumilum</i>	
	<i>fontanum</i>	<i>vulgatum</i>	<i>maximum</i>	
	<i>gorodkovianum</i>	<i>pauciflorum</i>		
<i>Dianthus</i>	<i>repens</i>	<i>repens</i>	<i>repens</i>	
		<i>chinensis</i>		
		<i>superbus</i>		
<i>Gypsophila</i>		<i>davurica</i>		
		<i>pacifica</i>		
<i>Lychnis</i>	<i>apetala</i>	<i>apetala</i>	<i>apetala</i>	<i>apetala</i>
	<i>furcata</i>	<i>furcata</i>	<i>furcata</i>	<i>furcata</i>
			<i>triflora</i>	<i>triflora</i>
	<i>viscaria</i>	<i>sibirica</i>	<i>taylorae</i>	
	<i>flos-cucis</i>	<i>fulgens</i>		
<i>Melandrium</i>	<i>alpina</i>			
	<i>acaulis</i>		<i>acaulis</i>	<i>acaulis</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>(Silene)</i>	<i>album</i>	<i>arricum</i>	<i>williamsii</i>	
	<i>dioicum</i>	<i>dahuricum</i>	<i>apeteum</i>	
	<i>nutans</i>	<i>jenissensis</i>	<i>douglasii</i>	
	<i>repens</i>	<i>menziesii</i>	<i>macrospermum</i>	
		<i>firmum</i>		
		<i>venosum</i>		
		<i>brachypetalum</i>		
		<i>foliosum</i>		
<i>Minuartia</i>		<i>laricina</i>	<i>stricta</i>	<i>stricta</i>
		<i>arctica</i>	<i>arctica</i>	
		<i>macrocarpa</i>	<i>macrocarpa</i>	
		<i>obtusiloba</i>	<i>obtusiloba</i>	
			<i>rossii</i>	
			<i>rubella</i>	
<i>Moehringia</i>	<i>lateriflora</i>	<i>lateriflora</i>	<i>lateriflora</i>	<i>lateriflora</i>
<i>Sagina</i>	<i>procumbens</i>	<i>procumbens</i>	<i>procumbens</i>	<i>procumbens</i>
	<i>nodosa</i>	<i>nodosa</i>	<i>nodosa</i>	<i>nodosa</i>
<i>Stellaria</i>	<i>calycantha</i>	<i>calycantha</i>	<i>calycantha</i>	<i>calycantha</i>
	<i>crassifolia</i>	<i>crassifolia</i>	<i>crassifolia</i>	<i>crassifolia</i>
	<i>alsine</i>	<i>alsine</i>	<i>alsine</i>	<i>alsine</i>
		<i>longifolia</i>	<i>longifolia</i>	<i>longifolia</i>
	<i>longipes</i>		<i>longipes</i>	<i>longipes</i>
	<i>crassipes</i>			<i>crassipes</i>
	<i>bungeana</i>	<i>bungeana</i>		
			<i>humifusa</i>	<i>humifusa</i>
		<i>discolor</i>	<i>umbellata</i>	
		<i>cherleriae</i>	<i>alaskana</i>	
		<i>dichotoma</i>	<i>calycantha</i>	
		<i>palustris</i>	<i>crispa</i>	
		<i>neglecta</i>	<i>laeta</i>	
		<i>filicaulis</i>		
<i>Spergula</i>		<i>arvensis</i>		
<i>Spergularia</i>		<i>salina</i>	<i>canadensis</i>	<i>canadensis</i>
<i>Vaccaria</i>		<i>segetalis</i>		<i>segetalis</i>
<i>(Saponaria)</i>				

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
Polygonaceae				
<i>Eriogonum</i>				<i>flavum</i>
<i>Koenigia</i>	<i>islandica</i>	<i>islandica</i>	<i>islandica</i>	<i>islandica</i>
<i>Oxyria</i>	<i>digynia</i>	<i>digynia</i>	<i>digynia</i>	<i>digynia</i>
<i>Polygonum</i>	<i>amphibium</i>	<i>amphibium</i>	<i>amphibium</i>	<i>amphibium</i>
	<i>viviparum</i>	<i>viviparum</i>	<i>viviparum</i>	<i>viviparum</i>
	<i>alpinum</i>	<i>alpinum</i>	<i>alpinum</i>	
	<i>aviculare</i>	<i>aviculare</i>	<i>aviculare</i>	<i>aviculare</i>
	<i>lapanthifolium</i>	<i>lapathifolium</i>		<i>lapathifolium</i>
	<i>oxyspermum</i>			<i>oxyspermum</i>
		<i>sagittatum</i>		<i>sagittatum</i>
		<i>bistorta</i>	<i>bistorta</i>	
		<i>caurianum</i>	<i>caurianum</i>	
			<i>fowleri</i>	<i>fowleri</i>
	<i>boreale</i>	<i>ajanense</i>		
	<i>aviculare</i>	<i>sieboldii</i>		
	<i>hydropiper</i>	<i>divaricatum</i>		
	<i>boreale</i>	<i>convolvulus</i>		
	<i>minus</i>	<i>sibiricum</i>		
	<i>persicaria</i>	<i>limosum</i>		
		<i>alopecuroides</i>		
		<i>angustifolium</i>		
		<i>dentato-alatum</i>		
		<i>excurrens</i>		
		<i>heterophyllum</i>		
		<i>hydropiper</i>		
		<i>manshuriense</i>		
		<i>orientale</i>		
		<i>paludosum</i>		
		<i>perfoliatum</i>		
		<i>posumbu</i>		
		<i>tinctorium</i>		
		<i>ussurens</i>		
	<i>rhaponticum</i>	<i>undulatum</i>		
<i>Rumex</i>	<i>acetosa</i>	<i>acetosa</i>	<i>acetosa</i>	<i>acetosa</i>
	<i>maritimus</i>	<i>maritimus</i>	<i>maritimus</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>acetosella</i>	<i>acetosella</i>		
		<i>arcticus</i>	<i>arcticus</i>	
		<i>amurensis</i>	<i>graminifolius</i>	
		<i>gmelini</i>	<i>salicifolius</i>	
	<i>conglomeratus</i>	<i>thyrsiflorus</i>	<i>occidentalis</i>	
	<i>palustris</i>	<i>crispus</i>		
	<i>hydrolapanthum</i>			
Plumbaginaceae				
<i>Armeria</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>
DILLENIIDAE				
Actinidiaceae				
<i>Actinidia</i>		<i>arguta</i>		
		<i>kolomicta</i>		
Guttiferae				
<i>Hypericum</i>	<i>hirsutum</i>	<i>hirsutum</i>		
	<i>maculatum</i>	<i>gebleri</i>		
	<i>montanum</i>	<i>longistylum</i>		
Tiliaceae				
<i>Tilia</i>	<i>cordata</i>	<i>amurense</i>		<i>americana</i>
Droseraceae				
<i>Drosera</i>	<i>rotundifolia</i>	<i>rotundifolia</i>	<i>rotundifolia</i>	<i>rotundifolia</i>
			<i>anglica</i>	<i>anglica</i>
Cistaceae				
<i>Helianthemum</i>	<i>arcticum</i>			
<i>Hudsonia</i>				<i>tomentosa</i>
Cucurbitaceae				

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Schizonepeta</i>		<i>tenuifolia</i>		
Violaceae				
<i>Viola</i>	<i>palustris</i> <i>selkirkii</i> <i>biflora</i>	<i>palustris</i> <i>selkirkii</i> <i>biflora</i> <i>longsdorfii</i>	<i>palustris</i> <i>selkirkii</i> <i>biflora</i> <i>longsdorfii</i> <i>adunca</i> <i>canadensis</i> <i>renifolia</i> <i>glaballa</i>	<i>palustris</i> <i>selkirkii</i> <i>biflora</i> <i>adunca</i> <i>canadensis</i> <i>renifolia</i> <i>incognita</i>
	<i>arvensis</i> <i>canina</i> <i>hirta</i> <i>odorata</i> <i>persicifolia</i> <i>riviniiana</i> <i>rupestris</i> <i>tricolor</i> <i>reichenbachiana</i>	<i>acuminata</i> <i>grypoceras</i> <i>manshurica</i> <i>prinantha</i> <i>selkirkii</i> <i>variegata</i>	<i>nephrophylla</i> <i>sempervirens</i>	
Salicaceae				
<i>Chosenia</i>		<i>arbutifolia</i>		
<i>Populus</i>	<i>tremula</i>	<i>dauidiana</i> <i>suoveolens</i> <i>ussuriensis</i>	<i>tremuloides</i> <i>balsamifera</i> <i>trichocarpa</i>	<i>tremuloides</i> <i>balsamifera</i> <i>glandidentata</i>
<i>Salix</i>	<i>arctica</i> <i>hastata</i> <i>pentandra</i> <i>herbacea</i> <i>phylicifolia</i> <i>reticulata</i> <i>glauca</i> <i>polaris</i>	<i>arctica</i> <i>hastata</i> <i>pentandra</i> <i>herbacea</i> <i>phylicifolia</i> <i>reticulata</i> <i>glauca</i> <i>polaris</i> <i>brachycarpa</i> <i>planifolia</i> <i>daphnoides</i>	<i>arctica</i> <i>hastata</i> <i>pentandra</i> <i>herbacea</i> <i>phylicifolia</i> <i>reticulata</i> <i>glauca</i> <i>polaris</i> <i>brachycarpa</i> <i>planifolia</i>	<i>arctica</i> <i>hastata</i> <i>pentandra</i> <i>herbacea</i> <i>phylicifolia</i> <i>reticulata</i> <i>glauca</i> <i>polaris</i> <i>brachycarpa</i> <i>planifolia</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>borealis</i>	<i>borealis</i>		
	<i>fragilis</i>	<i>fragilis</i>		
	<i>myrtilloides</i>	<i>myrtilloides</i>		
	<i>pyrolifolia</i>	<i>pyrolifolia</i>		
	<i>triandra</i>	<i>triandra</i>		
		<i>alexensis</i>	<i>alexensis</i>	
		<i>chamissonis</i>	<i>chamissonis</i>	
		<i>fruscescens</i>	<i>fruscescens</i>	
		<i>rigida</i>	<i>rigida</i>	
			<i>bebbiana</i>	<i>bebbiana</i>
			<i>canadida</i>	<i>canadida</i>
			<i>cordifolia</i>	<i>cordifolia</i>
			<i>interior</i>	<i>interior</i>
			<i>myrtillofolia</i>	<i>myrtillofolia</i>
			<i>pedicellaris</i>	<i>pedicellaris</i>
			<i>pyrifolia</i>	<i>pyrifolia</i>
	<i>aurita</i>	<i>characta</i>	<i>barclayi</i>	<i>cordata</i>
	<i>cinerea</i>	<i>dahurica</i>	<i>barrattiana</i>	
	<i>alba</i>	<i>amygdalina</i>	<i>arbusculoides</i>	
	<i>myrsinites</i>	<i>integra</i>	<i>mackenzieana</i>	
	<i>repens</i>	<i>koreensis</i>	<i>farrae</i>	
	<i>glandulifera</i>	<i>gracilistyla</i>	<i>glacialis</i>	
	<i>lanata</i>	<i>mongolica</i>	<i>commutata</i>	<i>calicicola</i>
	<i>caprea</i>		<i>dodgeana</i>	<i>drummondiana</i>
	<i>arbuscula</i>	<i>sibirica</i>	<i>scouleriana</i>	<i>arctophila</i>
	<i>stipulifera</i>	<i>viminalis</i>	<i>lutea</i>	<i>hookeriana</i>
	<i>starkeana</i>	<i>xerophila</i>	<i>athascensis</i>	<i>discolor</i>
	<i>xerophila</i>	<i>brachypoda</i>	<i>arbusculoides</i>	<i>arbutifolia</i>
	<i>rosmarinifolia</i>	<i>siuzevii</i>	<i>lasiandra</i>	<i>lanata</i>
	<i>arenaria</i>		<i>niphoclada</i>	<i>novaeangliae</i>
			<i>fallax</i>	<i>numularia</i>
			<i>ovalifolia</i>	<i>gracillis</i>
			<i>macCalliana</i>	<i>pallida</i>
			<i>flagellaris</i>	<i>padophylla</i>
			<i>ampifolia</i>	<i>vestita</i>
			<i>pulchra</i>	<i>sphenophylla</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
			<i>richardsonii</i>	<i>lucida</i>
			<i>glaucophylloides</i>	
			<i>silicicola</i>	
			<i>phlebophylla</i>	
			<i>tyrrellii</i>	
			<i>scordifolia</i>	
			<i>turnorii</i>	
			<i>subcoerulea</i>	
			<i>rotundifolia</i>	
			<i>setchelliana</i>	
			<i>sitchensis</i>	
			<i>stonifolia</i>	
Brassicaceae (Cruciferae)				
<i>Alyssum</i>		<i>sibiricum</i>	<i>americanum</i>	
		<i>lenese</i>		
<i>Aphragmus</i>			<i>eschscholtzianus</i>	
<i>Arabis</i>	<i>glabra</i>	<i>glabra</i>	<i>glabra</i>	<i>glabra</i>
	<i>hirsuta</i>	<i>hirsuta</i>	<i>hirsuta</i>	<i>hirsuta</i>
	<i>alpina</i>			<i>alpina</i>
			<i>divaricarpa</i>	<i>divaricarpa</i>
			<i>drummondii</i>	<i>drummondii</i>
			<i>holboellii</i>	<i>holboellii</i>
			<i>hookeri</i>	<i>hookeri</i>
			<i>lyrata</i>	<i>lyrata</i>
		<i>pendula</i>	<i>lemmonii</i>	
			<i>nuttallii</i>	
<i>Arabidopsis</i>			<i>sulsuginea</i>	
<i>Barbarea</i>		<i>orthoceras</i>	<i>orthoceras</i>	<i>orthoceras</i>
<i>Braya</i>			<i>humilis</i>	<i>humilis</i>
			<i>purpurascens</i>	<i>purpurascens</i>
			<i>glabella</i>	
<i>Cakile</i>			<i>edentula</i>	<i>edentula</i>
<i>Camelina</i>		<i>microcarpa</i>		

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
		<i>sativa</i>		
<i>Cardamine</i>	<i>pratensis</i>	<i>pratensis</i>	<i>pratensis</i>	<i>pratensis</i>
	<i>bellidifolia</i>	<i>bellidifolia</i>	<i>bellidifolia</i>	<i>bellidifolia</i>
	<i>flexusa</i>	<i>flexusa</i>		
	<i>hirsuta</i>	<i>hirsuta</i>		
		<i>digitata</i>	<i>digitata</i>	
		<i>hyperborea</i>	<i>hyperborea</i>	
	<i>bulbifera</i>	<i>leucantha</i>	<i>angulata</i>	
	<i>impatiens</i>	<i>prorepens</i>	<i>microphylla</i>	
			<i>purpurea</i>	
			<i>scutata</i>	
			<i>breweri</i>	
			<i>occidentalis</i>	
			<i>oligosperma</i>	
			<i>pennsylvanica</i>	
<i>Cochlearia</i>	<i>officinalis</i>	<i>officinalis</i>	<i>officinalis</i>	
<i>Descurainia</i>		<i>sophioides</i>	<i>sophioides</i>	
		<i>sophila</i>	<i>richardsonii</i>	
<i>Dontosetemon</i>		<i>dentatus</i>		
		<i>integrifolius</i>		
<i>Draba</i>	<i>alpina</i>	<i>alpina</i>	<i>alpina</i>	<i>alpina</i>
	<i>cinera</i>	<i>cinera</i>	<i>cinera</i>	
	<i>crassifolia</i>	<i>crassifolia</i>	<i>crassifolia</i>	
	<i>fladnizensis</i>	<i>fladnizensis</i>	<i>fladnizensis</i>	
	<i>glabella</i>	<i>glabella</i>	<i>glabella</i>	<i>glabella</i>
	<i>lanceolata</i>	<i>lanceolata</i>	<i>lanceolata</i>	<i>lanceolata</i>
	<i>nivalis</i>	<i>nivalis</i>	<i>nivalis</i>	<i>nivalis</i>
	<i>incana</i>	<i>incana</i>		<i>incana</i>
	<i>norvegica</i>			<i>norvegica</i>
		<i>aleutica</i>	<i>aleutica</i>	
		<i>borealis</i>	<i>borealis</i>	
		<i>caesia</i>	<i>caesia</i>	
		<i>eschscholtzii</i>	<i>eschscholtzii</i>	
		<i>exalata</i>	<i>exalata</i>	
		<i>hyperborea</i>	<i>hyperborea</i>	
		<i>lactea</i>	<i>lactea</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
		<i>nudicaulis</i>	<i>nudicaulis</i>	
		<i>stenopetala</i>	<i>stenopetala</i>	
			<i>acurea</i>	<i>acurea</i>
		<i>sibirica</i>	<i>longipes</i>	
		<i>ussuriensis</i>	<i>densifolia</i>	
		<i>nemorosa</i>	<i>incerta</i>	
		<i>mongolica</i>	<i>stenoloba</i>	
			<i>ogilviensis</i>	
			<i>oligosperma</i>	
			<i>praealta</i>	
<i>Erysimum</i>	<i>chieranthoides</i>	<i>chieranthoides</i>	<i>chieranthoides</i>	<i>chieranthoides</i>
			<i>inconspicuum</i>	<i>inconspicuum</i>
			<i>pallasii</i>	<i>pallasii</i>
			<i>asperum</i>	
<i>Eutrema</i>	<i>edwardsii</i>	<i>edwardsii</i>	<i>edwardsii</i>	<i>edwardsii</i>
<i>Isatis</i>		<i>costata</i>		
<i>Lepidium</i>		<i>apetalum</i>		<i>virginicum</i>
		<i>sibiricum</i>		
<i>Lesquerella</i>		<i>arctica</i>	<i>arctica</i>	<i>arctica</i>
<i>Neslia</i>	<i>paniculata</i>	<i>paniculata</i>		
<i>Parrya</i>	<i>nudicaulis</i>	<i>nudicaulis</i>	<i>nudicaulis</i>	
<i>Rorippa</i>	<i>islandica</i>	<i>islandica</i>	<i>islandica</i>	<i>islandica</i>
			<i>obtusata</i>	<i>obtusata</i>
		<i>globosa</i>	<i>curvisiliqua</i>	
		<i>barbareaefolia</i>		
<i>Semelowskia</i>		<i>alba</i>	<i>borealis</i>	
			<i>calycina</i>	
			<i>pyriformis</i>	
<i>Stevenia</i>		<i>cheiranthoides</i>		
<i>Subularia</i>	<i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>
<i>Thlaspi</i>	<i>arvense</i>	<i>arvense</i>	<i>arvense</i>	
		<i>cochleariforme</i>	<i>arcticum</i>	
Empetraceae				
<i>Empetrum</i>	<i>nigrum</i>	<i>nigrum</i>	<i>nigrum</i>	<i>nigrum</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
Ericaceae				
<i>Andromeda</i>	<i>polifolia</i>	<i>polifolia</i>	<i>polifolia</i>	<i>polifolia</i>
<i>Arctous</i>	<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>
<i>Arctostaphylos</i>	<i>uvaursi</i>	<i>uvaursi</i>	<i>uvaursi</i>	<i>uvaursi</i>
<i>Cladothamnus</i>			<i>pyrolaeiflorus</i>	
<i>Calluna</i>	<i>vulgaris</i>			<i>vulgaris</i>
<i>Cassiope</i>	<i>tetragona</i>	<i>tetragona</i> <i>lycopodioides</i> <i>stelleriana</i>	<i>tetragona</i> <i>lycopodioides</i> <i>stelleriana</i> <i>mertensiana</i>	<i>tetragona</i>
	<i>hypnoides</i>			
<i>Chamaedaphne</i> (<i>Cassandra</i>)	<i>calyculata</i>	<i>calyculata</i>	<i>calyculata</i>	<i>calyculata</i>
<i>Erica</i>	<i>cinerea</i> <i>tetralix</i>			
<i>Gaultheria</i>		<i>miqueliana</i>	<i>miqueliana</i> <i>shallon</i>	<i>amarella</i> <i>hispidula</i> <i>procumbens</i>
<i>Kalmia</i>			<i>polifolia</i>	<i>polifolia</i> <i>angustifolia</i>
<i>Ledum</i>	<i>palustre</i>	<i>palustre</i>	<i>palustre</i>	<i>palustre</i>
<i>Loiseleuria</i> (<i>Chamaeledon</i>)	<i>procumbens</i>	<i>procumbens</i>	<i>procumbens</i>	<i>procumbens</i>
<i>Menziesia</i>			<i>ferruginea</i>	
<i>Phyllodoce</i>	<i>caerulea</i>	<i>caerulea</i> <i>aleutica</i>	<i>caerulea</i> <i>aleutica</i>	<i>caerulea</i>
	<i>alpina</i>		<i>granduliflora</i>	
<i>Rhododendron</i>	<i>lapponicum</i>	<i>lapponicum</i> <i>micranthum</i> <i>dahuricum</i>	<i>lapponicum</i> <i>camtschaticum</i>	<i>lapponicum</i> <i>catawbieuse</i>
<i>Vaccinium</i>	<i>uliginosum</i> <i>vitis-idaea</i> <i>oxycoccos</i> <i>myrtilus</i>	<i>uliginosum</i> <i>vitis-idaea</i>	<i>uliginosum</i> <i>vitis-idaea</i> <i>ovarifolium</i> <i>caespitosum</i>	<i>uliginosum</i> <i>vitis-idaea</i> <i>oxycoccos</i> <i>myrtilloides</i> <i>ovarifolium</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
			<i>alaskaense</i> <i>membranaceum</i> <i>parvifolium</i>	
Pyrolaceae				
<i>Chimaphila</i>	<i>umbellata</i>	<i>umbellata</i>	<i>umbellata</i>	
<i>Hypopites</i>	<i>monotropa</i>	<i>monotropa</i>	<i>monotropa</i>	<i>monotropa</i>
<i>Moneses</i>	<i>uniflora</i>	<i>uniflora</i>	<i>uniflora</i>	<i>uniflora</i>
<i>Pyrola</i>	<i>minor</i> <i>rotundifolia</i> <i>secunda</i> <i>media</i>	<i>minor</i> <i>rotundifolia</i> <i>secunda</i> <i>incarnata</i>	<i>minor</i> <i>rotundifolia</i> <i>secunda</i> <i>incarnata</i> <i>virens</i>	<i>minor</i> <i>rotundifolia</i> <i>incarnata</i>
<i>Ramischia</i>		<i>obtusata</i> <i>secunda</i>		
Monotropaceae				
<i>Monotropa</i>	<i>uniflora</i>	<i>uniflora</i>	<i>uniflora</i>	<i>uniflora</i>
Diapensiaceae				
<i>Diapensia</i>	<i>lapponica</i>	<i>lapponica</i>	<i>lapponica</i>	<i>lapponica</i>
Primulaceae				
<i>Androsace</i>	<i>septentrionalis</i> <i>chamaejasme</i>	<i>septentrionalis</i> <i>chamaejasme</i> <i>umbellata</i>	<i>septentrionalis</i> <i>chamaejasme</i>	<i>septentrionalis</i>
<i>Dodecatheon</i>			<i>frigidum</i> <i>jeffeyi</i> <i>pulchellum</i>	
<i>Douglasia</i>		<i>ochotensis</i>	<i>ochotensis</i> <i>arctica</i> <i>gormanii</i>	
<i>Glaux</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>
<i>Lysimachia</i>	<i>thyrsiflora</i> <i>vulgaris</i> <i>nemorum</i>	<i>thyrsiflora</i> <i>vulgaris</i> <i>davurica</i>	<i>thyrsiflora</i> <i>ciliata</i>	<i>thyrsiflora</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Trientalis</i>	<i>nummularia</i> <i>europaea</i>	<i>europaea</i>	<i>europaea</i>	<i>americana</i> <i>borealis</i>
<i>Primula</i>	<i>stricta</i> <i>elatior</i> <i>farinosa</i> <i>veris</i>	<i>stricta</i> <i>elatior</i> <i>farinosa</i> <i>veris</i> <i>borealis</i> <i>cuneifolia</i> <i>matsumurae</i> <i>sibirica</i> <i>tenuis</i> <i>tschuktschorum</i>	<i>stricta</i> <i>borealis</i> <i>cuneifolia</i> <i>matsumurae</i> <i>sibirica</i> <i>tenuis</i> <i>tschuktschorum</i> <i>egalikensis</i> <i>mistassinica</i> <i>incana</i> <i>nivalis</i> <i>anavilensis</i>	<i>stricta</i> <i>egalikensis</i> <i>mistassinica</i>
	<i>scandinavica</i>			

ROSAIDAE

Crassulaceae

<i>Sedum</i>	<i>rosea</i> <i>acre</i> <i>aquatica</i> <i>villosum</i> <i>album</i> <i>annuum</i> <i>reflexum</i>	<i>rosea</i> <i>aquatica</i> <i>pallens</i> <i>purpureum</i> <i>cartilagineum</i> <i>aizoon</i> <i>hibernicum</i> <i>malacophyllum</i> <i>purpurascens</i> <i>spectabile</i>	<i>rosea</i> <i>oreganum</i> <i>lanceolatum</i>	<i>rosea</i> <i>acre</i> <i>aquatica</i> <i>villosum</i>
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Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Tillaea</i>	<i>aquatica</i>	<i>verticillatum</i> <i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>
Saxifragaceae				
<i>Boykinia</i>			<i>richardsonii</i>	
<i>Chrysosplenium</i>		<i>alternifolium</i>	<i>wrightii</i>	
	<i>leucanthemum</i>	<i>pilosum</i>	<i>tetrandrum</i>	<i>americanum</i>
	<i>segetum</i>			<i>arcticum</i>
	<i>vulgare</i>			<i>integrifolium</i>
<i>Deutzia</i>		<i>amurensis</i> <i>glabra</i>		
<i>Heuchera</i>			<i>glabra</i>	<i>richardsonii</i>
<i>Mitella</i>		<i>nuda</i>	<i>nuda</i> <i>pentandra</i> <i>trifida</i>	
<i>Parnassia</i>	<i>palustris</i>	<i>palustris</i> <i>kotzebuei</i> <i>sibirica</i> <i>scabiosaefolia</i> <i>villosa</i>	<i>palustris</i> <i>kotzebuei</i> <i>fimbriata</i>	<i>palustris</i> <i>kotzebuei</i>
<i>Philadelphus</i>		<i>incanus</i> <i>schrenkii</i>		
<i>Ribes</i>	<i>nigrum</i>	<i>nigrum</i> <i>triste</i>	<i>triste</i> <i>glandulosum</i>	<i>triste</i> <i>glandulosum</i>
	<i>alpinum</i>	<i>diacanthum</i>	<i>bracteosum</i>	
	<i>spicatum</i>	<i>pulchellum</i> <i>procumbens</i>	<i>hudsonianum</i> <i>lacustre</i> <i>laxiflorum</i> <i>oxyacanthoides</i> <i>maximowiczianum</i>	
<i>Saxifraga</i>	<i>caespitosa</i>	<i>caespitosa</i>	<i>caespitosa</i>	<i>caespitosa</i>
	<i>cernua</i>	<i>cernua</i>	<i>cernua</i>	<i>cernua</i>
	<i>foliolosa</i>	<i>foliolosa</i>	<i>foliolosa</i>	<i>foliolosa</i>
	<i>navalis</i>	<i>nivalis</i>	<i>nivalis</i>	<i>nivalis</i>
	<i>oppositifolia</i>	<i>oppositifolia</i>	<i>oppositifolia</i>	<i>oppositifolia</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>hiercifolia</i>	<i>hiercifolia</i>	<i>hiercifolia</i>	<i>hiercifolia</i>
	<i>hirculus</i>	<i>hirculus</i>	<i>hirculus</i>	<i>hirculus</i>
	<i>flagellaris</i>	<i>flagellaris</i>	<i>flagellaris</i>	
		<i>serpyllifolia</i>	<i>serpyllifolia</i>	<i>serpyllifolia</i>
	<i>aizoides</i>		<i>aizoides</i>	<i>aizoides</i>
	<i>aizoon</i>			<i>aizoon</i>
		<i>bracteata</i>	<i>bracteata</i>	
		<i>bronchialis</i>	<i>bronchialis</i>	
		<i>dahurica</i>	<i>dahurica</i>	
		<i>exilis</i>	<i>exilis</i>	
		<i>nudicaulis</i>	<i>nudicaulis</i>	
		<i>punctata</i>	<i>punctata</i>	
			<i>rivularis</i>	<i>rivularis</i>
		<i>manshuriensis</i>	<i>aleutica</i>	<i>tomeiei</i>
		<i>sibirica</i>	<i>eschscholtzii</i>	<i>tricuspidata</i>
			<i>ferruginnea</i>	
			<i>adscendens</i>	
			<i>lyallii</i>	
			<i>mertensiana</i>	
			<i>occidentalis</i>	
			<i>reflexa</i>	
			<i>spicata</i>	
			<i>unalaschensis</i>	
<i>Tellima</i>			<i>grandiflora</i>	
<i>Tiarella</i>			<i>trifoliata</i>	
			<i>unifoliata</i>	
<i>Tohniea</i>			<i>menziesii</i>	
Rosaceae				
<i>Agrimonia</i>	<i>eupatoria</i>	<i>pilosa</i>		
<i>Alchemilla</i>	<i>vulgaris</i>	<i>vulgaris</i>	<i>vulgaris</i>	<i>vulgaris</i>
	<i>alpina</i>			<i>alpina</i>
	<i>filicaulis</i>			<i>filicaulis</i>
	<i>glabra</i>			<i>glabra</i>
	<i>glomerulans</i>			<i>glomerulans</i>
	<i>vestita</i>			<i>vestita</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Amelanchier</i>			<i>alnifolia</i>	<i>arborea</i> <i>fernaldii</i> <i>sanguinea</i>
<i>Aruncus</i>		<i>sylvester</i>	<i>sylvester</i>	
<i>Chamaerhodes</i>		<i>arecta</i>	<i>arecta</i>	<i>arecta</i>
		<i>canescens</i>		
<i>Cotoneaster</i>	<i>integerrimus</i>	<i>integerrimus</i>		
		<i>melanocarpus</i>		
		<i>mongolicus</i>		
<i>Crataegus</i>	<i>monogyna</i>	<i>dahurica</i>	<i>douglasii</i>	<i>douglasii</i>
		<i>maximowiczii</i>	<i>cruggalii</i>	<i>cruggalii</i>
		<i>sanguinea</i>		<i>holmesiana</i> <i>punctata</i>
<i>Dryas</i>	<i>octopetala</i>	<i>octopetala</i>	<i>octopetala</i>	<i>octopetala</i>
			<i>drumondii</i>	<i>drumondii</i>
			<i>integrifolia</i>	<i>integrifolia</i>
<i>Filipendula</i>	<i>ulmaria</i>	<i>palmata</i>		
	<i>vulgaris</i>	<i>angustiloba</i>		
		<i>intermedia</i>		
		<i>purpurea</i>		
<i>Fragaria</i>	<i>vesca</i>		<i>vesca</i>	<i>vesca</i>
		<i>orientalis</i>	<i>chiloensis</i>	
			<i>virginiana</i>	<i>virginiana</i>
<i>Geum</i>	<i>aleppicum</i>	<i>aleppicum</i>	<i>aleppicum</i>	<i>aleppicum</i>
	<i>rivale</i>			<i>rivale</i>
		<i>glaciale</i>	<i>glaciale</i>	
		<i>rossii</i>	<i>rossii</i>	
			<i>macrophyllum</i>	<i>macrophyllum</i>
			<i>calthifolium</i>	
			<i>pentapetalum</i>	
				<i>canadense</i> <i>slaciale</i>
<i>Malus</i>	<i>silvestris</i>	<i>baccata</i>	<i>fusca</i>	<i>cooronaria</i>
<i>Physocarpus</i>			<i>capitatus</i>	
<i>Potentilla</i>	<i>fruticosa</i>	<i>fruticosa</i>	<i>fruticosa</i>	<i>fruticosa</i>
	<i>hyparctica</i>	<i>hyparctica</i>	<i>hyparctica</i>	<i>hyparctica</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>
	<i>anseriana</i>	<i>anseriana</i>	<i>anseriana</i>	
		<i>pensylvanica</i>	<i>pensylvanica</i>	<i>pensylvanica</i>
	<i>crantzii</i>			<i>crantzii</i>
	<i>chamissonis</i>			<i>chamissonis</i>
	<i>erecta</i>			<i>erecta</i>
	<i>norvegica</i>		<i>norvegica</i>	
		<i>biflora</i>	<i>biflora</i>	
		<i>elegans</i>	<i>elegans</i>	
		<i>hookeriana</i>	<i>hookeriana</i>	
		<i>uniflora</i>	<i>uniflora</i>	
		<i>villosa</i>	<i>villosa</i>	
			<i>nivea</i>	<i>nivea</i>
			<i>pulchella</i>	<i>pulchella</i>
	<i>argentea</i>	<i>cryptotaeniae</i>	<i>gracilis</i>	
		<i>conferta</i>	<i>stipularis</i>	
		<i>discolor</i>	<i>arguta</i>	
		<i>flagellaris</i>	<i>diversifolia</i>	
		<i>inquinans</i>	<i>hippiana</i>	
		<i>fragarioides</i>		
		<i>chinensis</i>		
		<i>multifida</i>		
		<i>verticillaris</i>		
		<i>leucophylla</i>		
		<i>nudicaulis</i>		
		<i>tanacetifolia</i>		
		<i>bifurca</i>		
		<i>paradoxa</i>		
		<i>sanguisorba</i>		
		<i>viscosa</i>		
<i>Prinsepia</i>		<i>uniflora</i>		
<i>Prunus</i>	<i>padus</i>	<i>padus</i>	<i>virginiana</i>	<i>nigra</i>
				<i>virginiana</i>
		<i>mandshurica</i>		<i>pensylvanica</i>
<i>Rosa</i>	<i>acicularis</i>	<i>acicularis</i>	<i>acicularis</i>	<i>acicularis</i>
		<i>beggeriana</i>	<i>nutkana</i>	<i>villosa</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
		<i>davurica</i>	<i>woodsii</i>	
		<i>xanthina</i>		
<i>Rubus</i>	<i>arcticus</i>	<i>arcticus</i>	<i>arcticus</i>	<i>arcticus</i>
	<i>chamaemorus</i>	<i>chamaemorus</i>	<i>chamaemorus</i>	<i>chamaemorus</i>
	<i>idaeus</i>	<i>idaeus</i>	<i>idaeus</i>	<i>idaeus</i>
	<i>sachalinensis</i>	<i>sachalinensis</i>		
		<i>pedatus</i>	<i>pedatus</i>	
			<i>pubescens</i>	<i>pubescens</i>
	<i>saxatilis</i>	<i>crataegifolia</i>	<i>leucodermis</i>	
			<i>parviflorus</i>	
			<i>stellatus</i>	
			<i>spectabilis</i>	
<i>Sanguisorba</i>	<i>officinalis</i>	<i>officinalis</i>	<i>officinalis</i>	
		<i>glandulosa</i>	<i>sitchensis</i>	
	<i>minor</i>	<i>tenuifolia</i>	<i>stipulata</i>	<i>canadensis</i>
		<i>grandiflora</i>	<i>menziesii</i>	
<i>Sibbaldia</i>	<i>procumbens</i>	<i>procumbens</i>	<i>procumbens</i>	
<i>Sorbus</i>	<i>aucuparia</i>	<i>sibirica</i>	<i>sambucifolia</i>	<i>americana</i>
		<i>alnifolia</i>	<i>sitchensis</i>	<i>decora</i>
		<i>pohuashanensis</i>	<i>scopolina</i>	
<i>Spiraea</i>		<i>betilifolia</i>	<i>heauverdiana</i>	
		<i>media</i>	<i>douglasii</i>	
		<i>mongolica</i>		
		<i>hailarensis</i>		
		<i>sericens</i>		
		<i>trilobata</i>		
		<i>pubescens</i>		
		<i>salicifolia</i>		
		<i>ussuriensis</i>		
<i>Sorbaria</i>		<i>sorbifolia</i>		
Leguminosae				
<i>Astragalus</i>	<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>
	<i>australis</i>	<i>australis</i>	<i>australis</i>	
		<i>adsurgens</i>	<i>adsurgens</i>	
		<i>umbellatus</i>	<i>umbellatus</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
			<i>eucosmus</i>	<i>eucosmus</i>
			<i>bodinii</i>	<i>bodinii</i>
			<i>tenellus</i>	<i>tenellus</i>
	<i>frigidus</i>	<i>monogolicus</i>	<i>robbinsii</i>	
	<i>glycyphyllos</i>	<i>membraneus</i>	<i>americanus</i>	<i>agrestis</i>
		<i>danicus</i>	<i>agrestis</i>	
		<i>dahuricus</i>	<i>williamsii</i>	
		<i>melilotoides</i>	<i>polaris</i>	
		<i>uliginosus</i>		
		<i>marinus</i>	<i>harringtonii</i>	
		<i>inopinatu</i>	<i>nuitzinensis</i>	
<i>Glycyrrhiza</i>		<i>pallidiflora</i>		
<i>Gueldenstaedtia</i>		<i>verna</i>		
<i>Hedysarum</i>		<i>alpinum</i>	<i>alpinum</i>	<i>alpinum</i>
	<i>hedysaroides</i>	<i>dahuricum</i>	<i>boreale</i>	<i>boreale</i>
<i>Kummerowia</i>		<i>striata</i>		
<i>Lathyrus</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>
	<i>japonicus</i>	<i>japonicus</i>	<i>japonicus</i>	<i>japonicus</i>
	<i>montanus</i>	<i>humilis</i>	<i>ochroleucus</i>	<i>venosus</i>
	<i>nigra</i>	<i>davidii</i>		<i>alpinum</i>
	<i>pratensis</i>	<i>quinquenervius</i>		
	<i>salicaria</i>	<i>clavatum</i>		
	<i>sylvestris</i>			
	<i>vernus</i>			
<i>Lespedeza</i>		<i>bicolor</i>		
		<i>fomentosa</i>		
		<i>formosa</i>		
<i>Lupinus</i>			<i>arcticus</i>	
<i>Macckia</i>		<i>amurense</i>		
<i>Oxytropis</i>	<i>campestris</i>	<i>campestris</i>	<i>campestris</i>	<i>campestris</i>
		<i>maydelliana</i>	<i>maydelliana</i>	<i>maydelliana</i>
		<i>nigrescens</i>	<i>nigrescens</i>	<i>nigrescens</i>
		<i>viscida</i>	<i>viscida</i>	<i>viscida</i>
		<i>mertensiana</i>	<i>mertensiana</i>	
			<i>arctica</i>	<i>arctica</i>
			<i>deflexa</i>	<i>deflexa</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>lapponica</i>	<i>glabra</i> <i>caerulea</i> <i>grandiflora</i> <i>sylvatica</i> <i>microphylla</i> <i>hirta</i>	<i>huddelsonii</i> <i>scammaniana</i> <i>sericea</i> <i>splendens</i> <i>polyphyllus</i> <i>kuschei</i> <i>nootkatensis</i> <i>kobukensis</i> <i>kokrinensis</i>	
<i>Thermopsis</i>		<i>lanceolata</i>		
<i>Trifolium</i>	<i>arvense</i> <i>aureum</i> <i>campestre</i> <i>dubium</i> <i>fragitanum</i> <i>hybridum</i> <i>incanatum</i> <i>montanum</i> <i>pratense</i> <i>repens</i>	<i>lupinaster</i>		
<i>Vicia</i>	<i>cracca</i>	<i>cracca</i> <i>gigantea</i>	<i>gigantea</i> <i>americana</i>	<i>americana</i>
	<i>hirsuta</i> <i>sativa</i> <i>sepium</i> <i>tenuifolia</i> <i>tetrasperma</i>	<i>amoena</i> <i>multicaulis</i> <i>unijuga</i> <i>venosa</i> <i>baicalensis</i> <i>amurensis</i> <i>cracca</i> <i>japonica</i> <i>pseudorobus</i> <i>ramuliflora</i>		
Elaeagnaceae				
<i>Elaeagnus</i>			<i>commutata</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Shepherdia</i>	<i>arvensis</i>		<i>canadensis</i>	<i>canadensis</i>
Haloragaceae				
<i>Hippuris</i>	<i>tetraphylla</i>	<i>tetraphylla</i>	<i>tetraphylla montana</i>	<i>tetraphylla</i>
<i>Myriophyllum</i>	<i>alterniflorum spicatum</i>	<i>alterniflorum spicatum</i>	<i>alterniflorum spicatum</i>	<i>alterniflorum spicatum</i>
Lythraceae				
<i>Lythrum</i>		<i>salicaria</i>		
Onagraceae				
<i>Circaea</i>	<i>alpina</i> <i>luteiana</i>	<i>alpina</i> <i>luteiana</i>	<i>alpina</i>	<i>alpina</i> <i>luteiana</i>
<i>Epilobium</i>	<i>alpinum</i> <i>angustifolium</i> <i>palustre</i> <i>latifolium</i> <i>hornemanni</i> <i>hirsutum</i> <i>parviflorum</i>	<i>alpinum</i> <i>angustifolium</i> <i>palustre</i> <i>latifolium</i> <i>hornemanni</i> <i>hirsutum</i> <i>parviflorum</i>	<i>alpinum</i> <i>angustifolium</i> <i>palustre</i> <i>latifolium</i> <i>hornemanni</i>	<i>alpinum</i> <i>angustifolium</i> <i>palustre</i> <i>latifolium</i>
	<i>montanum</i>	<i>adenocaulon</i> <i>cylindrostigma</i>	<i>glandulosum</i> <i>leptocarpum</i> <i>luteum</i>	<i>glandulosum</i>
Cornaceae				
<i>Cornus</i>	<i>suecica</i> <i>sanguinea</i>	<i>suecica</i> <i>alba</i>	<i>suecica</i> <i>stolonifera</i> <i>canadensis</i>	<i>suecica</i> <i>stolonifera</i> <i>canadensis</i>
Santalaceae				
<i>Geocaulon</i>			<i>lividum</i>	<i>lividum</i>
<i>Thesium</i>		<i>axatile</i> <i>chinense</i>		

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
		<i>longifolium</i> <i>refractum</i>		
Loranthaceae				
<i>Arceuthobium</i>			<i>campylopodum</i>	
Celastraceae				
<i>Celastrus</i>		<i>flagellaris</i> <i>orbiculatus</i>		<i>scandens</i>
<i>Euonymus</i>	<i>europaeus</i>	<i>alatus</i> <i>verrucosus</i>		
Euphorbiaceae				
<i>Euphorbia</i>	<i>frigida</i>			<i>frigida</i> <i>maculata</i>
	<i>cyparissius</i> <i>esula</i> <i>exigua</i> <i>helioscopia</i> <i>palustris</i> <i>peplus</i>	<i>fischeriana</i> <i>linulata</i> <i>sieboldiana</i>	<i>maculata</i>	
Rhamnaceae				
<i>Rhamnus</i>	<i>catharticus</i>	<i>dahurica</i> <i>nipponica</i>		<i>alnifolia</i>
Vitaceae				
<i>Ampelopsis</i>		<i>brevipedunculata</i>		
<i>Vitis</i>		<i>amurensis</i>		
Linaceae				
<i>Linum</i>	<i>perenne</i> <i>catharticum</i>	<i>perenne</i>	<i>perenne</i>	<i>catharticum</i>
Polygalaceae				
<i>Polygala</i>	<i>comosa</i>	<i>japonica</i>		

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>vulgaris</i>	<i>sibirica</i>		
Aceraceae				
<i>Acer</i>	<i>pantanoides</i>	<i>mono</i> <i>tegmentosum</i> <i>ukurunduense</i> <i>ginnala</i>	<i>glabrum</i> <i>circinatum</i>	<i>nigrum</i> <i>rubrum</i> <i>spicatum</i> <i>saccharinum</i>
Rutaceae				
<i>Dictamnus</i>		<i>dasycarpus</i>		<i>pensylvanicus</i> <i>saccharum</i>
<i>Phellodendron</i>		<i>amurense</i>		
Anacardiaceae				
<i>Rhus</i>				<i>typhina</i>
Oxaliaceae				
<i>Oxalis</i>	<i>acetosella</i>	<i>corniculata</i>		<i>montana</i>
Geraniaceae				
<i>Geranium</i>	<i>robertianum</i> <i>pratense</i> <i>sylvaticum</i>	<i>robertianum</i> <i>pratense</i> <i>sylvaticum</i>	<i>bickeillii</i> <i>erianthum</i> <i>richardsonii</i> <i>caridinianum</i>	<i>bickeillii</i>
	<i>columbinum</i> <i>lucidum</i> <i>pyrenaicum</i> <i>dissectum</i>	<i>eriosomon</i> <i>maximowiczii</i> <i>sibiricum</i> <i>dahuricum</i>		
Balsaminaceae				
<i>Impatiens</i>	<i>noli-tangere</i>	<i>noli-tangere</i>	<i>noli-tangere</i>	<i>capensis</i>
Araliaceae				
<i>Acanthopanax</i>		<i>senticosus</i>		

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Aralia</i>			<i>nudicaulis</i>	<i>nudicaulis</i>
		<i>manshurica</i>		<i>racemosa</i>
<i>Kalopanax</i>		<i>septemlobus</i>		
<i>Oplopanax</i>			<i>horridum</i>	<i>horridum</i>
Apiaceae (Umbelliferae)				
<i>Angelica</i>		<i>lucida</i>	<i>lucida</i>	
		<i>triradiatum</i>	<i>triradiatum</i>	
	<i>archangelica</i>	<i>amurensis</i>	<i>genuflexa</i>	
	<i>sylvestris</i>	<i>dahurica</i>		
<i>Bupleurum</i>		<i>longradiatum</i>		
		<i>marginatum</i>		
		<i>scorzonerifolium</i>		
		<i>sibiricum</i>		
<i>Cicuta</i>			<i>douglasii</i>	
			<i>mackenziana</i>	
<i>Conioselinum</i>		<i>chinense</i>	<i>chinense</i>	<i>chinense</i>
		<i>cnidiifolium</i>	<i>cnidiifolium</i>	
<i>Glehnia</i>			<i>leiocarpa</i>	
<i>Heracleum</i>		<i>lanatum</i>	<i>lanatum</i>	
	<i>sphondylium</i>	<i>barbatum</i>		
		<i>dissectum</i>		
		<i>hemsleyanum</i>		
<i>Ligusticum</i>	<i>scoticum</i>	<i>scoticum</i>	<i>scoticum</i>	<i>scoticum</i>
		<i>mutellinoides</i>	<i>mutellinoides</i>	
<i>Oenanthe</i>			<i>sarmentosa</i>	
<i>Osmorhiza</i>			<i>chilensis</i>	<i>chilensis</i>
			<i>depauperata</i>	<i>depauperata</i>
			<i>purpurea</i>	<i>purpurea</i>
		<i>aristata</i>		<i>longistylis</i>
				<i>claytonii</i>
<i>Sanicula</i>			<i>marilandica</i>	<i>marilandica</i>
	<i>europaea</i>	<i>chinensis</i>		<i>canadensis</i>
		<i>rubriflora</i>		
<i>Saposhnikoria</i>		<i>divarcta</i>		
<i>Sium</i>	<i>latifolium</i>	<i>suave</i>	<i>suave</i>	<i>suave</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
ASTERIDAE				
Gentianaceae				
<i>Gentiana</i>	<i>tenella</i>	<i>tenella</i>	<i>tenella</i>	
		<i>prostrata</i>	<i>prostrata</i>	<i>prostrata</i>
	<i>nivalis</i>			<i>nivalis</i>
		<i>algida</i>	<i>algida</i>	
		<i>glauca</i>	<i>glauca</i>	
	<i>pneumonanthe</i>	<i>dahurica</i>	<i>douglasiana</i>	<i>amarella</i>
		<i>aquarrosa</i>	<i>platypetala</i>	
<i>Gentianella</i>	<i>amarella</i>	<i>amarella</i>	<i>amarella</i>	<i>amarella</i>
	<i>detonsa</i>	<i>detonsa</i>	<i>detonsa</i>	<i>detonsa</i>
		<i>propinqua</i>	<i>propinqua</i>	<i>propinqua</i>
		<i>auriculata</i>	<i>auriculata</i>	
			<i>tenella</i>	<i>tenella</i>
<i>Lomatogonium</i>			<i>rotatum</i>	<i>rotatum</i>
<i>Swertia</i>	<i>perennis</i>	<i>perennis</i>	<i>perennis</i>	
Apocynaceae				
<i>Apocynum</i>				<i>droseaemifolium</i>
Plantaginaceae				
<i>Plantago</i>	<i>maritima</i>	<i>Maritima</i>	<i>maritima</i>	<i>maritima</i>
		<i>canescens</i>	<i>canescens</i>	
			<i>eriopoda</i>	<i>eriopoda</i>
			<i>macrocarpa</i>	
Solanaceae				
<i>Solanum</i>	<i>nigrum</i>	<i>nigrum</i>		
	<i>dulcamera</i>	<i>japonense</i>		
Convolvaceae				
<i>Catystagia</i>	<i>sepium</i>	<i>dahurica</i>		

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>soldanella</i>	<i>soldanella</i>		
Menyanthaceae				
<i>Fauria</i>			<i>crisia-galli</i>	
<i>Menyanthes</i>	<i>trifoliata</i>	<i>trifoliata</i>	<i>trifoliata</i>	<i>trifoliata</i>
Polemoniaceae				
<i>Polemonium</i>	<i>caeruleum</i> <i>boreale</i>	<i>caeruleum</i> <i>hingganicum</i>	<i>caeruleum</i> <i>acutiflorum</i> <i>pulcherrimum</i> <i>hoodii</i>	<i>caeruleum</i>
<i>Phlox</i>		<i>sibirica</i>	<i>sibirica</i>	
Boraginaceae				
<i>Cynoglossum</i>			<i>boreale</i>	<i>boreale</i>
<i>Eritrichium</i>	<i>nanum</i>	<i>nanum</i> <i>rupestre</i> <i>mandshuricum</i> <i>aretioides</i>	<i>nanum</i> <i>rupestre</i> <i>plendens</i> <i>aretioides</i> <i>chamissonis</i> <i>deflexa</i>	
<i>Hackelia</i>			<i>redowski</i>	
<i>Lappula</i>		<i>echinata</i>		
<i>Mertensia</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i> <i>paniculata</i> <i>drummondii</i>	<i>maritima</i> <i>paniculata</i>
<i>Myosotis</i>	<i>sylvatica</i>	<i>sylvatica</i> <i>alpestris</i>	<i>sylvatica</i> <i>alpestris</i>	
Phrymaceae				
<i>Phryma</i>		<i>leptostachya</i>		
Lamiaceae (Labiatae)				
<i>Agastache</i>		<i>rugosus</i>		<i>foeniculum</i>
<i>Amethystea</i>		<i>caerulea</i>		
<i>Dracocephalum</i>		<i>argunense</i> <i>ruyschianum</i>		<i>parviflorum</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Elsholtzia</i>		<i>moldavicum</i>	<i>parviflora</i>	<i>parviflora</i>
<i>Lamium</i>	<i>album</i>	<i>ciliata</i>		
	<i>purpureum</i>	<i>album</i>		
<i>Leonurus</i>	<i>cardiaca</i>	<i>artemisia</i>		
		<i>tataricus</i>		
<i>Lycopus</i>		<i>uniflorus</i>	<i>uniflorus</i>	<i>uniflorus</i>
		<i>lucidus</i>		
		<i>ramosissimus</i>		
<i>Mentha</i>	<i>arvensis</i>	<i>arvensis</i>	<i>arvensis</i>	<i>arvensis</i>
	<i>rotundifolia</i>	<i>rotundifolia</i>		
	<i>spicata</i>	<i>dahurica</i>		
		<i>sachalinensis</i>		
<i>Rabdosia</i>		<i>exicisa</i>		
		<i>parvifolia</i>		
<i>Thymus</i>	<i>pulegioides</i>	<i>dahurica</i>		
	<i>serpyllum</i>	<i>mongolicus</i>		
		<i>nervulosus</i>		
<i>Prunella</i>	<i>vulgaris</i>	<i>vulgaris</i>	<i>vulgaris</i>	
	<i>grandiflora</i>	<i>asiatica</i>		
<i>Scutellaria</i>	<i>galericulata</i>	<i>galericulata</i>	<i>galericulata</i>	<i>galericulata</i>
	<i>histifolia</i>	<i>baicalensis</i>		<i>epilobifolia</i>
		<i>scordifolia</i>		
<i>Stachys</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>	
	<i>arvensis</i>	<i>baicalensis</i>		
		<i>chinensis</i>		
Callitrichaceae				
<i>Callitriche</i>	<i>hermaphroditica</i>	<i>hermaphroditica</i>	<i>hermaphroditica</i>	
	<i>verna</i>	<i>verna</i>	<i>verna</i>	
		<i>anceps</i>	<i>anceps</i>	
Hydrophyllaceae				
<i>Phacelia</i>			<i>franklinii</i>	
			<i>mollis</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Romanzoffia</i>			<i>sericea</i> <i>sitchensis</i>	
Oleaceae				
<i>Fraxinus</i>	<i>excelsior</i>	<i>manshurica</i>		<i>nigra</i> <i>americana</i> <i>pennsylvanica</i>
<i>Syringa</i>		<i>amurensis</i>		
Scrophulariaceae				
<i>Bartsia</i>	<i>alpina</i>	<i>alpina</i>		<i>alpina</i>
<i>Castilleja</i>	<i>pallida</i> <i>schrenkii</i>	<i>pallida</i>	<i>pallida</i> <i>hyerborea</i> <i>raupii</i> <i>unalaschcensis</i> <i>parviflora</i> <i>annua</i> <i>elegans</i> <i>miniata</i> <i>yukonis</i>	<i>steptentrionalis</i>
<i>Euphrasia</i>	<i>brevipila</i> <i>salisburgensis</i>	<i>amurensis</i> <i>pectinata</i>	<i>arctica</i>	<i>arctica</i>
<i>Lagotis</i>		<i>glauca</i>	<i>glauca</i>	
<i>Limosella</i>	<i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>
<i>Linaria</i>		<i>japonica</i> <i>vulgaris</i>		
<i>Melampyrum</i>	<i>cristatum</i> <i>nemorosum</i> <i>pratense</i> <i>sylvaticum</i>	<i>roseum</i>		<i>lineare</i>
<i>Mimulus</i>			<i>guttatus</i> <i>lewisii</i>	
<i>Orthocarpus</i>			<i>hispidus</i>	
<i>Pedicularis</i>	<i>lapponica</i> <i>palustris</i>	<i>lapponica</i> <i>palustris</i>	<i>lapponica</i>	<i>lapponica</i> <i>palustris</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>hirsuta</i>			<i>hirsuta</i>
	<i>silvatica</i>			<i>silvatica</i>
	<i>oederi</i>	<i>oederi</i>	<i>oederi</i>	
	<i>verticillata</i>	<i>verticillata</i>	<i>verticillata</i>	
		<i>capitata</i>	<i>capitata</i>	<i>capitata</i>
		<i>langsдорffii</i>	<i>langsдорffii</i>	<i>langsдорffii</i>
		<i>chamissoonis</i>	<i>chamissionis</i>	
		<i>pennellii</i>	<i>pennellii</i>	
			<i>groenlandica</i>	<i>groenlandica</i>
			<i>labradorica</i>	<i>labradorica</i>
			<i>lanata</i>	<i>lanata</i>
	<i>sceptum</i>	<i>spicata</i>	<i>parviflora</i>	
	<i>carolinum</i>	<i>striata</i>	<i>sudetica</i>	
		<i>resupinata</i>	<i>ornithorhyncha</i>	
		<i>chinensis</i>		
<i>Parasites</i>	<i>arvensis</i>	<i>arvensis</i>		
<i>Penstemon</i>			<i>gormanii</i>	
			<i>procerus</i>	
			<i>serrulatus</i>	
<i>Rhinanthus</i>	<i>minor</i>	<i>minor</i>	<i>minor</i>	<i>minor</i>
	<i>groenlandicus</i>			<i>groenlandicus</i>
<i>Scrophularia</i>	<i>nodosa</i>	<i>nodosa</i>	<i>nodosa</i>	<i>nodosa</i>
<i>Synthyris</i>				<i>borealis</i>
<i>Veronica</i>	<i>alpina</i>	<i>alpina</i>	<i>alpina</i>	<i>alpina</i>
	<i>officinalis</i>	<i>officinalis</i>	<i>officinalis</i>	
	<i>scutellata</i>	<i>scutellata</i>	<i>scutellata</i>	<i>scutellata</i>
	<i>serpyllifolia</i>	<i>serpyllifolia</i>	<i>serpyllifolia</i>	<i>serpyllifolia</i>
	<i>anagallisaquatica</i>	<i>anagallisaquatica</i>		
			<i>americana</i>	<i>americana</i>
	<i>baccabunga</i>	<i>didyma</i>	<i>grandiflora</i>	
	<i>chamaedrus</i>	<i>incana</i>	<i>wormskjoldii</i>	
		<i>rotunda</i>		
		<i>grandis</i>		
Orobanchaceae				
<i>Boshchniakia</i>		<i>rossica</i>	<i>rossica</i>	

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Genus	Europe	E-Asia	WN-America	EN-America
<i>Orobanche</i>		<i>caerulescens</i> <i>uniflora</i>	<i>fasciculata</i> <i>uniflora</i>	<i>fasciculata</i> <i>uniflora</i>
Lentibulariaceae				
<i>Pinguicula</i>	<i>vulgaris</i> <i>villosa</i>	<i>vulgaris</i> <i>villosa</i>	<i>vulgaris</i> <i>villosa</i>	<i>vulgaris</i> <i>villosa</i>
<i>Utricularia</i>	<i>intermedia</i> <i>minor</i> <i>vulgaris</i>	<i>intermedia</i> <i>minor</i> <i>vulgaris</i>	<i>intermedia</i> <i>minor</i> <i>vulgaris</i>	<i>intermedia</i> <i>minor</i> <i>vulgaris</i>
Campanulaceae				
<i>Adenophora</i>	<i>lilifolia</i>	<i>lilifolia</i> <i>amurensis</i> <i>divaricata</i> <i>gmelini</i> <i>paniculata</i> <i>polyantha</i> <i>stricta</i> <i>tetraphylla</i> <i>tracheliodes</i>		
<i>Campanula</i>	<i>rotundifolia</i> <i>uniflora</i> <i>barbata</i> <i>glomerata</i>	<i>rotundifolia</i> <i>uniflora</i>	<i>rotundifolia</i> <i>uniflora</i> <i>aurita</i>	<i>rotundifolia</i>
	<i>cervicaria</i> <i>latifolia</i> <i>persicifolia</i> <i>rapunculus</i> <i>trachelium</i>	<i>glomerata</i> <i>chamissonis</i> <i>lasiocarpa</i> <i>punctata</i>	<i>chamissonis</i> <i>lasiocarpa</i> <i>scouleri</i>	
<i>Codonopsis</i>		<i>pilosula</i>		
<i>Lobelia</i>	<i>dortmanna</i>	<i>chinensis</i>	<i>dortmanna</i>	<i>dortmanna</i> <i>kalmii</i>
Rubiaceae				

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Genus	Europe	E-Asia	WN-America	EN-America
<i>Cephalanthus</i>				<i>occidentalis</i>
<i>Galium</i>	<i>aparine</i>	<i>aparine</i>	<i>aparine</i>	<i>aparine</i>
	<i>boreale</i>	<i>boreale</i>	<i>boreale</i>	<i>boreale</i>
	<i>palustre</i>	<i>palustre</i>		<i>palustre</i>
		<i>kamtschaticum</i>	<i>kamtschaticum</i>	<i>kamtschaticum</i>
	<i>trifidum</i>	<i>trifidum</i>	<i>trifidum</i>	<i>trifidum</i>
	<i>saxatile</i>			<i>saxatile</i>
			<i>triflorum</i>	<i>triflorum</i>
	<i>rotundifolium</i>	<i>verum</i>		<i>labradoricum</i>
	<i>pumilum</i>			<i>asprellum</i>
	<i>uliginosum</i>			
<i>Rubia</i>		<i>cordifolia</i>		
Caprifoliaceae				
<i>Diervilla</i>				<i>lonicera</i>
<i>Linnaea</i>	<i>boreale</i>	<i>boreale</i>	<i>boreale</i>	<i>boreale</i>
<i>Lonicera</i>	<i>caerulea</i>	<i>caerulea</i>		
			<i>dioica</i>	<i>dioica</i>
		<i>chrysantha</i>		<i>villosa</i>
		<i>mackii</i>		<i>involuta</i>
		<i>ruprechtiana</i>		<i>canadensis</i>
<i>Symphoricarpos</i>			<i>albus</i>	<i>albus</i>
				<i>occidentalis</i>
<i>Viburnum</i>	<i>opulus</i>	<i>opulus</i>	<i>opulus</i>	<i>opulus</i>
			<i>edule</i>	<i>edule</i>
		<i>sargentii</i>	<i>cassinoides</i>	
		<i>uliginosum</i>		
Adoxaceae				
<i>Adoxa</i>	<i>moschatellina</i>	<i>moschatellina</i>	<i>moschatellina</i>	<i>moschatellina</i>
		<i>orientalis</i>		
<i>Sambucus</i>	<i>racemosa</i>	<i>racemosa</i>	<i>racemosa</i>	<i>racemosa</i>
Valerianaceae				
<i>Patrinia</i>	<i>scabiosaefolia</i>	<i>scabiosaefolia</i>		
<i>Valeriana</i>	<i>officinalis</i>	<i>officinalis</i>		

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Genus	Europe	E-Asia	WN-America	EN-America
	<i>dioica</i>		<i>dioica</i>	<i>dioica</i>
		<i>capitata</i>	<i>capitata</i>	
		<i>amuriensis</i>	<i>sitchensis</i>	
Dipsacaceae				
<i>Scabiosa</i>		<i>comosa</i>		
Asteraceae				
<i>Achillea</i>	<i>millefolium</i>	<i>millefolium</i>	<i>millefolium</i>	<i>millefolium</i>
		<i>sibirica</i>	<i>sibirica</i>	
			<i>borealis</i>	<i>borealis</i>
	<i>ptamica</i>	<i>setacea</i>	<i>lanulosa</i>	
<i>Adenocaulon</i>		<i>himalaicum</i>		
<i>Agoseris</i>			<i>aurantiaca</i>	
			<i>glauc</i>	
<i>Anaphalis</i>		<i>margaritacea</i>	<i>margaritacea</i>	<i>margaritacea</i>
<i>Antennaria</i>	<i>dioica</i>	<i>dioica</i>	<i>dioica</i>	
	<i>alpina</i>	<i>alpina</i>	<i>alpina</i>	
		<i>monocephala</i>	<i>monocephala</i>	<i>monocephala</i>
		<i>friesiana</i>	<i>friesiana</i>	
			<i>neglecta</i>	<i>neglecta</i>
			<i>pulcherrima</i>	<i>pulcherrima</i>
			<i>rosea</i>	<i>rosea</i>
			<i>mollis</i>	
			<i>latifolia</i>	
			<i>amplexicaulis</i>	
			<i>chamissonis</i>	
			<i>diversifolia</i>	
			<i>lessingii</i>	
			<i>parryi</i>	
			<i>shumaginensis</i>	
			<i>umbrinella</i>	
<i>Apargidium</i>			<i>boreale</i>	
<i>Arnica</i>	<i>alpina</i>	<i>alpina</i>	<i>alpina</i>	<i>alpina</i>
			<i>cordifolia</i>	<i>cordifolia</i>

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Genus	Europe	E-Asia	WN-America	EN-America
<i>Artemisia</i>	<i>montana</i>	<i>lessingii</i>	<i>lessingii</i>	
		<i>louiseana</i>	<i>louiseana</i>	
		<i>unalaschcensis</i>	<i>unalaschcensis</i>	
			<i>lonchophylla</i>	
		<i>arctica</i>	<i>arctica</i>	
		<i>borealis</i>	<i>borealis</i>	
		<i>furcata</i>	<i>furcata</i>	
		<i>frigida</i>	<i>frigida</i>	
	<i>absinthium</i> <i>campestris</i> <i>vulgaris</i>	<i>globularia</i>	<i>globularia</i>	
		<i>lacinata</i>	<i>lacinata</i>	
		<i>senjavinensis</i>	<i>senjavinensis</i>	
		<i>tilesii</i>	<i>tilesii</i>	
		<i>keiseana</i>	<i>alaskana</i>	
		<i>lagocephala</i>	<i>campestris</i>	<i>campestris</i>
		<i>mongolica</i>	<i>ludoviciana</i>	<i>ludoviciana</i>
		<i>stolonifera</i>	<i>aleutica</i>	
<i>Aster</i>	<i>alpinus</i>	<i>argyi</i>	<i>dracuncul</i>	
		<i>gmelinii</i>	<i>glomerata</i>	
		<i>sacrorum</i>	<i>norvrgica</i>	
		<i>siversiana</i>		
	<i>tripolium</i>	<i>scoparia</i>		
		<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>
		<i>sibiricus</i>	<i>sibiricus</i>	
		<i>sehecioides</i>	<i>yukonensis</i>	<i>borealis</i>
<i>Atractylis</i>		<i>scaber</i>	<i>ciliolatus</i>	<i>umbellatus</i>
		<i>tataricus</i>	<i>commutatus</i>	<i>laevis</i>
			<i>junctiformis</i>	<i>macrophyllus</i>
			<i>modestus</i>	<i>puniceus</i>
			<i>subspicatus</i>	
<i>Atractylodes</i>		<i>japonica</i>		
		<i>chinensis</i>		
<i>Bidens</i>	<i>crenua</i> <i>cripartita</i>	<i>chinensis</i>		
		<i>japonica</i>		
		<i>crenua</i>		
		<i>bipinnata</i>		
		<i>parviflora</i>		

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Genus	Europe	E-Asia	WN-America	EN-America
<i>Cacalia</i>		<i>auriculata</i> <i>hastata</i>	<i>auriculata</i>	
<i>Chrysanthemum</i>	<i>arcticum</i>	<i>arcticum</i> <i>integrifolium</i> <i>zawadzkii</i>	<i>integrifolium</i>	
<i>Cirsium</i>	<i>palustre</i>	<i>kamtschatium</i> <i>japonicum</i> <i>pendulum</i> <i>schantarense</i> <i>vlassovianum</i>	<i>kamtschatium</i> <i>edule</i> <i>foliosum</i>	<i>palustre</i>
<i>Crepis</i>	<i>biennis</i> <i>paludosa</i> <i>capillaris</i>	<i>nana</i> <i>crocea</i> <i>indica</i>	<i>nana</i> <i>elogans</i>	<i>nana</i>
<i>Echinops</i>		<i>gmelinii</i> <i>latifolius</i>		
<i>Erigeron</i>	<i>acris</i> <i>humile</i> <i>uniflorus</i> <i>alpinus</i>	<i>acris</i> <i>humile</i> <i>uniflorus</i> <i>komarowii</i>	<i>acris</i> <i>humile</i> <i>uniflorus</i> <i>compositus</i> <i>philadelphicus</i> <i>longchophyllus</i> <i>hyperboreus</i> <i>caespitosus</i> <i>glabellus</i> <i>grandiflorus</i> <i>pumilus</i> <i>purpuratus</i> <i>yukonensis</i> <i>hyssopifolius</i> <i>muirii</i>	<i>acris</i> <i>humile</i> <i>uniflorus</i> <i>compositus</i> <i>philadelphicus</i>
<i>Eupatorium</i> <i>Gnaphalium</i>	<i>cannabinum</i> <i>norvegicum</i> <i>silvaticum</i> <i>supinum</i>	<i>japonicum</i>	<i>occidentale</i>	<i>purpureum</i> <i>norvegicum</i> <i>silvaticum</i> <i>supinum</i>

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Genus	Europe	E-Asia	WN-America	EN-America
<i>Haplopappus</i>		<i>mandshuricum</i>	<i>palustre</i>	
<i>Hieracium</i>	<i>umbellatum</i>	<i>umbellatum</i>	<i>macleanii</i>	<i>umbellatum</i>
	<i>alpinum</i>	<i>holoeion</i>	<i>albiflorum</i>	
	<i>caesium</i>		<i>gracile</i>	
		<i>triste</i>	<i>triste</i>	
	<i>piloseua</i>			
	<i>salicina</i>			
	<i>vulgatum</i>			
<i>Filifolium</i>		<i>sibiricum</i>		
<i>Inula</i>	<i>salicina</i>	<i>britannica</i>		
<i>Lactuca</i>		<i>tatarica</i>	<i>tatarica</i>	<i>tatarica</i>
			<i>biennis</i>	<i>biennis</i>
	<i>alpina</i>	<i>sibirica</i>		
	<i>serriola</i>	<i>triangulata</i>		
	<i>sativa</i>			
<i>Leontopodium</i>		<i>conglobatum</i>		
<i>Ligularia</i>		<i>fischeri</i>		
<i>Matricaria</i>	<i>ambigua</i>	<i>ambigua</i>	<i>ambigua</i>	
<i>Petasites</i>		<i>frigidus</i>	<i>frigidus</i>	<i>frigidus</i>
			<i>sagittatus</i>	<i>sagittatus</i>
		<i>japonicus</i>		<i>palmaris</i>
				<i>vittifolius</i>
<i>Picris</i>	<i>hieracioides</i>	<i>hieracioides</i>	<i>hieracioides</i>	
<i>Prenanthes</i>			<i>alata</i>	
<i>Saussurea</i>		<i>angustifolia</i>	<i>angustifolia</i>	
		<i>nuda</i>	<i>nuda</i>	
	<i>discolor</i>	<i>amurensis</i>	<i>americana</i>	
<i>Senecio</i>	<i>atropurpureus</i>	<i>atropurpureus</i>	<i>atropurpureus</i>	<i>atropurpureus</i>
	<i>fuscatus</i>	<i>fuscatus</i>	<i>fuscatus</i>	<i>fuscatus</i>
	<i>integrifolius</i>	<i>integrifolius</i>	<i>integrifolius</i>	<i>integrifolius</i>
		<i>congestus</i>	<i>congestus</i>	<i>congestus</i>
		<i>resedifolius</i>	<i>resedifolius</i>	<i>resedifolius</i>
			<i>pauperculus</i>	<i>pauperculus</i>
	<i>aquaticus</i>	<i>flammens</i>	<i>lugens</i>	<i>tridenticulatus</i>
	<i>jacobaea</i>	<i>kirilowii</i>	<i>indecorus</i>	<i>pauciflorus</i>

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Genus	Europe	E-Asia	WN-America	EN-America
	<i>sylvaticus</i>	<i>cannabifolius</i>	<i>yukoyensis</i> <i>streptanthifolius</i> <i>hyperborealis</i> <i>sheldonensis</i> <i>triangularis</i>	
<i>Solidago</i>	<i>virgaurea</i>	<i>virgaurea</i> <i>decurens</i>	<i>canadensis</i> <i>spathulata</i> <i>multiradiata</i> <i>nemoralis</i>	<i>gigantea</i> <i>macrophylla</i> <i>multiradiata</i> <i>nispida</i>
<i>Syneilesis</i>		<i>aconitifolia</i>		
<i>Tanacetum</i>	<i>bipinnatum</i>	<i>bipinnatum</i>	<i>bipinnatum</i>	<i>bipinnatum</i> <i>huronense</i>
<i>Tanthium</i>		<i>sibiricum</i>		
<i>Taraxacum</i>	<i>ceratophorum</i> <i>hyparcticum</i> <i>croceum</i> <i>lapponicum</i>	<i>ceratophorum</i> <i>hyparcticum</i>	<i>ceratophorum</i> <i>hyparcticum</i>	<i>ceratophorum</i> <i>croceum</i> <i>lapponicum</i>
		<i>alaskanum</i> <i>eriophorum</i> <i>lateritium</i> <i>lyratum</i>	<i>alaskanum</i> <i>eriophorum</i> <i>lateritium</i> <i>lyratum</i>	
	<i>glabrum</i>	<i>ohwianum</i>		<i>lacerum</i>
<i>Townsendia</i>			<i>hookeri</i>	

ALISMATIDAE

Alismaceae

<i>Alisma</i>	<i>gramineum</i>	<i>gramineum</i>	<i>gramineum</i>	<i>gramineum</i>
<i>Sagittaria</i>			<i>cuneata</i>	<i>cuneata</i>

Scheuchzeriaceae

<i>Schenchzeria</i>	<i>palustris</i> <i>vaginatus</i>	<i>palustris</i> <i>vaginatus</i>	<i>palustris</i> <i>vaginatus</i> <i>zosterifolius</i>	<i>palustris</i> <i>zosterifolius</i>
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Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
			<i>praelongus</i>	<i>praelongus</i>
			<i>robbinsii</i>	<i>robbinsii</i>
			<i>subsibiricus</i>	
<i>Triglochin</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>
	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>
Potamogetonaceae				
<i>Potamogeton</i>	<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>
	<i>filiformis</i>	<i>filiformis</i>	<i>filiformis</i>	<i>filiformis</i>
	<i>friesii</i>	<i>friesii</i>	<i>friesii</i>	<i>friesii</i>
	<i>crispus</i>	<i>crispus</i>		<i>crispus</i>
	<i>distinctus</i>	<i>distinctus</i>		<i>distinctus</i>
	<i>obtusifolius</i>	<i>obtusifolius</i>		<i>obtusifolius</i>
	<i>gramineus</i>	<i>gramineus</i>	<i>gramineus</i>	
	<i>natans</i>	<i>natans</i>	<i>natans</i>	
	<i>perfoliatus</i>	<i>perfoliatus</i>	<i>perfoliatus</i>	
	<i>lucens</i>	<i>lucens</i>		
			<i>berchtoldii</i>	<i>berchtoldii</i>
			<i>epihydrus</i>	<i>epihydrus</i>
			<i>foliosus</i>	<i>foliosus</i>
			<i>pectinatus</i>	<i>pectinatus</i>
				<i>illinoensis</i>
Ruppiaceae				
<i>Ruppia</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>
Najadaceae				
<i>Najas</i>	<i>flexilis</i>	<i>flexilis</i>	<i>flexilis</i>	<i>flexilis</i>
Zannichelliaceae				
<i>Zannichellia</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>
Zosteraceae				
<i>Phyllospadix</i>			<i>scouleri</i>	
<i>Zostera</i>	<i>marina</i>	<i>marina</i>	<i>marina</i>	<i>marina</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
ARECIDAE				
Lemnaceae				
<i>Lemna</i>	<i>minor</i> <i>trisulca</i>	<i>minor</i> <i>trisulca</i>	<i>minor</i> <i>trisulca</i>	<i>minor</i> <i>trisulca</i>
Juncaceae				
<i>Juncus</i>	<i>arcticus</i> <i>biglumis</i> <i>castaneus</i> <i>bufonius</i> <i>effusus</i> <i>filiformis</i> <i>trifidus</i> <i>articulatus</i> <i>tenuis</i> <i>gerardi</i> <i>acutiflorus</i> <i>bulbosus</i>	<i>arcticus</i> <i>biglumis</i> <i>castaneus</i> <i>bufonius</i> <i>effusus</i> <i>filiformis</i> <i>trifidus</i> <i>articulatus</i> <i>tenuis</i> <i>gerardi</i> <i>nipponensis</i>	<i>arcticus</i> <i>biglumis</i> <i>castaneus</i> <i>bufonius</i> <i>effusus</i> <i>filiformis</i> <i>trifidus</i> <i>articulatus</i> <i>tenuis</i> <i>falcatus</i> <i>drummondii</i>	<i>arcticus</i> <i>biglumis</i> <i>castaneus</i> <i>bufonius</i> <i>effusus</i> <i>filiformis</i> <i>trifidus</i> <i>articulatus</i> <i>tenuis</i> <i>gerardi</i> <i>acutiflorus</i> <i>falcatus</i> <i>compressus</i>
<i>Luzula</i>	<i>arcuata</i> <i>campestris</i> <i>spicata</i> <i>alpinus</i> <i>confusa</i> <i>multiflora</i> <i>wahlenbergii</i> <i>nivalis</i> <i>pilosa</i>	<i>arcuata</i> <i>campestris</i> <i>spicata</i> <i>alpinus</i> <i>confusa</i> <i>multiflora</i> <i>wahlenbergii</i> <i>nivalis</i> <i>parviflora</i> <i>pilosa</i> <i>reflescens</i> <i>tundricola</i>	<i>arcuata</i> <i>campestris</i> <i>spicata</i> <i>alpinus</i> <i>confusa</i> <i>multiflora</i> <i>wahlenbergii</i> <i>nivalis</i> <i>parviflora</i> <i>reflescens</i> <i>tundricola</i> <i>nodosus</i>	<i>arcuata</i> <i>campestris</i> <i>spicata</i> <i>alpinus</i> <i>confusa</i> <i>multiflora</i> <i>wahlenbergii</i> <i>nivalis</i> <i>parviflora</i> <i>nodosus</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
			<i>stygius</i>	<i>stygius</i>
			<i>triglumis</i>	<i>triglumis</i>
			<i>supiniformis</i>	<i>saltuensis</i>
Cyperaceae				
<i>Carex</i>	<i>acutiformis</i>	<i>aquatilis</i>	<i>aquatilis</i>	<i>aquatilis</i>
	<i>atherodes</i>	<i>atherodes</i>	<i>atherodes</i>	<i>atherodes</i>
	<i>atrata</i>	<i>atrata</i>	<i>atrata</i>	<i>atrata</i>
	<i>bigelowii</i>	<i>bigelowii</i>	<i>bigelowii</i>	<i>bigelowii</i>
	<i>bicolor</i>	<i>bicolor</i>	<i>bicolor</i>	<i>bicolor</i>
	<i>capitata</i>	<i>capitata</i>	<i>capitata</i>	<i>capitata</i>
	<i>echinata</i>	<i>echinata</i>	<i>echinata</i>	<i>echinata</i>
	<i>flava</i>	<i>flava</i>	<i>flava</i>	<i>flava</i>
	<i>limosa</i>	<i>limosa</i>	<i>limosa</i>	<i>limosa</i>
	<i>livida</i>	<i>livida</i>	<i>livida</i>	<i>livida</i>
	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>
	<i>misandra</i>	<i>misandra</i>	<i>misandra</i>	<i>misandra</i>
	<i>paniculata</i>	<i>pauciflora</i>	<i>pauciflora</i>	<i>pauciflora</i>
	<i>rotundata</i>	<i>rotundata</i>	<i>rotundata</i>	<i>rotundata</i>
	<i>rupestris</i>	<i>rupestris</i>	<i>rupestris</i>	<i>rupestris</i>
	<i>ursina</i>	<i>ursina</i>	<i>ursina</i>	<i>ursina</i>
	<i>pseudocyperus</i>	<i>pseudocyperus</i>	<i>pseudocyperus</i>	<i>pseudocyperus</i>
	<i>viridula</i>	<i>viridula</i>	<i>viridula</i>	<i>viridula</i>
	<i>glareosa</i>	<i>glareosa</i>	<i>glareosa</i>	<i>glareosa</i>
	<i>magellanica</i>	<i>magellanica</i>	<i>magellanica</i>	<i>magellanica</i>
	<i>rostrata</i>	<i>rostrata</i>	<i>rostrata</i>	<i>rostrata</i>
		<i>chordorrhiza</i>	<i>chordorrhiza</i>	<i>chordorrhiza</i>
		<i>tenuiflora</i>	<i>tenuiflora</i>	<i>tenuiflora</i>
	<i>hostiana</i>			<i>hostiana</i>
	<i>lepidocarpa</i>			<i>lepidocarpa</i>
	<i>nigra</i>			<i>nigra</i>
	<i>panicea</i>			<i>panicea</i>
	<i>pallescens</i>			<i>pallescens</i>
		<i>anthozanthea</i>	<i>anthozanthea</i>	
		<i>bonanzensis</i>	<i>bonanzensis</i>	
		<i>eleusinoides</i>	<i>eleusinoides</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
		<i>gmelinii</i>	<i>gmelinii</i>	
		<i>membranacea</i>	<i>membranacea</i>	
		<i>nesophila</i>	<i>nesophila</i>	
		<i>podocarpa</i>	<i>podocarpa</i>	
		<i>sabulosa</i>	<i>sabulosa</i>	
		<i>williamsii</i>	<i>williamsii</i>	
			<i>acicularis</i>	<i>acicularis</i>
			<i>adelostoma</i>	<i>adelostoma</i>
			<i>arcta</i>	<i>arcta</i>
			<i>athrostachya</i>	<i>athrostachya</i>
			<i>atratifomis</i>	<i>atratifomis</i>
			<i>atrofusca</i>	<i>atrofusca</i>
			<i>brunnescens</i>	<i>brunnescens</i>
			<i>canescens</i>	<i>canescens</i>
			<i>capillaris</i>	<i>capillaris</i>
			<i>crawfordii</i>	<i>crawfordii</i>
			<i>deflexa</i>	<i>deflexa</i>
			<i>concinna</i>	<i>concinna</i>
			<i>eburnea</i>	<i>eburnea</i>
			<i>heleonates</i>	<i>heleonates</i>
			<i>holostoma</i>	<i>holostoma</i>
			<i>interior</i>	<i>interior</i>
			<i>kamtschatica</i>	<i>kamtschatica</i>
			<i>lanuginosa</i>	<i>lanuginosa</i>
			<i>media</i>	<i>media</i>
			<i>microglochin</i>	<i>microglochin</i>
			<i>nardina</i>	<i>nardina</i>
			<i>nitida</i>	<i>nitida</i>
			<i>peckii</i>	<i>peckii</i>
			<i>quinqueflora</i>	<i>quinqueflora</i>
			<i>rariflora</i>	<i>rariflora</i>
			<i>scirpoidea</i>	<i>scirpoidea</i>
			<i>stylosa</i>	<i>stylosa</i>
			<i>vagianta</i>	<i>vagianta</i>
	<i>acuta</i>	<i>angustinowiczii</i>	<i>albo-nigra</i>	<i>aenea</i>
	<i>arenaria</i>	<i>appendiculata</i>	<i>argyrantha</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>canescens</i>	<i>capilliformis</i>	<i>buxbaumii</i>	
	<i>caryophyllea</i>	<i>callitrichos</i>	<i>bebbii</i>	
	<i>dioica</i>	<i>duriuscula</i>	<i>circinata</i>	
	<i>divulsa</i>	<i>elongata</i>	<i>deweyana</i>	
	<i>distans</i>	<i>foliacea</i>	<i>dioica</i>	
	<i>elata</i>	<i>lanceolata</i>	<i>disperma</i>	
	<i>extensa</i>	<i>meyeriana</i>	<i>enanderi</i>	<i>foenea</i>
	<i>hirta</i>	<i>laevirostris</i>	<i>filifolia</i>	<i>garberi</i>
		<i>longirostrata</i>	<i>jacobi-peteri</i>	<i>glacialis</i>
		<i>maximowiczii</i>	<i>oederi</i>	<i>gynocrates</i>
		<i>neurocarpa</i>	<i>mertensii</i>	
	<i>otrubae</i>	<i>ovalis</i>	<i>laeviculmis</i>	<i>lacustris</i>
	<i>pilulifera</i>		<i>lachenalii</i>	<i>lugens</i>
	<i>pulicaris</i>	<i>quadriflora</i>	<i>lasiocarpa</i>	
	<i>remota</i>	<i>rhynchophysa</i>	<i>laxa</i>	
	<i>riparia</i>	<i>rugulosa</i>	<i>leptalea</i>	
	<i>scandinavica</i>	<i>siderostica</i>	<i>lenticularis</i>	
	<i>schmidtii</i>	<i>siderostifolia</i>	<i>lofiacea</i>	
		<i>spicata</i>	<i>lyngbyei</i>	
	<i>sylvatica</i>		<i>macrocephala</i>	
	<i>vesicaria</i>	<i>ussuriensis</i>	<i>mackenziei</i>	
	<i>vulpina</i>		<i>macrochaeta</i>	
			<i>nigricans</i>	
			<i>obtusata</i>	
			<i>parryana</i>	<i>paupercula</i>
			<i>petasata</i>	<i>pensylvanica</i>
			<i>petricosa</i>	
			<i>phaeocephala</i>	
			<i>phyllomanica</i>	
			<i>pluriflora</i>	
			<i>praegracilis</i>	
			<i>rossii</i>	
			<i>praticola</i>	
			<i>preslii</i>	
			<i>pyrenaica</i>	
			<i>rhynchophysa</i>	

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Genus	Europe	E-Asia	WN-America	EN-America
			<i>saxatilis</i>	
			<i>scopulorum</i>	
			<i>sitchensis</i>	
			<i>spectabilis</i>	<i>stans</i>
			<i>stenophylla</i>	<i>siccata</i>
			<i>subspanthacea</i>	
			<i>supina</i>	<i>trisperma</i>
			<i>sychnocephala</i>	<i>woodii</i>
<i>Eleocharis</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>
	<i>aciacularis</i>	<i>aciacularis</i>	<i>aciacularis</i>	<i>aciacularis</i>
	<i>umiglumis</i>	<i>umiglumis</i>	<i>umiglumis</i>	<i>umiglumis</i>
			<i>kamtschatica</i>	<i>kamtschatica</i>
			<i>nitida</i>	<i>nitida</i>
	<i>multicaulis</i>	<i>pauciflora</i>		
<i>Eriophorum</i>	<i>angustifolium</i>	<i>angustifolium</i>	<i>angustifolium</i>	<i>angustifolium</i>
	<i>vaginatum</i>	<i>vaginatum</i>	<i>vaginatum</i>	<i>vaginatum</i>
	<i>latifolium</i>	<i>latifolium</i>	<i>latifolium</i>	<i>latifolium</i>
	<i>russeolum</i>	<i>russeolum</i>	<i>russeolum</i>	<i>russeolum</i>
	<i>scheuchzeri</i>	<i>scheucheri</i>	<i>scheucheri</i>	
			<i>gracile</i>	<i>gracile</i>
			<i>viridicarinarum</i>	<i>viridicarinarum</i>
			<i>chamissonis</i>	<i>chamissonis</i>
			<i>calitrix</i>	<i>calitrix</i>
			<i>brachyantherum</i>	<i>brachyantherum</i>
			<i>faurie</i>	<i>comosum</i>
<i>Kobresia</i>	<i>myosuroides</i>	<i>myosuroides</i>	<i>myosuroides</i>	<i>myosuroides</i>
		<i>sibirica</i>	<i>sibirica</i>	
<i>Rhynchospora</i>	<i>fusca</i>			<i>fusca</i>
			<i>alba</i>	
			<i>simpliciascula</i>	
<i>Scirpus</i>	<i>caespitosus</i>	<i>caespitosus</i>	<i>caespitosus</i>	<i>caespitosus</i>
		<i>pumilus</i>	<i>pumilus</i>	<i>pumilus</i>
	<i>mucronatus</i>	<i>mucronatus</i>		
	<i>triqueter</i>	<i>triqueter</i>		
			<i>hudsonianus</i>	<i>hudsonianus</i>
			<i>microcarpus</i>	<i>microcarpus</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
			<i>rufus</i>	<i>rufus</i>
			<i>validus</i>	<i>validus</i>
	<i>lacustris</i>	<i>orientalis</i>	<i>paludosus</i>	<i>expanus</i>
	<i>maritimus</i>		<i>americanus</i>	
	<i>setaceus</i>		<i>subterminalis</i>	
	<i>sylvaticus</i>			
Poaceae				
<i>Agropyron</i>	<i>boreale</i>	<i>boreale</i>	<i>boreale</i>	<i>boreale</i>
	<i>caninum</i>	<i>caninum</i>	<i>caninum</i>	<i>caninum</i>
	<i>junceiforme</i>	<i>mongolicum</i>	<i>macrourum</i>	
	<i>repens</i>	<i>repens</i>		
			<i>spicatum</i>	<i>trachycaulum</i>
			<i>yukonense</i>	
<i>Agrostis</i>	<i>canina</i>	<i>canina</i>		<i>canina</i>
	<i>capillaris</i>	<i>myriantha</i>	<i>alaskana</i>	
	<i>stolonifera</i>	<i>stolonifera</i>		
			<i>borealis</i>	<i>borealis</i>
			<i>alba</i>	<i>hyemalis</i>
			<i>aequalivalvis</i>	
			<i>exarata</i>	
			<i>scabra</i>	
			<i>tenuis</i>	
			<i>thurberiana</i>	
<i>Aira</i>			<i>carophyllea</i>	
<i>Alopecurus</i>			<i>aqualis</i>	<i>aqualis</i>
			<i>aepinus</i>	<i>aepinus</i>
			<i>pratensis</i>	
<i>Arctagrostis</i>	<i>latifolia</i>	<i>latifolia</i>	<i>latifolia</i>	
<i>Arctophila</i>			<i>fulva</i>	
<i>Beckmannia</i>		<i>syzigachne</i>	<i>syzigachne</i>	<i>syzigachne</i>
<i>Bromus</i>	<i>inermis</i>	<i>inermis</i>		
	<i>tectorum</i>	<i>tectorum</i>	<i>tectorum</i>	<i>tectorum</i>
	<i>arvensis</i>	<i>japonicus</i>	<i>pacificus</i>	
	<i>hordeaceus</i>	<i>remotiflorus</i>		
			<i>ciliatus</i>	<i>ciliatus</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>racemosus</i>		<i>pumpellianus</i>	
		<i>richardsonii</i>	<i>richardsonii</i>	
			<i>sitchensis</i>	
			<i>latigumis</i>	
<i>Calamagrostis</i> (<i>Deyxixia</i>)	<i>arundinacea</i>	<i>arundinacea</i>	<i>canadensis</i>	<i>canadensis</i>
			<i>inexpansa</i>	<i>inexpansa</i>
			<i>lapponica</i>	<i>lapponica</i>
			<i>neglecta</i>	<i>neglecta</i>
		<i>holmii</i>	<i>holmii</i>	
	<i>purpurea</i>	<i>angusifolia</i>		
		<i>longsdorfii</i>	<i>purpurascens</i>	
		<i>epigios</i>	<i>nukaensis</i>	
		<i>pseudophragmites</i>	<i>deschampsoides</i>	
<i>Cinna</i> <i>Cleistogenes</i>	<i>latifolia</i>	<i>latifolia</i>	<i>latifolia</i>	<i>latifolia</i>
		<i>chinensis</i>		
		<i>songarica</i>		
<i>Clinelymus</i>		<i>dahuricus</i>		
		<i>sibiricus</i>		
<i>Colopodium</i> <i>Danthonia</i>		<i>wrightii</i>	<i>spicata</i>	<i>spicata</i>
		<i>scheideri</i>	<i>intermedia</i>	
<i>Deschampsia</i>	<i>caespitosa</i>	<i>caespitosa</i>	<i>caespitosa</i>	<i>caespitosa</i>
	<i>flexuosa</i>	<i>flexuosa</i>	<i>flexuosa</i>	
			<i>atropurpurea</i>	<i>atropurpurea</i>
			<i>beringensis</i>	
<i>Dupontia</i>	<i>fisheri</i>	<i>fisheri</i>	<i>fisheri</i>	<i>fisheri</i>
<i>Elymus</i>	<i>arenaris</i>	<i>dahurica</i>	<i>hisutus</i>	
		<i>sibiricus</i>	<i>sibiricus</i>	
			<i>glaucus</i>	
			<i>innovatus</i>	
			<i>mollis</i>	
<i>Eragrostis</i>		<i>minor</i>		
<i>Festuca</i>	<i>rubra</i>	<i>rubra</i>	<i>rubra</i>	<i>rubra</i>
	<i>ovina</i>	<i>ovina</i>	<i>ovina</i>	<i>ovina</i>
		<i>altaica</i>	<i>altaica</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
			<i>baffinensis</i>	<i>baffinensis</i>
	<i>arundinacea</i>		<i>megalura</i>	
	<i>gigantea</i>		<i>brachyphylla</i>	
			<i>brerissima</i>	
<i>Glyceria</i>			<i>grandis</i>	<i>grandis</i>
			<i>striata</i>	<i>striata</i>
			<i>borealis</i>	
			<i>leptostachya</i>	
			<i>pulchella</i>	
<i>Helictotrichon</i>			<i>hookeri</i>	
<i>Hierochloe</i>	<i>odorata</i>	<i>odorata</i>	<i>odorata</i>	<i>odorata</i>
			<i>alpina</i>	<i>alpina</i>
		<i>pauciflora</i>	<i>pauciflora</i>	<i>pauciflora</i>
<i>Holcus</i>	<i>lanatus</i>	<i>lanatus</i>		
	<i>mollis</i>			
<i>Hordeum</i>			<i>brachyantherum</i>	
			<i>jubatum</i>	
			<i>vulgare</i>	
<i>Koeleria</i>		<i>asiatica</i>	<i>asiatica</i>	
		<i>komarovii</i>		
		<i>nitida</i>	<i>nitida</i>	
		<i>sibirica</i>		<i>innovatus</i>
		<i>crista</i>		
<i>Lolium</i>			<i>multiflorum</i>	
			<i>perenne</i>	
			<i>temulentum</i>	
<i>Melica</i>			<i>subulata</i>	
<i>Muhlenbergia</i>			<i>glomerata</i>	<i>glomerata</i>
			<i>mexicana</i>	
			<i>richardsonis</i>	
<i>Oryzopsis</i>			<i>asperifolia</i>	<i>asperifolia</i>
			<i>pungens</i>	<i>pungens</i>
<i>Phalaris</i>	<i>arundinacea</i>	<i>arundinacea</i>	<i>arundinacea</i>	
<i>Phippsia</i>	<i>algida</i>	<i>algida</i>	<i>algida</i>	
<i>Phleum</i>	<i>alpinum</i>	<i>alpinum</i>	<i>alpinum</i>	<i>alpinum</i>
<i>Poa</i>	<i>alpina</i>	<i>alpina</i>	<i>alpina</i>	<i>alpina</i>

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
	<i>arctica</i>	<i>arctica</i>	<i>arctica</i>	<i>arctica</i>
	<i>nemoralis</i>	<i>nemoralis</i>	<i>nemoralis</i>	<i>nemoralis</i>
	<i>pratensis</i>	<i>pratensis</i>	<i>pratensis</i>	
		<i>annua</i>	<i>annua</i>	<i>annua</i>
		<i>borealis</i>	<i>borealis</i>	
		<i>eminens</i>	<i>eminens</i>	
		<i>malacantha</i>	<i>malacantha</i>	
			<i>abbreviata</i>	<i>abbreviata</i>
			<i>glauca</i>	<i>glauca</i>
		<i>sibirica</i>	<i>brachyanthera</i>	
			<i>laxiflora</i>	
			<i>trivialis</i>	
			<i>scabrella</i>	
			<i>leibergii</i>	
			<i>leptocoma</i>	
			<i>macrocalyx</i>	
			<i>stenantha</i>	
<i>Puccinellia</i>	<i>distans</i>	<i>distans</i>	<i>distans</i>	<i>distans</i>
	<i>langeana</i>	<i>langeana</i>	<i>langeana</i>	<i>langeana</i>
			<i>arctica</i>	<i>arctica</i>
			<i>andersonii</i>	
			<i>lucida</i>	
			<i>nutkaensis</i>	
			<i>nuttalliana</i>	
			<i>phyganodes</i>	
			<i>pumila</i>	
<i>Schizanthne</i>		<i>purpurascens</i>	<i>purpurascens</i>	
<i>Scolochloa</i>			<i>festucea</i>	
<i>Sphenopholis</i>			<i>intermedia</i>	
<i>Spodiopogon</i>		<i>sibiricus</i>		
<i>Stipa</i>		<i>bugeana</i>	<i>comata</i>	
		<i>grandis</i>	<i>occidentalis</i>	
		<i>baicalensis</i>	<i>richardsonii</i>	
<i>Torreyochloa</i>			<i>pauciflora</i>	
<i>Trisetum</i>		<i>sibiricum</i>	<i>sibiricum</i>	
		<i>spicatum</i>	<i>spicatum</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
			<i>cernuum</i>	
Sparganiaceae				
<i>Sparganium</i>	<i>angustifolium</i> <i>hyperboreum</i> <i>minimum</i>	<i>angustifolium</i> <i>hyperboreum</i> <i>minimum</i>	<i>angustifolium</i> <i>hyperboreum</i> <i>minimum</i> <i>emersum</i>	<i>angustifolium</i> <i>hyperboreum</i> <i>minimum</i> <i>emersum</i>
Typhaceae				
<i>Typha</i>	<i>latifolia</i>	<i>latifolia</i>	<i>latifolia</i>	<i>latifolia</i>
LILIIDAE				
Liliaceae				
<i>Allium</i>	<i>schoenoprasum</i> <i>oleraceum</i> <i>scorodoprasum</i> <i>ursinum</i> <i>vineale</i>	<i>schoenoprasum</i> <i>mongolicum</i> <i>senescens</i>	<i>schoenoprasum</i>	<i>victorialis</i>
<i>Asparagus</i>	<i>officinalis</i>	<i>officinalis</i> <i>dauricus</i> <i>oligoclonos</i>		
<i>Catabrosa</i>	<i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>
<i>Clintonia</i>		<i>udensis</i>	<i>borealis</i>	<i>borealis</i>
<i>Colpodium</i>	<i>vahlianum</i>	<i>vahlianum</i> <i>wrightii</i>	<i>vahlianum</i> <i>wrightii</i>	<i>vahlianum</i>
<i>Convallaria</i>	<i>majalis</i>	<i>majalis</i>	<i>majalis</i>	
<i>Fritillaria</i>		<i>dagana</i> <i>ussuriensis</i>		
<i>Gagea</i>	<i>lutea</i> <i>samojedorum</i>	<i>lutea</i> <i>hiensis</i>		
<i>Hemerocallis</i>		<i>minor</i>		
<i>Hosta</i>		<i>ensata</i>		
<i>Kruhsea</i>			<i>streptopoides</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Lilium</i>		<i>callosum</i> <i>dahuricum</i> <i>leichtlinii</i> <i>pumilum</i>		
<i>Lloydia</i>	<i>serotina</i>	<i>serotina</i>	<i>serotina</i>	
<i>Maianthemum</i>	<i>bifolium</i>	<i>bifolium</i>	<i>bifolium</i> <i>canadense</i> <i>dilatatum</i>	<i>bifolium</i> <i>canadense</i>
<i>Paris</i>	<i>quadrifolia</i>	<i>quadrifolia</i>		
<i>Polygonatum</i>	<i>odoratum</i> <i>verticillatum</i> <i>multiflorum</i>	<i>odoratum</i> <i>verticillatum</i> <i>humile</i> <i>desoulavyi</i> <i>inflatum</i> <i>involucratum</i> <i>pauriflorum</i> <i>sibiricum</i>		
<i>Smilacina</i>			<i>racemosa</i> <i>stellata</i> <i>trifolia</i>	<i>racemosa</i> <i>stellata</i> <i>trifolia</i>
<i>Streptopus</i>		<i>dahurica</i> <i>amplexifolius</i> <i>obtusatus</i> <i>parviflorus</i>	<i>amplexifolius</i> <i>roseus</i>	<i>amplexifolius</i> <i>roseus</i>
<i>Tofieldia</i>	<i>pusilla</i>	<i>coccinea</i>	<i>coccinea</i> <i>pusilla</i>	<i>coccinea</i> <i>pusilla</i>
<i>Veratrum</i>	<i>album</i>	<i>thibetica</i> <i>album</i> <i>dahuricum</i> <i>maackii</i>	<i>glutinosa</i> <i>album</i> <i>eschsoltzii</i>	
<i>Zigadenus</i>		<i>sibiricus</i>	<i>elegans</i>	
Iridaceae				
<i>Iris</i>	<i>pseudocorus</i>	<i>lactea</i> <i>setosa</i>	<i>versicolor</i> <i>setosa</i>	

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
		<i>dichotoma</i> <i>ensata</i> <i>uniflora</i>		
<i>Sisyrinchium</i>			<i>angustifolium</i>	<i>montanum</i>
Orchidaceae				
<i>Amerorchis</i>			<i>rotundifolia</i>	
<i>Aplectrum</i>				<i>hyemale</i>
<i>Arethusa</i>				<i>bulbosa</i>
<i>Calopogon</i>				<i>tuberosus</i>
<i>Calypso</i>	<i>bulbosa</i>	<i>bulbosa</i>	<i>bulbosa</i>	<i>bulbosa</i>
<i>Coeloglossum</i>	<i>viride</i>	<i>viride</i>	<i>viride</i>	<i>viride</i>
<i>Corallorhiza</i>	<i>trifida</i>	<i>trifida</i>	<i>trifida</i>	<i>trifida</i>
			<i>maculata</i>	<i>maculata</i>
			<i>striata</i>	<i>striata</i>
<i>Cyperipedium</i>	<i>calceolus</i>	<i>calceolus</i>	<i>calceolus</i>	<i>calceolus</i>
			<i>acaule</i>	<i>acaule</i>
		<i>guttatum</i>	<i>guttatum</i>	
		<i>macranthum</i>	<i>passerinum</i>	<i>arietinum</i>
		<i>ventricosum</i>		<i>reginae</i>
		<i>flavum</i>		
<i>Dactylorhiza</i>	<i>maculata</i>		<i>aristata</i>	
<i>Galearis</i>				<i>spectabilis</i>
<i>Goodyera</i>	<i>repens</i>	<i>repens</i>	<i>repens</i>	<i>repens</i>
			<i>oblongifolia</i>	<i>oblongifolia</i>
				<i>tesselata</i>
<i>Gymnadenia</i>	<i>conopsea</i>	<i>conopsea</i>		
<i>Habenaria</i>		<i>linearifolia</i>		<i>behringiana</i>
		<i>sagittifera</i>		<i>dilatata</i>
				<i>obtusata</i>
<i>Liparis</i>				<i>loeselii</i>
<i>Listera</i>	<i>cordata</i>	<i>cordata</i>	<i>cordata</i>	<i>cordata</i>
			<i>borealis</i>	<i>borealis</i>
	<i>ovata</i>	<i>nipponica</i>		<i>auriculata</i>
			<i>convallarioides</i>	<i>convallarioides</i>
		<i>puherula</i>		

Appendix III

Genus	Europe	E-Asia	WN-America	EN-America
<i>Malaxis</i>	<i>monophyllos</i> <i>paludosa</i>	<i>monophyllos</i> <i>paludosa</i>	<i>monophyllos</i> <i>paludosa</i> <i>unifolia</i>	<i>monophyllos</i>
<i>Neottia</i>	<i>nidus-avis</i>	<i>smithiana</i>		
<i>Platanthera</i>	<i>obtusata</i> <i>albida</i> <i>bifolia</i>	<i>obtusata</i> <i>albida</i> <i>bifolia</i>	<i>obtusata</i> <i>albida</i> <i>dilatata</i> <i>hyperborea</i> <i>orbiculata</i> <i>stricta</i>	<i>obtusata</i> <i>dilatata</i> <i>hyperborea</i> <i>orbiculata</i> <i>blephariglottis</i> <i>clavellata</i> <i>grandifloa</i> <i>psycodes</i> <i>flava</i> <i>lacera</i> <i>hookeri</i> <i>ophioglossoides</i>
<i>Pogonia</i>				
<i>Spiranthes</i>	<i>romunzoffiana</i>	<i>lancea</i> <i>sinensis</i>	<i>romunzoffiana</i>	<i>romunzoffiana</i> <i>intermedia</i>
<i>Splatanthera</i>		<i>tipuloides</i>	<i>tipuloides</i>	

APPENDIX IV

TOTAL NATIVE SPECIES LIST OF SEED PLANTS IN THE TEMPERATE REGIONS OF CONTINENTAL EASTERN ASIA, JAPAN, AND WESTERN AND EASTERN NORTH AMERICA.

Notes:

1. Only Latin names are listed to avoid ambiguities caused by varying scopes of taxonomic characters employed in species identification by different authors;
2. Absence means no species grow naturally in that region;
3. Main References: Braun (1967); Gleason & Cronquist (1963, 1991); Hitchcock & Cronquist (1973); John (1963); Li (unpublished, 1988); Little (1980); Numata (1974); Ohwi (1965); Scoggan (1978); Skelton & Skelton (1991); Takhtajan (1986).

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
GYMNOSPERMS				
Pinaceae				
<i>Abies</i>	<i>nephrolepis</i> <i>holophylla</i>	<i>sachalinensis</i>	<i>amabilis</i> <i>concolor</i> <i>grandis</i> <i>lasiocarpa</i> <i>procera</i>	<i>balsamea</i>
<i>Larix</i>	<i>olgensis</i> <i>gmelini</i>		<i>occidentalis</i> <i>lyallii</i>	<i>laricina</i>
<i>Picea</i>	<i>jezoensis</i> <i>koraiensis</i>	<i>jezoensis</i> <i>glehnii</i>	<i>glauca</i> <i>sitchensis</i> <i>pungens</i> <i>engelmannii</i>	<i>glauca</i> <i>mariana</i> <i>rubens</i>
<i>Pinus</i>	<i>koraiensis</i> <i>sylvestris</i> <i>pumila</i> <i>ussuriensis</i> <i>densiflora</i>	<i>pentaphylla</i> <i>pumila</i> <i>densiflora</i>	<i>contorta</i> <i>ponderosa</i> <i>monticola</i> <i>albicaulis</i> <i>lambertiana</i> <i>taxifolia</i>	<i>strobus</i> <i>rigida</i> <i>resinosa</i> <i>banksiana</i>
<i>Pseudotsuga</i>			<i>heterophylla</i>	<i>canadensis</i>
<i>Tsuga</i>			<i>mertensiana</i>	<i>caroliniana</i>
Cupressaceae				
<i>Calocedrus</i>			<i>decurrens</i>	
<i>Chamaecyparis</i>			<i>nootkensis</i>	
<i>Juniperus</i>	<i>communis</i> <i>dahurica</i>	<i>communis</i> <i>coniferta</i> <i>chinensis</i>	<i>communis</i> <i>occidentalis</i> <i>virginiana</i> <i>scopulorum</i>	<i>communis</i> <i>horizontalis</i> <i>virginiana</i>
<i>Platycladus</i>	<i>orientalis</i>			
<i>Thuja</i>	<i>koraiensis</i>		<i>plicata</i>	<i>occidentalis</i>
<i>Thujopsis</i>		<i>dolabrata</i>		
Taxaceae				
<i>Taxus</i>	<i>cuspidata</i>	<i>cuspidata</i>	<i>brevifolia</i>	<i>canadensis</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<u>ANGIOSPERMS</u>				
MAGNOLIACEAE				
Magnoliaceae				
<i>Lindera</i>	<i>obtusiloba</i>	<i>umbellata</i>		<i>benzoin</i>
<i>Liriodendron</i>				<i>tulipifera</i>
<i>Magnolia</i>	<i>siboldii</i>	<i>obovata</i>		<i>acuminata</i>
<i>Sassafras</i>				<i>albidum</i>
Annonaceae				
<i>Asimina</i>				<i>triloba</i>
Calycanthaceae				
<i>Calycanthus</i>				<i>floridus</i>
Chloranthaceae				
<i>Chloranthus</i>	<i>japonicus</i>	<i>japonicus</i>		
Saururaceae				
<i>Saururus</i>				<i>cernuus</i>
Aristolochiaceae				
<i>Aristolochia</i>	<i>contorta</i>			<i>durior</i>
				<i>serpentaria</i>
<i>Asarum</i>	<i>heterotropoides</i>		<i>caudatum</i>	<i>canadense</i>
Schisandraceae				
<i>Schisandra</i>	<i>chinensis</i>	<i>chinensis</i>		
		<i>repanda</i>		
Nymphaeaceae				
<i>Brasenia</i>	<i>schreberi</i>	<i>schreberi</i>	<i>schreberi</i>	<i>schreberi</i>
<i>Euryale</i>	<i>ferox</i>	<i>ferox</i>		
<i>Nelumbo</i>	<i>nucifera</i>			<i>lutea</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Nuphar</i>	<i>pumilum</i>	<i>pumilum</i> <i>japonicum</i>	<i>pumilum</i> <i>polysepalum</i> <i>variegatum</i>	<i>pumilum</i> <i>microphyllum</i> <i>variegatum</i>
<i>Nymphaea</i>	<i>tetragona</i>	<i>tetragona</i>	<i>tetragona</i>	<i>tetragona</i> <i>odorata</i> <i>tuberosa</i>
Ceratophyllaceae				
<i>Ceratophyllum</i>	<i>demersum</i> <i>manshuricum</i>	<i>demersum</i>	<i>demersum</i>	<i>demersum</i>
Ranunculaceae				
<i>Aconitum</i>	<i>alboviolaceum</i> <i>danhuaense</i> <i>fusungense</i> <i>fischeri</i> <i>birobidshanicum</i> <i>claire</i> <i>coreanum</i> <i>villosum</i> <i>jeholense</i> <i>kusnezoffii</i> <i>jaluense</i> <i>kirinense</i> <i>koreanum</i> <i>monanthum</i> <i>manshuricum</i> <i>paniculigerum</i> <i>tschangbaischanense</i> <i>raddeanum</i> <i>sczukinii</i> <i>umbrosum</i> <i>volubile</i> <i>wulingense</i>	<i>gigas</i> <i>sachalinense</i> <i>yozeense</i>	<i>columbianum</i> <i>napellus</i>	<i>uncinatum</i>
<i>Actaea</i>	<i>asiatica</i>	<i>asiatica</i>	<i>rubra</i> <i>piperi</i>	<i>rubra</i> <i>pachypoda</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Adonis</i>	<i>amurensis</i>	<i>amurensis</i>		
<i>Anemone</i>		<i>cylindrica</i>	<i>cylindrica</i>	<i>cylindrica</i>
	<i>dichotoma</i>	<i>dichotoma</i>	<i>canadensis</i>	<i>canadensis</i>
	<i>narcissiflora</i>	<i>narcissiflora</i>	<i>parviflora</i>	<i>parviflora</i>
	<i>raddeana</i>	<i>raddeana</i>	<i>multifida</i>	<i>multifida</i>
	<i>stolonifera</i>	<i>stolonifera</i>		
	<i>baicalensis</i>	<i>debilis</i>	<i>nuttalliana</i>	
	<i>rivularis</i>	<i>pseudoaltaica</i>	<i>occidentalis</i>	
	<i>sylvestris</i>	<i>yezoensis</i>	<i>deltoidea</i>	
	<i>rossii</i>	<i>flaccida</i>	<i>drummondii</i>	<i>quinquefolia</i>
	<i>glabrata</i>		<i>piperi</i>	<i>virginiana</i>
	<i>udensis</i>		<i>oregana</i>	<i>riparia</i>
	<i>reflexa</i>		<i>lyallii</i>	
	<i>amurensis</i>			
<i>Anemonella</i>				<i>thalictroides</i>
<i>Aquilegia</i>	<i>parviflora</i>	<i>flabellata</i>	<i>coerulea</i>	<i>canadensis</i>
	<i>oxysepala</i>	<i>buergeriana</i>	<i>jonesii</i>	<i>vulgaris</i>
	<i>yebeuna</i>		<i>formosa</i>	
	<i>viridiflora</i>		<i>flavescens</i>	
<i>Callianthem</i>		<i>miyabeaenum</i>		
<i>Caltha</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>
	<i>natanus</i>		<i>natanus</i>	<i>natanus</i>
	<i>membranacea</i>		<i>biflora</i>	
<i>Cimicifuga</i>	<i>simplex</i>	<i>simplex</i>	<i>elata</i>	<i>racemosa</i>
	<i>dahurica</i>		<i>lacinianta</i>	
	<i>heracleifolia</i>			
<i>Clematis</i>	<i>fusca</i>	<i>fusca</i>		
	<i>koreana</i>	<i>koreana</i>		
	<i>ochotensis</i>	<i>ochotensis</i>		
	<i>nobilis</i>		<i>columbiana</i>	<i>crispa</i>
	<i>hexapetala</i>		<i>hirsutissima</i>	<i>ochroleuca</i>
	<i>mandshurica</i>		<i>ligusticifolia</i>	<i>verticillaris</i>
	<i>serratifolia</i>		<i>vitalba</i>	<i>viorna</i>
	<i>brevicaudata</i>		<i>tenuiloba</i>	<i>virginiana</i>
	<i>macropetala</i>		<i>pseudoapina</i>	<i>occidentalis</i>
	<i>patens</i>	<i>maximowicziana</i>		

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>heracleifolia</i>			
	<i>intricata</i>			
	<i>sibirica</i>			
<i>Coptis</i>	<i>trifolia</i>	<i>trifolia</i>	<i>trifolia</i>	<i>trifolia</i>
	<i>chinensis</i>	<i>japonica</i>	<i>asplenifolia</i>	
			<i>lanciniata</i>	
			<i>occidentalis</i>	
<i>Delphinium</i>	<i>grandiflorum</i>		<i>virescens</i>	<i>virescens</i>
	<i>hsinganense</i>		<i>bicolor</i>	<i>tricolor</i>
	<i>maackianum</i>		<i>burkei</i>	<i>exaltatum</i>
	<i>chellanthum</i>		<i>cyanoreios</i>	
	<i>crassifolium</i>		<i>andersonii</i>	
			<i>glaucescens</i>	
			<i>glareosum</i>	
			<i>stachydeum</i>	
			<i>pavonaceum</i>	
			<i>leucopaeum</i>	
			<i>glaucum</i>	
			<i>xantholeucum</i>	
			<i>nelsonii</i>	
			<i>menziesii</i>	
			<i>occidentale</i>	
			<i>nuttallii</i>	
			<i>nuttalliana</i>	
			<i>multiplum</i>	
			<i>troliifolium</i>	
			<i>depauperatum</i>	
<i>Enemion</i>	<i>reddeanum</i>			
<i>Eranthis</i>	<i>stellata</i>			
<i>Hepatica</i>	<i>nobilis</i>			<i>acutiloba</i>
				<i>americana</i>
				<i>canadensis</i>
<i>Hydrastis</i>				
<i>Glaucidium</i>		<i>palmatum</i>		
<i>Isopyrum</i>	<i>mandshuricum</i>		<i>hallii</i>	<i>biteratum</i>
			<i>stipitatum</i>	
<i>Leptopyrum</i>	<i>fumarioides</i>			

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Myosurus</i>			<i>minimus</i> <i>aristatus</i> <i>sessilis</i>	<i>minimus</i>
<i>Paeonia</i>	<i>obovata</i> <i>lactiflora</i>	<i>obovata</i>	<i>brownii</i>	
<i>Pulsatilla</i>	<i>ambigua</i> <i>cernua</i> <i>chinensis</i> <i>dahurica</i> <i>patens</i> <i>turczaninowii</i>	<i>nipponica</i>		
<i>Ranunculus</i>	<i>gmelinii</i> <i>acris</i> <i>repens</i> <i>sceleratus</i> <i>monophyllus</i> <i>pedatifidus</i> <i>amurensis</i> <i>chinensis</i> <i>natans</i> <i>cymbalaria</i> <i>pulchellus</i> <i>tachiroei</i> <i>flaccidus</i> <i>foeniculacens</i> <i>bungei</i> <i>cuneifolius</i> <i>radicans</i> <i>kauffmanii</i> <i>ruthenicus</i> <i>franchetii</i> <i>ssp (10)</i>	<i>acris</i> <i>repens</i> <i>sceleratus</i> <i>nipponicus</i> <i>quelapaertensis</i> <i>yezoensis</i>	<i>gmelinii</i> <i>repens</i> <i>aboortivus</i> <i>aquatilis</i> <i>pygmaeus</i> <i>cymbalaria</i> <i>flabellaris</i> <i>macounii</i> <i>longirostris</i> <i>recurvatus</i> <i>pensylvanicus</i> <i>sceleratus</i> <i>andersonii</i> <i>alismaefolius</i> <i>lobbii</i> <i>gormanii</i> <i>flammula</i> <i>glaberrimus</i> <i>herbecarpus</i> <i>orthorhynchus</i> <i>cooleyae</i>	<i>gmelinii</i> <i>acris</i> <i>aboortivus</i> <i>aquatilis</i> <i>pygmaeus</i> <i>cymbalaria</i> <i>flabellaris</i> <i>macounii</i> <i>longirostris</i> <i>recurvatus</i> <i>pensylvanicus</i> <i>sceleratus</i> <i>allegghensis</i> <i>hispidus</i> <i>lapponicus</i> <i>reptans</i> <i>rhomboideus</i> <i>septentrionalis</i> <i>pusillus</i> <i>trichophyllus</i> <i>subrigidus</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>reconditus</i>	
			<i>populago</i>	
			<i>presterusa</i>	
			<i>uncinatus</i>	
			<i>subrigidus</i>	
			<i>acriformis</i>	
			<i>jovis</i>	
			<i>inamoenus</i>	
			<i>eschschoitzii</i>	
			<i>pedatifidus</i>	
			<i>cardiophyllus</i>	
			<i>verecundus</i>	
			<i>gelidus</i>	
			<i>californicus</i>	
			<i>occidentalis</i>	
<i>Thalictrum</i>	<i>aquilegifolium</i>	<i>aquilegifolium</i>	<i>confine</i>	<i>confine</i>
	<i>baicalense</i>	<i>baicalense</i>	<i>venulosum</i>	<i>venulosum</i>
	<i>filamentosum</i>	<i>filamentosum</i>	<i>dasycarpum</i>	<i>dasycarpum</i>
	<i>foetidum</i>	<i>foetidum</i>		
	<i>sparsiflorum</i>		<i>sparsiflorum</i>	
	<i>taberiferum</i>	<i>integrilobum</i>	<i>polycarpum</i>	<i>dioicum</i>
	<i>petaloideum</i>	<i>minus</i>	<i>fenderi</i>	<i>pubescens</i>
	<i>ichangense</i>	<i>sachalinense</i>	<i>alpinum</i>	<i>revolutum</i>
	<i>simplex</i>			
	<i>prewalskii</i>			
	<i>squarrosum</i>			
	<i>thunbergii</i>			
<i>Trautvetteria</i>	<i>japonica</i>	<i>japonica</i>	<i>carolinensis</i>	<i>carolinensis</i>
<i>Trollius</i>	<i>japonicus</i>	<i>japonicus</i>	<i>laxus</i>	<i>laxus</i>
	<i>ledebourii</i>	<i>pulcher</i>		
	<i>macropetalus</i>	<i>riederianus</i>		
	<i>asiaticus</i>			
<i>Xanthorrhiza</i>				<i>simplicissima</i>
Berberidaceae				
<i>Achlys</i>		<i>japonica</i>	<i>triphylla</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Berberis</i>	<i>amurensis</i> <i>sibirica</i>	<i>amurensis</i>	<i>aquifolium</i> <i>repens</i> <i>nervosa</i>	<i>canadensis</i>
<i>Caulophyllum</i>	<i>robustum</i>	<i>robustum</i>		<i>thalictroides</i>
<i>Diphylleia</i>	<i>grayi</i>	<i>grayi</i>		
<i>Epimedium</i>	<i>koreanum</i>	<i>koreanum</i>		
<i>Jeffersonia</i>	<i>dubia</i>			<i>diphylla</i>
<i>Leontice</i>	<i>microrrhyncha</i>			
<i>Podophyllum</i>				<i>peltatum</i>
<i>Vancouveria</i>			<i>hexandra</i>	
Lardizabalaceae				
<i>Akebia</i>	<i>trifoliata</i>	<i>trifoliata</i>		
Menispermaceae				
<i>Cocculus</i>	<i>trilobus</i>	<i>trilobus</i>		
<i>Menispermum</i>	<i>dauricum</i>	<i>dauricum</i>		<i>canadense</i>
<i>Sinomenium</i>	<i>acutum</i>			
Coriariaceae				
<i>Coriaria</i>		<i>japonica</i>		
Papaveraceae				
<i>Adlumia</i>	<i>asiatica</i>			<i>fungosa</i>
<i>Canbya</i>			<i>aurea</i>	
<i>Chelidonium</i>	<i>majus</i>	<i>majus</i>		
<i>Eschscholzia</i>			<i>californica</i>	
<i>Hylomecon</i>	<i>vernal</i>			
<i>Meconella</i>			<i>oregana</i>	
<i>Papaver</i>	<i>nucicaule</i> <i>pseudo-radicatum</i>		<i>argemone</i> <i>pygmaeum</i> <i>somniferum</i> <i>rheas</i>	
<i>Sanguinaria</i>				<i>canadensis</i>
<i>Stylophorum</i>				<i>diphyllum</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
Fumariaceae				
<i>Adlumia</i>				<i>fungosa</i>
<i>Corydalis</i>	<i>ambigua</i>	<i>curvicalcarata</i>	<i>aurea</i>	<i>aurea</i>
	<i>pallida</i>	<i>ruddeana</i>	<i>sempervirens</i>	<i>sempervirens</i>
	<i>buschii</i>	<i>incisa</i>	<i>aquae-gelidae</i>	<i>flavula</i>
	<i>impatiens</i>	<i>speciosa</i>	<i>washingtoniana</i>	<i>micrantha</i>
	<i>ochotensis</i>		<i>caseana</i>	
	<i>thurtschaninovii</i>		<i>scouleri</i>	
	<i>repens</i>			
	<i>gigantea</i>			
<i>Dicentra</i>	<i>spectabilis</i>	<i>peregrina</i>	<i>cucullaria</i>	<i>cucullaria</i>
			<i>formosa</i>	<i>canadensis</i>
			<i>uniflora</i>	<i>eximia</i>
HAMAMELIDAE				
Cercidiphyllaceae				
<i>Cercidiphyllum</i>		<i>japonicum</i>		
Platanaceae				
<i>Platanus</i>				<i>occidentalis</i>
Hamamelidaceae				
<i>Hamamelis</i>	<i>mollis</i>	<i>japonica</i>		<i>virginiana</i>
Daphniphyllaceae				
<i>Daphniphyllum</i>		<i>macropodum</i>		
Ulmaceae				
<i>Celtis</i>	<i>bungeana</i>	<i>bungeana</i>	<i>douglasii</i>	<i>occidentalis</i>
	<i>koraensis</i>			<i>tenuifolia</i>
<i>Pteroceltis</i>	<i>tatarinowii</i>			
<i>Ulmus</i>	<i>japonica</i>	<i>japonica</i>		<i>americana</i>
	<i>pumila</i>			<i>thomasii</i>
	<i>macrocarpa</i>	<i>macrocarpa</i>		<i>rubra</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>laciniata</i>	<i>laciniata</i>		<i>fulva</i>
Moraceae				
<i>Humulus</i>	<i>scandens</i>	<i>lupulus</i>		
<i>Morus</i>	<i>bombycis</i> <i>australis</i> <i>mongolica</i>	<i>bombycis</i>		<i>rubra</i>
Urticaceae				
<i>Boehmeria</i>	<i>tricuspis</i>	<i>tricuspis</i> <i>biloba</i> <i>longispica</i> <i>platanifolia</i>		<i>cylindrica</i>
<i>Elatostema</i>		<i>laetevirens</i> <i>umbellatum</i>		<i>cylindrica</i>
<i>Girardinia</i>	<i>cuspidata</i>			
<i>Laportea</i>	<i>bulbifera</i>	<i>bulbifera</i> <i>macrostachya</i>		<i>canadensis</i>
<i>Parietaria</i>	<i>micrantha</i>		<i>pensylvanica</i>	<i>pensylvanica</i>
<i>Pilea</i>	<i>mongolica</i> <i>peploides</i> <i>japonica</i>	<i>mongolica</i> <i>hamaoi</i>		<i>fontana</i> <i>pumila</i>
<i>Urtica</i>	<i>angustifolia</i> <i>laetevirens</i> <i>urens</i> <i>cannabina</i> <i>cyanescens</i>	<i>angustifolia</i> <i>laetevirens</i> <i>platyphylla</i>	<i>dioca</i> <i>holosericea</i> <i>gracilis</i> <i>lyallii</i> <i>serra</i>	<i>dioca</i> <i>chamaedryoides</i>
Juglandaceae				
<i>Carya</i>				<i>cordiformis</i> <i>ovalis</i> <i>ovata</i> <i>glabra</i> <i>laciniosa</i> <i>tomentosa</i>
<i>Juglans</i>	<i>mandshurica</i>	<i>ailanthifolia</i>		<i>cinerea</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Pterocarya</i>		<i>rhoifolia</i>		<i>nigra</i>
Myriaceae				
<i>Comptonia</i>				<i>peregrina</i>
<i>Myrica</i>	<i>gale</i>	<i>gale</i>	<i>gale</i> <i>californica</i>	<i>gale</i> <i>aspenifolia</i>
Fagaceae				
<i>Castanea</i>		<i>crenata</i>		<i>dentata</i>
<i>Castanopsis</i>			<i>chrysophylla</i>	
<i>Fagus</i>		<i>crenata</i>		<i>grandifolia</i>
<i>Quercus</i>	<i>mongolica</i>	<i>mongolica</i>	<i>garryana</i>	<i>alba</i>
	<i>liaotungensis</i>	<i>serota</i>	<i>kelloggii</i>	<i>borealis</i>
	<i>dentata</i>	<i>dentata</i>		<i>macrocarpa</i>
				<i>rubra</i>
				<i>bicolor</i>
				<i>stellata</i>
				<i>prinoides</i>
				<i>imbricaria</i>
				<i>ilicifolia</i>
				<i>shumardii</i>
				<i>coccinea</i>
Betulaceae				
<i>Alnus</i>	<i>crispa</i>	<i>crispa</i>	<i>crispa</i>	<i>crispa</i>
	<i>incana</i>	<i>incana</i>	<i>incana(rugosa)</i>	<i>incana</i>
		<i>pendula</i>	<i>tenuifolia</i>	<i>tenuifolia</i>
			<i>rhombifolia</i>	<i>serrulata</i>
			<i>sinuata</i>	<i>maritima</i>
<i>Betula</i>	<i>dahurica</i>	<i>dahurica</i>	<i>occidentalis</i>	<i>occidentalis</i>
	<i>platyphylla</i>	<i>platyphylla</i>	<i>glandulosa</i>	<i>glandulosa</i>
	<i>costata</i>	<i>costata</i>	<i>papyrifera</i>	<i>papyrifera</i>
	<i>ermanii</i>	<i>ermanii</i>		
	<i>schmidtii</i>	<i>maximowicziana</i>		<i>alleghaniensis</i>
	<i>microphylla</i>	<i>apoiensis</i>		<i>pumila</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>fruticosa</i> <i>rotundifolia</i>	<i>tatewakiana</i>		<i>nigra</i> <i>lenta</i> <i>populifolia</i> <i>lutea</i> <i>caernleograndis</i> <i>caroliniana</i>
<i>Carpinus</i>	<i>cordata</i>	<i>cordata</i> <i>laxiflora</i>		
<i>Corylus</i>	<i>heterophylla</i> <i>mandshurica</i>	<i>heterophylla</i> <i>mandshurica</i>	<i>cornuta</i>	<i>cornuta</i> <i>americana</i>
<i>Ostrya</i>		<i>virginiana</i>		<i>virginiana</i>
<i>Ostryopsis</i>	<i>dauriana</i>			

CARYPHYLLIDAE

Nyctaginaceae

<i>Abronia</i>		<i>fragrans</i> <i>latifolia</i> <i>umbellata</i> <i>turbinata</i> <i>micrantha</i> <i>mellifera</i>	
<i>Mirabilis</i>		<i>nyctaginea</i> <i>linearis</i> <i>macfarlanes</i>	<i>nyctaginea</i>

Aizoaceae

<i>Mollugo</i>	<i>pentaphylla</i>	<i>veriticillata</i>	
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Cactaceae

<i>Opuntia</i>		<i>fragilis</i> <i>polyacantha</i>	<i>humifusa</i> <i>fragillilis</i> <i>macrorrhiza</i>
<i>Coryphantha</i>		<i>missouriensis</i> <i>vivipara</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Pediocactus</i>			<i>simpsonii</i>	
Chenopodiaceae				
<i>Atriplex</i>	<i>gmelinii</i> <i>littoralis</i>	<i>gmelinii</i> <i>subcordata</i>	<i>patula</i> <i>canescens</i> <i>argentea</i> <i>confertifolia</i> <i>dioica</i> <i>spinosa</i> <i>nuttallii</i> <i>truncata</i> <i>phyllostegia</i> <i>powellii</i>	<i>patula</i> <i>argentea</i> <i>glabriuscula</i> <i>arenaria</i> <i>sabulosa</i>
<i>Axyris</i>	<i>amaranthoides</i>			
<i>Chenopodium</i>	<i>hybridum</i> <i>glaucum</i> <i>album</i> <i>urbicum</i>	<i>hybridum</i> <i>glaucum</i>	<i>hybridum</i> <i>glaucum</i> <i>album</i> <i>urbicum</i> <i>capitatum</i> <i>gigantosperm</i> <i>rubrum</i> <i>leptophyllum</i> <i>murale</i> <i>berlanderi</i> <i>chenopodioides</i> <i>pratericolata</i> <i>fremontii</i> <i>ambrosioides</i>	<i>hybridum</i> <i>capitatum</i> <i>gigantosperm</i> <i>rubrum</i> <i>standleyanum</i>
	<i>bryoninefolium</i> <i>aristatum</i> <i>acuminatum</i> <i>vachollii</i> <i>stenophyllum</i> <i>serotinum</i>	<i>ficifolium</i>		
<i>Corispermum</i>	<i>macrocaepum</i> <i>flexuosum</i>			
<i>Eurotia</i>			<i>lanata</i>	
<i>Kochia</i>	<i>scoparia</i> <i>prostrata</i> <i>sieversiana</i>		<i>scoparia</i> <i>americana</i>	
<i>Monolepis</i>			<i>nuttalliana</i> <i>pusilla</i> <i>spathulata</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Nitrophila</i>			<i>occidentalis</i>	
<i>Salicornia</i>	<i>europaea</i>	<i>europaea</i>	<i>europaea</i>	<i>europaea</i>
<i>Salsola</i>	<i>komarovii</i> <i>collina</i> <i>urhonica</i>	<i>komarovii</i>		<i>kali</i>
<i>Sarcobatus</i>			<i>vermiculatus</i>	
<i>Suaeda</i>	<i>glauca</i> <i>corniculata</i> <i>heteroptera</i> <i>laevissima</i>		<i>maritima</i> <i>occidentalis</i> <i>niger</i> <i>intermedia</i> <i>depressa</i>	<i>maritima</i> <i>americana</i> <i>richii</i> <i>calceoliformis</i>
<i>Teloxys</i>	<i>aristata</i>			
Amaranthaceae				
<i>Amaranthus</i>	<i>scandens</i> <i>retroflexus</i> <i>viridis</i>	<i>lividus</i>	<i>californicus</i> <i>powellii</i> <i>albus</i> <i>graecizans</i> <i>retroflexus</i>	<i>spinosus</i> <i>cannabinus</i> <i>rudis</i>
Portulacaceae				
<i>Clandrinia</i>			<i>ciliata</i> <i>roseum</i>	
<i>Calyptidium</i>			<i>sibirica</i> <i>arenicola</i> <i>chamissoi</i> <i>cordifolia</i> <i>dichotoma</i> <i>lanceolata</i> <i>linearis</i> <i>parviflora</i> <i>perfoliata</i> <i>kelloggii</i> <i>nevadensis</i> <i>rediviva</i> <i>triphylla</i>	<i>caroliniana</i> <i>virginica</i>
<i>Claytonia</i>	<i>sibirica</i>			
<i>Lewisia</i>				

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Montia</i>		<i>lamprosperma</i>	<i>fontana</i>	<i>fontana</i> <i>chamissoi</i>
<i>Portulaca</i>	<i>oleracea</i>	<i>oleracea</i>	<i>oleracea</i>	<i>oleracea</i>
<i>Sprague</i>			<i>umbellata</i>	
<i>Talinum</i>			<i>okanoganense</i>	<i>parviflorum</i>
Caryophyllaceae				
<i>Arenaria</i>	<i>serpyllifolia</i>	<i>serpyllifolia</i>	<i>lateriflora</i> <i>stricta</i> <i>rubella</i> <i>macrophylla</i>	<i>lateriflora</i> <i>stricta</i> <i>rubella</i> <i>macrophylla</i>
	<i>capillaris</i>	<i>katoana</i>	<i>capillaris</i>	<i>groenlandica</i>
	<i>juncea</i>	<i>merckiioides</i>	<i>congesta</i> <i>pusilla</i> <i>paludicola</i> <i>serpyllifolia</i> <i>hookeri</i> <i>kingii</i> <i>rosii</i> <i>nuttallii</i> <i>abtusiloba</i> <i>franklinii</i> <i>aculeata</i>	<i>caroliniana</i> <i>patula</i>
<i>Cerastium</i>	<i>arvense</i>	<i>vulgatum</i>	<i>arvense</i> <i>vulgatum</i>	<i>arvense</i> <i>vulgatum</i>
	<i>cerstoides</i>	<i>cerstoides</i>		
	<i>fischerianum</i>	<i>fischerianum</i>		
	<i>caespitosum</i>	<i>caespitosum</i>		
	<i>furcatum</i>		<i>viscosum</i> <i>natans</i> <i>semidecandrum</i>	<i>viscosum</i> <i>natans</i> <i>semidecandrum</i>
	<i>pauciflorum</i>		<i>berringianum</i> <i>ramosissima</i>	
<i>Cardionema</i>				
<i>Cucubalus</i>	<i>baccifer</i>	<i>baccifer</i>		
<i>Dianthus</i>	<i>superbus</i>	<i>superbus</i>		
	<i>barbatus</i>	<i>japonicus</i>		

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>chinensis</i>			
	<i>versicolor</i>			
<i>Gypsophila</i>	<i>pacifica</i>			
<i>Honkenya</i>	<i>peplodes</i>	<i>peplodes</i>	<i>peplodes</i>	<i>peplodes</i>
<i>Lychnis</i>	<i>fulgens</i>	<i>fulgens</i>	<i>drummondii</i>	
	<i>wilfordii</i>	<i>wilfordii</i>		
	<i>cognata</i>		<i>apetala</i>	
<i>Malachium</i>	<i>aquaticum</i>	<i>aquaticum</i>		
<i>Minuartia</i>	<i>arctica</i>	<i>arctica</i>		
	<i>laricina</i>	<i>verna</i>		
<i>Moehringia</i>	<i>lateriflora</i>	<i>lateriflora</i>	<i>lateriflora</i>	<i>lateriflora</i>
		<i>trinervia</i>		
<i>Paronychia</i>			<i>sessiliflora</i>	<i>argrocoma</i>
				<i>canadensis</i>
				<i>fastigiata</i>
				<i>virginica</i>
<i>Sagina</i>	<i>saginoides</i>	<i>saginoides</i>	<i>saginoides</i>	<i>saginoides</i>
	<i>japonica</i>	<i>japonica</i>	<i>procumbens</i>	<i>procumbens</i>
	<i>maxima</i>	<i>maxima</i>	<i>occidentalis</i>	<i>decumbens</i>
			<i>crassicaulis</i>	<i>nodosa</i>
<i>Melandrium</i>	<i>repens</i>	<i>repens</i>	<i>repens</i>	
(<i>Silene</i>)	<i>foliosum</i>	<i>foliosum</i>		
	<i>jenisseensis</i>		<i>acaulis</i>	<i>acaulis</i>
	<i>capitatum</i>		<i>antirrhinum</i>	<i>antirrhinum</i>
	<i>koreanum</i>		<i>conica</i>	<i>carolinianum</i>
	<i>olgae</i>		<i>douglasii</i>	<i>atellatum</i>
	<i>firmum</i>		<i>menziesii</i>	<i>virginicum</i>
	<i>brachypetalum</i>		<i>oregana</i>	<i>nivea</i>
	<i>apricum</i>		<i>scouleri</i>	<i>regia</i>
			<i>canoidea</i>	<i>rotundifolia</i>
			<i>dichotoma</i>	
			<i>parryi</i>	
			<i>suksdorfii</i>	
			<i>seelyi</i>	
			<i>spaldingii</i>	
			<i>hookeri</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Pseudostellaria</i>	<i>japonica</i> <i>sylvatica</i> <i>dauidii</i> <i>rupestris</i> <i>heterophylla</i>	<i>japonica</i> <i>sylvatica</i>	<i>scaposa</i> <i>macrotheca</i>	
<i>Spergula</i>	<i>arvensis</i>	<i>arvensis</i>		
<i>Spergularia</i>	<i>salina</i>	<i>salina</i> <i>rubra</i>	<i>canadensis</i>	<i>canadensis</i>
<i>Stellaria</i>	<i>crassifolia</i> <i>longifolia</i> <i>alsine</i>	<i>crassifolia</i> <i>longifolia</i> <i>alsine</i> <i>calycantha</i>	<i>crassifolia</i> <i>longifolia</i> <i>alsine</i> <i>calycantha</i> <i>longipes</i>	<i>crassifolia</i> <i>longifolia</i> <i>alsine</i> <i>calycantha</i> <i>longipes</i>
	<i>bungeana</i> <i>media</i> <i>radians</i>	<i>bungeana</i> <i>media</i> <i>radians</i>		
	<i>dichotoma</i> <i>cherleriae</i> <i>palustris</i> <i>discolor</i> <i>filicaulis</i>	<i>sessiliflora</i> <i>ruscifolia</i> <i>pterosperma</i> <i>fenzlii</i> <i>nipponica</i>	<i>humifusa</i> <i>crispa</i> <i>nitens</i> <i>obtusa</i> <i>viridula</i> <i>graminea</i> <i>jamesiana</i> <i>americana</i> <i>simcoei</i> <i>umbellata</i>	<i>humifusa</i> <i>glauca</i> <i>borealis</i>
Polygonaceae				
<i>Chorizanthe</i>			<i>bevicornu</i> <i>watsonii</i>	
<i>Eriogonum</i>			<i>caespitosum</i> <i>cernuum</i> <i>spergulinum</i> <i>watsonii</i> <i>maculatum</i> <i>baileyi</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>anuum</i>	
			<i>ovalifolium</i>	
			<i>cusickii</i>	
			<i>nudum</i>	
			<i>pauciflorum</i>	
			<i>ochrocephalum</i>	
			<i>chrysops</i>	
			<i>thymoides</i>	
			<i>flavum</i>	
			<i>elatum</i>	
			<i>sphaerocephalum</i>	
			<i>umbellatum</i>	
			<i>compositum</i>	
			<i>douglasii</i>	
			<i>heracleoides</i>	
			<i>microthecum</i>	
			<i>niveum</i>	
			<i>piperi</i>	
			<i>marifolium</i>	
			<i>subalpinum</i>	
			<i>vimideum</i>	
			<i>mancum</i>	
			<i>stellatum</i>	
			<i>strictum</i>	
<i>Oxyria</i>	<i>digyna</i>	<i>digyna</i>	<i>digyna</i>	<i>digyna</i>
<i>Oxytheca</i>			<i>dedroides</i>	
<i>Polygonella</i>				<i>articulata</i>
<i>Polygonum</i>	<i>amphibium</i>	<i>amphibium</i>	<i>amphibium</i>	<i>amphibium</i>
	<i>lapanthifolium</i>	<i>lapathifolium</i>	<i>lapathifolium</i>	<i>lapathifolium</i>
	<i>viviparum</i>	<i>viviparum</i>	<i>viviparum</i>	<i>viviparum</i>
	<i>convolvulus</i>	<i>convolvulus</i>	<i>convolvulus</i>	
	<i>hydropiper</i>	<i>hydropiper</i>	<i>hydropiper</i>	
	<i>persicaria</i>	<i>persicaria</i>	<i>persicaria</i>	
	<i>aviculare</i>	<i>aviculare</i>	<i>aviculare</i>	
	<i>foliosum</i>	<i>foliosum</i>	<i>douglasii</i>	<i>douglasii</i>
	<i>japonicum</i>	<i>japonicum</i>	<i>erectum</i>	<i>erectum</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>longisetum</i>	<i>longisetum</i>	<i>fowleri</i>	<i>fowleri</i>
	<i>perfoliatum</i>	<i>perfoliatum</i>	<i>coccineum</i>	<i>coccineum</i>
	<i>senticosum</i>	<i>senticosum</i>	<i>punctatum</i>	<i>punctatum</i>
	<i>sieboldii</i>	<i>sieboldii</i>	<i>ramosissimum</i>	<i>ramosissimum</i>
	<i>thunbergii</i>	<i>thunbergii</i>	<i>divisae</i>	<i>divisae</i>
	<i>attenuatum</i>	<i>ajunense</i>	<i>bistortoides</i>	<i>tenue</i>
	<i>sibiricum</i>	<i>cuspidatum</i>	<i>confertiflorum</i>	<i>virginianum</i>
	<i>alatum</i>	<i>dentatoalatum</i>	<i>exsertum</i>	<i>scandens</i>
	<i>minus</i>	<i>dumetorum</i>	<i>kellogsii</i>	<i>achoreum</i>
	<i>divaricatum</i>	<i>filiforme</i>	<i>majus</i>	<i>careyi</i>
	<i>kirinense</i>	<i>naikai</i>	<i>parryi</i>	<i>arifolium</i>
	<i>manshuriense</i>	<i>polyneuron</i>	<i>minimum</i>	<i>cilinode</i>
	<i>mandshuricola</i>	<i>sachalinense</i>	<i>polygaloides</i>	<i>buxiforme</i>
	<i>maackianum</i>	<i>weyrichii</i>	<i>watsonii</i>	
	<i>heterophyllum</i>	<i>bistorta</i>	<i>heterosepalum</i>	<i>sagittatum</i>
	<i>limosum</i>		<i>californicum</i>	
	<i>orientale</i>			
	<i>posumbu</i>			<i>glaucum</i>
	<i>bungeanum</i>		<i>polystachyum</i>	<i>hydopiperoides</i>
	<i>nodosum</i>		<i>polycnemoides</i>	<i>pensylvanicum</i>
	<i>viscosum</i>			<i>natans</i>
	<i>roseovivide</i>		<i>nuttallii</i>	
	<i>procumbens</i>		<i>campanalatum</i>	<i>puritanorum</i>
	<i>fusco-ochreatum</i>	<i>achoreum</i>		
	<i>parviflorum</i>		<i>cascadense</i>	
	<i>laxmanni</i>		<i>engelmannii</i>	
	<i>ochotense</i>		<i>spergulariae</i>	
	<i>trigonocarpum</i>		<i>sawatchense</i>	
	<i>pacificum</i>		<i>austintae</i>	
	<i>rigidum</i>		<i>paronychia</i>	
	<i>salinum</i>		<i>phytolaccaefolium</i>	
	<i>excurrentes</i>		<i>newberryi</i>	
	<i>mandshuricum</i>			
	<i>prostratum</i>			
	<i>tincorium</i>			
	<i>koreense</i>			

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>sungareense</i>			
	<i>platyphyllum</i>			
	<i>dumetorum</i>			
	<i>dentato-alatum</i>			
	<i>ussuriense</i>			
	<i>strigosum</i>			
	<i>dissitiflorum</i>			
	<i>paludosum</i>			
<i>Rumex</i>	<i>acetosa</i>	<i>acetosa</i>	<i>acetosa</i>	<i>acetosa</i>
	<i>maritimus</i>	<i>maritimus</i>	<i>maritimus</i>	<i>maritimus</i>
	<i>acetosella</i>	<i>acetosella</i>	<i>acetosella</i>	
	<i>aquaticus</i>	<i>aquaticus</i>	<i>occidentalis</i>	<i>occidentalis</i>
	<i>gmelinii</i>	<i>gmelinii</i>	<i>salicifolius</i>	<i>salicifolius</i>
	<i>japonicus</i>	<i>japonicus</i>	<i>persicarioides</i>	<i>persicarioides</i>
	<i>longifolius</i>	<i>longifolius</i>		
	<i>conglomeratus</i>	<i>montanus</i>	<i>mexicanus</i>	<i>alteissimus</i>
	<i>hydrolapanthum</i>	<i>mudaio</i>	<i>pulcher</i>	<i>hastatus</i>
	<i>palustris</i>	<i>obtusifolius</i>	<i>obtusifolius</i>	<i>pallidus</i>
	<i>patientia</i>		<i>paucifolius</i>	<i>orbiculatus</i>
	<i>thyrsiflorus</i>		<i>venosus</i>	<i>verticillatus</i>
	<i>crispus</i>			
	<i>domesticus</i>			
	<i>ussuriensis</i>			
	<i>amurensis</i>			
Plumbaginaceae				
<i>Armeria</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>	
DILLENIACEAE				
Theaceae				
<i>Stewartia</i>				<i>ovata</i>
Actinidiaceae				
<i>Actinidia</i>	<i>arguta</i>	<i>arguta</i>		

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>kolomicta</i>	<i>kolomicta</i>		
	<i>polygama</i>	<i>polygama</i>		
Elatinaceae				
<i>Bergia</i>			<i>texana</i>	
<i>Elatine</i>	<i>triandra</i>		<i>triandra</i>	<i>triandra</i>
	<i>hydroper</i>		<i>americana</i>	<i>minima</i>
			<i>brachysperma</i>	
			<i>californica</i>	
Guttiferae				
<i>Triadenum</i>	<i>japonicum</i>	<i>japonicum</i>		<i>fraseri</i>
				<i>virginicum</i>
<i>Hypericum</i>	<i>ascyron</i>	<i>ascyron</i>		
	<i>laxum</i>	<i>laxum</i>		
			<i>majus</i>	<i>majus</i>
			<i>perforatum</i>	<i>perforatum</i>
	<i>gebleri</i>	<i>erectum</i>	<i>anagalloides</i>	<i>boreale</i>
	<i>attenuatum</i>	<i>kamischaticum</i>	<i>formosa</i>	<i>canadense</i>
			<i>scouleri</i>	<i>ellipticum</i>
				<i>gentianoides</i>
				<i>mutilum</i>
				<i>prolificum</i>
				<i>punctatum</i>
				<i>pyramidatum</i>
				<i>drummondii</i>
				<i>hypericoides</i>
				<i>tragulum</i>
				<i>kalmianum</i>
				<i>sphaerocarpum</i>
				<i>gymnanthum</i>
Tiliaceae				
<i>Corchoropsis</i>	<i>psilocarpa</i>			
	<i>tomentosa</i>			

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Tilia</i>	<i>amurense</i> <i>mandshurica</i> <i>mongolica</i>	<i>japonica</i> <i>maximowiczii</i>		<i>americana</i> <i>heterophylla</i>
Sarraceniaceae				
<i>Darlingtonia</i>			<i>californica</i>	
<i>Sarracenia</i>				<i>purpurea</i>
Droseraceae				
<i>Drosera</i>	<i>rotundifolia</i> <i>anglica</i>	<i>rotundifolia</i> <i>anglica</i>	<i>rotundifolia</i> <i>anglica</i>	<i>rotundifolia</i> <i>anglica</i> <i>intermedia</i> <i>linearis</i> <i>intermedia</i>
Cistaceae				
<i>Helianthemum</i>				<i>canadense</i> <i>propinquum</i>
<i>Hudsonia</i>				<i>ericoides</i> <i>tomentosa</i>
<i>Lechea</i>				<i>intermedia</i> <i>leggettii</i> <i>minor</i> <i>maritima</i> <i>stricta</i> <i>tenuifolia</i> <i>villosa</i>
Violaceae				
<i>Hybanthus</i>				<i>concolor</i>
<i>Viola</i>	<i>selkirkii</i> <i>hirtipes</i> <i>manshurica</i> <i>langsдорffii</i> <i>patrinii</i> <i>phalacrocarpa</i>	<i>selkirkii</i> <i>hirtipes</i> <i>manshurica</i> <i>langsдорffii</i> <i>patrinii</i> <i>phalacrocarpa</i>	<i>selkirkii</i> <i>adunca</i> <i>canadensis</i> <i>langsдорffii</i> <i>nephrophylla</i> <i>nuttallii</i>	<i>selkirkii</i> <i>adunca</i> <i>canadensis</i> <i>nephrophylla</i> <i>nuttallii</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>raddeana</i>	<i>raddeana</i>	<i>palustris</i>	<i>palustris</i>
	<i>sachalinensis</i>	<i>sachalinensis</i>	<i>renifolia</i>	<i>renifolia</i>
	<i>verecunda</i>	<i>verecunda</i>	<i>rugulosa</i>	<i>rugulosa</i>
	<i>yedoensis</i>	<i>yedoensis</i>	<i>septentrionalis</i>	<i>septentrionalis</i>
	<i>philippica</i>	<i>aliariaefolia</i>		
	<i>prionantha</i>	<i>biflora</i>	<i>glabella</i>	<i>blanda</i>
	<i>rossii</i>	<i>blandaeformis</i>	<i>linguaefolia</i>	<i>conspersa</i>
	<i>collina</i>	<i>collina</i>	<i>beckwithii</i>	<i>eriocarpa</i>
	<i>acuminata</i>	<i>vaginata</i>	<i>howellii</i>	<i>emarginata</i>
	<i>mirabilis</i>	<i>hondoensis</i>	<i>mocloskeyi</i>	
	<i>muehldorfii</i>	<i>grypoceras</i>	<i>flettii</i>	<i>cucullata</i>
	<i>biflora</i>	<i>crassa</i>	<i>semperivens</i>	<i>hastata</i>
	<i>amurica</i>	<i>brevistipulata</i>	<i>ocellata</i>	<i>fimbriatula</i>
	<i>fissifolia</i>	<i>yubariana</i>	<i>hallii</i>	<i>hirsutula</i>
	<i>gmeliniana</i>	<i>kusanoana</i>	<i>orbiculata</i>	<i>incognita</i>
	<i>dissecta</i>	<i>senamlensis</i>	<i>purpurea</i>	<i>lanceolata</i>
	<i>savatieri</i>		<i>sheltonii</i>	<i>latinscula</i>
	<i>orientalis</i>		<i>trinervata</i>	<i>navae-angliae</i>
	<i>variegata</i>		<i>orbiculata</i>	<i>brittoniana</i>
	<i>brachyceras</i>			<i>pallens</i>
	<i>epipsila</i>			<i>palmata</i>
	<i>diamantiaca</i>			<i>papilionacea</i>
	<i>funghuangensis</i>			<i>rostrata</i>
	<i>liaosiensis</i>			<i>rotundifolia</i>
	<i>mongolica</i>			<i>sagittata</i>
	<i>albida</i>			<i>primulifolia</i>
	<i>chaerophylloides</i>			<i>pubescens</i>
	<i>dactyloides</i>			<i>sororia</i>
	<i>tenuicornis</i>			<i>strata</i>
	<i>websterii</i>			<i>walteri</i>
	<i>xanthopetala</i>			

Passifloraceae

*Passiflora**incarnata**lutea*

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
Cucurbitaceae				
<i>Echinocystis</i>			<i>lobata</i>	
<i>Gynostemma</i>	<i>pentaphyllum</i>	<i>pentaphyllum</i>		
<i>Marah</i>			<i>oreganus</i>	
<i>Schizopepon</i>	<i>bryoniaefolius</i>	<i>bryoniaefolius</i>		
<i>Sicyos</i>				<i>sangulatus</i>
<i>Thlasdiantha</i>	<i>dubia</i>			
<i>Trichosanthes</i>		<i>kirilowii</i>		
Salicaceae				
<i>Chosenia</i>	<i>arbutifolia</i>	<i>arbutifolia</i>		
<i>Populus</i>	<i>daurica</i>	<i>daurica</i>	<i>tremuloides</i>	<i>tremuloides</i>
	<i>suaveolens</i>	<i>maximowiczii</i>	<i>balsamifera</i>	<i>balsamifera</i>
	<i>koreana</i>	<i>koreana</i>	<i>deltoides</i>	<i>deltoides</i>
	<i>ussuriensis</i>	<i>sieboldii</i>	<i>hastata</i>	<i>grandidentata</i>
	<i>nakaii</i>	<i>jessoensis</i>	<i>acuminata</i>	
<i>Salix</i>	<i>gracilistyla</i>	<i>gracilistyla</i>	<i>lucida</i>	<i>lucida</i>
	<i>rorida</i>	<i>rorida</i>	<i>amygdaloides</i>	<i>amygdaloides</i>
	<i>sachalinensis</i>	<i>sachalinensis</i>	<i>rigida</i>	<i>rigida</i>
	<i>subfragilis</i>	<i>subfragilis</i>	<i>canadica</i>	<i>canadica</i>
	<i>pentandra</i>	<i>petsusu</i>	<i>bebbiana</i>	<i>bebbiana</i>
	<i>raddeana</i>		<i>pedicellaris</i>	<i>pedicellaris</i>
	<i>daphnoides</i>	<i>reinii</i>	<i>barratiana</i>	
	<i>borealis</i>	<i>pauciflora</i>	<i>argophylla</i>	<i>fragilis</i>
	<i>phylicifolia</i>	<i>gilgiana</i>	<i>caudata</i>	<i>planifolia</i>
	<i>triandra</i>	<i>bakko</i>	<i>drummondii</i>	<i>agryrocarpa</i>
	<i>aurita</i>	<i>nultenii</i>	<i>exigua</i>	<i>herbacea</i>
	<i>cinerea</i>	<i>hidenwoi</i>	<i>nivalis</i>	
	<i>herbacea</i>	<i>miyabeana</i>	<i>dodgeana</i>	
	<i>florida</i>	<i>hidakamontana</i>	<i>arctica</i>	<i>uva-ursi</i>
	<i>myrsinites</i>	<i>urbaniana</i>	<i>geyeriana</i>	
	<i>matsudana</i>	<i>paludicola</i>	<i>sitchensis</i>	<i>coactilis</i>
	<i>koraiensis</i>	<i>jessoensis</i>	<i>lemmonii</i>	<i>pyrifolia</i>
	<i>paraplesia</i>	<i>yezoalpina</i>	<i>lasiantha</i>	<i>sericea</i>
	<i>kangensis</i>	<i>taraikensis</i>	<i>lasiolepis</i>	<i>pellita</i>
	<i>maximowiczii</i>		<i>mackenziana</i>	<i>serissima</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>mongolica</i>		<i>melanopsis</i>	<i>cordata</i>
	<i>myrtilloides</i>		<i>monochroma</i>	<i>discolor</i>
	<i>pyrolifolia</i>		<i>scouleriana</i>	<i>glaucophylloides</i>
			<i>sessilifolia</i>	<i>petiolaris</i>
	<i>viminalis</i>		<i>fluviatilis</i>	<i>humilis</i>
	<i>hastata</i>		<i>tweedyi</i>	<i>nigra</i>
	<i>xerophila</i>		<i>hookeriana</i>	<i>interior</i>
	<i>polyadenia</i>		<i>barclayi</i>	
	<i>livida</i>		<i>wolfii</i>	<i>subsericea</i>
	<i>reticulata</i>		<i>commutata</i>	<i>tristis</i>
	<i>polyadenia</i>		<i>farriae</i>	
	<i>intergra</i>		<i>paperi</i>	
	<i>pierotii</i>		<i>monticola</i>	
	<i>brachypoda</i>		<i>myrtillifolia</i>	
	<i>dolichostyle</i>		<i>vestita</i>	
	<i>pseudolinearis</i>			
	<i>starkeneana</i>			
	<i>roridaeformis</i>			
	<i>rosmarinifolia</i>			
	<i>siuzevii</i>			
Loasaceae				
	<i>Mentzelia</i>		<i>albicaulis</i>	
			<i>decapetala</i>	
			<i>dispersa</i>	
			<i>douglasii</i>	
			<i>laevicaulis</i>	
Capparaceae				
	<i>Cleome</i>		<i>lutea</i>	
			<i>serrulata</i>	
			<i>platycarpa</i>	
	<i>Cleomella</i>		<i>nachrideana</i>	
	<i>Polanisia</i>		<i>trachysperma</i>	<i>dodecandra</i>
				<i>jamesii</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
Brassicaceae (Cruciferae)				
<i>Anelsonia</i>			<i>eurycarpa</i>	
<i>Armoracia</i>				<i>lucustris</i> <i>rusticana</i>
<i>Arabis</i>	<i>hirsuta</i> <i>glabra</i> <i>lyrata</i> <i>pendula</i> <i>nipponica</i> <i>cornata</i>	<i>hirsuta</i> <i>lyrata</i> <i>pendula</i> <i>serrata</i> <i>stelleri</i>	<i>hirsuta</i> <i>glabra</i> <i>lyrata</i> <i>drummondii</i> <i>divaricarpa</i> <i>crusickii</i> <i>crucisetosa</i> <i>holboellii</i> <i>microphylla</i> <i>nuttallii</i> <i>sparisiflora</i> <i>suffrutescens</i> <i>saesuginea</i> <i>pusillus</i>	<i>hirsuta</i> <i>glabra</i> <i>drummondii</i> <i>divaricarpa</i> <i>holbodii</i> <i>laevigata</i> <i>shortii</i> <i>viridis</i> <i>canadensis</i> <i>missouriensis</i>
<i>Arabidopsis</i>	<i>thaliana</i>	<i>thaliana</i>		
<i>Athysanus</i>				
<i>Barbarea</i>	<i>orthoceras</i>		<i>orthoceras</i> <i>verna</i>	<i>orthoceras</i>
<i>Berteroa</i>	<i>incana</i>			
<i>Braya</i>	<i>humilis</i>	<i>humilis</i>	<i>humilis</i>	<i>humilis</i>
<i>Bunias</i>	<i>orientalis</i> <i>cochlearioides</i>			
<i>Cakile</i>			<i>edentula</i> <i>cobrensis</i> <i>furcata</i> <i>platysperma</i> <i>lemmonii</i> <i>lyallii</i> <i>puberula</i> <i>lignifera</i>	<i>edentula</i>
<i>Camelina</i>	<i>microcarpa</i> <i>sativa</i>			
<i>Capsella</i>	<i>bursa-pastoris</i>	<i>bursa-pastoris</i>		
<i>Cardamine</i>	<i>parviflora</i>			<i>parviflora</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>flexuosa</i>	<i>flexuosa</i>	<i>pensylvanicua</i>	<i>pensylvanicua</i>
	<i>scutata</i>	<i>scutata</i>	<i>lyallii</i>	<i>lyallii</i>
	<i>impatiens</i>	<i>impatiens</i>		
	<i>lancantha</i>	<i>lancantha</i>		
	<i>leucantha</i>	<i>fauriei</i>	<i>angulata</i>	<i>bulbosa</i>
	<i>lyrata</i>	<i>schinziana</i>	<i>brewei</i>	<i>douglassii</i>
	<i>prorepens</i>	<i>yezoensis</i>	<i>constancei</i>	<i>pratensis</i>
	<i>tenuifolia</i>		<i>penduliflora</i>	<i>longii</i>
	<i>baishanensis</i>		<i>integrifolia</i>	<i>parviflora</i>
	<i>resedifolia</i>		<i>pulcherrima</i>	<i>diphylla</i>
	<i>Komarovii</i>		<i>pattersonii</i>	<i>maxima</i>
			<i>occidentais</i>	<i>concatenata</i>
			<i>oligosperma</i>	<i>angustata</i>
			<i>bellidifolia</i>	<i>rhomoboidea</i>
			<i>cordifolia</i>	<i>rotundifolia</i>
			<i>rupicola</i>	
<i>Caulanthus</i>			<i>crasicaulis</i>	
			<i>pilosus</i>	
<i>Chlorocrambe</i>			<i>hastata</i>	
<i>Cochlearia</i>	<i>officinalis</i>		<i>officinalis</i>	
		<i>oblongifolia</i>		
<i>Coronopus</i>	<i>didymus</i>			
<i>Dentaria</i>	<i>tenuifolia</i>		<i>californica</i>	<i>diphylla</i>
			<i>germata</i>	<i>laciniata</i>
			<i>pachystigma</i>	<i>maxima</i>
			<i>tenella</i>	<i>multifida</i>
<i>Descurainia</i>	<i>sophila</i>		<i>sophila</i>	
			<i>richardsonii</i>	<i>richardsonii</i>
			<i>californica</i>	<i>pinnata</i>
<i>Dontosetemon</i>	<i>dentatus</i>			
<i>Draba</i>	<i>nemorosea</i>	<i>nemorosea</i>	<i>nemorosea</i>	
			<i>glabella</i>	<i>glabella</i>
	<i>epiopoda</i>	<i>borealis</i>	<i>reptans</i>	<i>reptans</i>
	<i>mongolica</i>	<i>kitadakensis</i>	<i>crassifolia</i>	<i>lanceolata</i>
	<i>sibirica</i>	<i>japonica</i>	<i>densifolia</i>	<i>incana</i>
	<i>ussuriensis</i>	<i>sachalinensis</i>	<i>platycarpa</i>	<i>arabisans</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>multiceps</i>		<i>cuneifolia</i> <i>stenoloba</i> <i>praealta</i> <i>fladuizensis</i> <i>lonchocarpa</i> <i>lanceolata</i> <i>crassa</i> <i>aurea</i> <i>douglasii</i> <i>oligosperma</i> <i>incerta</i> <i>oreibata</i> <i>apiculata</i> <i>lemmonii</i> <i>sphaerocarpa</i> <i>paysonii</i> <i>ventosa</i> <i>argyreae</i>	<i>cana</i> <i>norvegica</i>
<i>Erysimum</i>	<i>chelranthoides</i> <i>marschllianum</i>	<i>chelranthoides</i>	<i>asperum</i> <i>inconspicuum</i> <i>arenicola</i> <i>occidentale</i>	<i>asperum</i> <i>inconspicuum</i>
<i>Harbarea</i> <i>Halimolobos</i>	<i>orthoceras</i>	<i>orthoceras</i>	<i>virgata</i> <i>whitedii</i> <i>perplexa</i> <i>procumbens</i> <i>scapigera</i> <i>tinctoria</i>	
<i>Hutchinsia</i> <i>Idanóa</i> <i>Isatis</i> <i>Leavenworthia</i> <i>Lepidium</i>	<i>oblongata</i>	<i>oblongata</i>		<i>uniflora</i>
	<i>virginicum</i> <i>densiflorum</i> <i>campestre</i> <i>sibiricum</i> <i>ruderae</i> <i>apetalum</i>		<i>virginicum</i> <i>densiflorum</i> <i>dictyotum</i> <i>nitidum</i> <i>sativum</i> <i>heterophyllum</i>	<i>virginicum</i> <i>densiflorum</i>

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Lesquerella</i>			<i>montanum</i> <i>ramosissimum</i> <i>ludoviccana</i> <i>douglasii</i> <i>carinata</i> <i>kingii</i> <i>alpina</i>	<i>ludoviccana</i>
<i>Macropodium</i>	<i>nimble</i>	<i>pterospermum</i>		
<i>Nasturtium</i>	<i>officinale</i>	<i>officinale</i>	<i>officinale</i>	
<i>Phoenicautis</i>			<i>chieranthoides</i>	
<i>Physaria</i>			<i>alpestris</i> <i>geyeri</i> <i>oregona</i> <i>didymocarpa</i>	
<i>Pitilotrimum</i>	<i>cretaceum</i>			
<i>Polycitenium</i>			<i>framontii</i>	
<i>Rorripa</i>	<i>islandica</i> <i>globosa</i>	<i>islandica</i> <i>indica</i>	<i>islandica</i> <i>curisiliqua</i> <i>obtusa</i> <i>sinuata</i> <i>linifolia</i>	<i>islandica</i> <i>amphibia</i>
<i>Schoenocarambe</i>			<i>longipedicellatum</i> <i>viscosum</i>	
<i>Sisymbrium</i>	<i>heteromallum</i> <i>officinale</i> <i>luteum</i>			
<i>Smelowskia</i>	<i>calycina</i>		<i>calycina</i> <i>ovalis</i> <i>confertiflora</i> <i>pinnata</i> <i>tomentosa</i> <i>viridiflora</i> <i>longirostris</i>	
<i>Stanleya</i>			<i>cordatus</i>	
<i>Streptanthella</i>			<i>aquatica</i>	<i>aquatica</i>
<i>Strepanthus</i>			<i>glaucum</i> <i>feulleri</i> <i>perfoliatum</i>	
<i>Subularia</i>	<i>aquatica</i>	<i>aquatica</i>		
<i>Thalaspia</i>	<i>arvense</i> <i>cochleariforme</i>	<i>arvense</i> <i>japonicum</i>		

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Thelypodium</i>			<i>parviflorum</i> <i>eucosmum</i> <i>flexuosum</i> <i>howellii</i> <i>sagittatum</i> <i>lasiophyllum</i> <i>repandum</i> <i>integrifolium</i> <i>laciniatum</i>	
<i>Thysanocarpus</i>			<i>curvipes</i>	
Clethraceae				
<i>Clethra</i>		<i>barbinervis</i>		<i>alnifolia</i>
Empetraceae				
<i>Corema</i>				<i>conradii</i>
<i>Empetrum</i>	<i>nigrum</i>	<i>nigrum</i>	<i>nigrum</i>	<i>nigrum</i>
Ericaceae				
<i>Allotropa</i>			<i>virgata</i>	
<i>Andromeda</i>	<i>polifolia</i>	<i>polifolia</i>	<i>polifolia</i>	<i>glaucophylla</i>
<i>Arbutus</i>			<i>menziesi</i>	
<i>Arctericia</i>		<i>nana</i>		
<i>Arctostaphylos</i>			<i>uvaursi</i> <i>patula</i> <i>nevadensis</i> <i>columbiana</i>	<i>uvaursi</i>
<i>Arctous</i>	<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>
<i>Bryanthus</i>		<i>gmelinii</i>		
<i>Cladothamnus</i>			<i>pyroliflorus</i>	
<i>Calluna</i>				<i>vulgaris</i>
<i>Cassiope</i>		<i>lycopodioides</i>	<i>mertensiana</i> <i>stelleriana</i> <i>tetragona</i>	
<i>Chamaedaphe</i> (<i>Cassandra</i>)	<i>calyculata</i>	<i>calyculata</i>		<i>calyculata</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Enkianthus</i>		<i>campanulatus</i>		
<i>Epigaea</i>				<i>repens</i>
<i>Erica</i>				<i>cinerea</i>
				<i>tetralix</i>
				<i>vagans</i>
<i>Eubotrys</i>				<i>racemosa</i>
<i>Gaultheria</i>		<i>adenothrix</i>	<i>hispidula</i>	<i>hispidula</i>
		<i>miqueliana</i>	<i>ovatifolia</i>	<i>hyphoides</i>
			<i>shallon</i>	<i>procumbens</i>
<i>Gaylussacia</i>				<i>baccata</i>
				<i>dumosa</i>
				<i>fruticosa</i>
				<i>frondosa</i>
				<i>brachycera</i>
<i>Harrimanella</i>		<i>stelleriana</i>		<i>hypnoides</i>
<i>Hemitomes</i>			<i>congestum</i>	
<i>Kalmia</i>			<i>macrophylla</i>	<i>latifolia</i>
			<i>occidentalis</i>	<i>angustifolia</i>
				<i>polifolia</i>
<i>Ledum</i>	<i>palustre</i>	<i>palustre</i>	<i>palustre</i>	<i>palustre</i>
			<i>groenlandicum</i>	<i>groenlandicum</i>
			<i>procumbens</i>	<i>procumbens</i>
			<i>glandulosum</i>	<i>hirta</i>
				<i>capitata</i>
				<i>nuttallii</i>
				<i>intermedia</i>
				<i>violacea</i>
				<i>virginica</i>
				<i>repens</i>
<i>Leucothoe</i>		<i>grayana</i>		
<i>Loiseleuria</i>	<i>procumbens</i>	<i>procumbens</i>	<i>procumbens</i>	<i>procumbens</i>
<i>Lyonia</i>				<i>ligustrina</i>
<i>Menziesia</i>		<i>pentandra</i>	<i>ferruginea</i>	
		<i>clitcalyx</i>		
<i>Oxydendrum</i>				<i>arboretum</i>
<i>Phyllodoce</i>	<i>caerulea</i>	<i>caerulea</i>		<i>caerulea</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>alpina</i>	<i>nipponica</i> <i>aleutica</i>	<i>empetritiformis</i> <i>granduliflora</i> <i>californica</i> <i>fimbriolata</i> <i>andromedeae</i>	
<i>Pityopus</i>				
<i>Pleuricospora</i>				
<i>Pterospora</i>				
<i>Rhododendron</i>	<i>parviflorum</i>	<i>parviflorum</i> <i>camtschaticum</i>	<i>albiflorum</i>	<i>canadense</i> <i>camtschaticum</i>
	<i>mucronatum</i>	<i>aureum</i>	<i>lapponicum</i>	<i>lapponicum</i>
	<i>dahuricum</i>	<i>dahuricum</i>	<i>occidentale</i>	<i>nudiflorum</i>
	<i>micranthum</i>	<i>brachycarpum</i>	<i>macrophyllum</i>	<i>maximum</i>
	<i>chryseum</i>	<i>tschonoskii</i> <i>kaempferi</i> <i>albrechtii</i>		<i>catawbieuse</i> <i>roseum</i> <i>viscosum</i> <i>prinophyllum</i>
	<i>schlippenbachii</i>			
<i>Tripetaleia</i>		<i>bracteata</i> <i>paniculata</i>		
<i>Vaccinium</i>	<i>uliginosum</i>	<i>uliginosum</i>	<i>uliginosum</i>	<i>uliginosum</i>
	<i>vitis-idaea</i>	<i>vitis-idaea</i>	<i>vitis-idaea</i>	<i>vitis-idaea</i>
	<i>oxycoccus</i>	<i>oxycoccus</i>	<i>oxycoccus</i>	<i>oxycoccus</i>
		<i>ovalifolium</i>	<i>caespitosum</i>	<i>caespitosum</i>
		<i>smallii</i>	<i>membranaceum</i>	<i>membranaceum</i>
		<i>oldhamii</i>	<i>ovarifolium</i>	<i>ovarifolium</i>
		<i>japonicum</i>	<i>parvifolium</i>	<i>parvifolium</i>
			<i>myrtilloides</i>	<i>myrtilloides</i>
		<i>hirtum</i>	<i>alaskanense</i>	<i>angustifolium</i>
		<i>aestans</i>	<i>ovatum</i>	<i>atrococcum</i>
		<i>microcarpum</i>	<i>scoparium</i>	<i>lamardci</i>
			<i>deliciosum</i>	<i>brittonii</i>
			<i>murtillus</i>	<i>pallidum</i>
			<i>occidentale</i>	<i>vacillans</i>
			<i>globulare</i>	
Pyrolaceae				
<i>Chimaphila</i>	<i>umbellata</i>	<i>umbellata</i>	<i>umbellata</i>	<i>umbellata</i>
	<i>japonica</i>	<i>japonica</i>	<i>menziesii</i>	<i>maculata</i>
<i>Moneses</i>	<i>uniflora</i>	<i>uniflora</i>	<i>uniflora</i>	<i>uniflora</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Monotropastrum</i>	<i>globosum</i> <i>tschanbaischanicum</i>	<i>globosum</i>		
<i>Pyrola</i>	<i>rotundifolia</i> <i>minor</i> <i>incarnata</i> <i>japonica</i> <i>renifolia</i> <i>subaphylla</i> <i>solunica</i>	<i>rotundifolia</i> <i>incarnata</i> <i>japonica</i> <i>renifolia</i> <i>alpina</i> <i>faurieana</i> <i>nephrophylla</i>	<i>rotundifolia</i> <i>minor</i> <i>asarifolia</i> <i>elliptica</i> <i>virens</i> <i>chlorantha</i> <i>aphylla</i> <i>picta</i> <i>secunda</i> <i>dentata</i>	<i>rotundifolia</i> <i>minor</i> <i>asarifolia</i> <i>elliptica</i> <i>virens</i> <i>chlorantha</i>
<i>Ramischia</i>	<i>secund</i> <i>obtusata</i>	<i>secund</i>	<i>secund</i>	<i>secund</i>
Monotropaceae				
<i>Hypopitys</i>	<i>monotropa</i>	<i>monotropa</i>	<i>monotropa</i>	<i>monotropa</i>
<i>Monotropa</i>	<i>uniflora</i>	<i>uniflora</i>	<i>uniflora</i>	<i>uniflora</i>
<i>Pterospora</i>				<i>andromedea</i>
Diapensiaceae				
<i>Diapensia</i>		<i>lapponica</i>		<i>lapponica</i>
<i>Shortia</i>		<i>soldanelloides</i>		
Ebenaceae				
<i>Diospyros</i>				<i>virginiana</i>
Styracaceae				
<i>Halesia</i>				<i>tetraptera</i>
<i>Styrax</i>	<i>obassia</i>	<i>obassia</i> <i>japonica</i>		<i>americanus</i>
Symplocaceae				
<i>Symplocus</i>	<i>chinensis</i>	<i>chinensis</i>		<i>tinctoria</i>
Mysinaceae				

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Ardisia</i>		<i>japonica</i>		
Primulaceae				
<i>Androsacea</i>	<i>filiformis</i> <i>septrionalis</i>		<i>filiformis</i> <i>septrionalis</i>	
		<i>lehmanniana</i>	<i>lehmanniana</i>	
	<i>umbellata</i>		<i>occidentalis</i>	<i>occidentalis</i>
<i>Centunculus</i>			<i>minimus</i>	<i>minimus</i>
<i>Cortusa</i>	<i>matthioli</i>	<i>matthioli</i>		
<i>Dodecatheon</i>			<i>alpinum</i> <i>dentatum</i> <i>jeffreii</i> <i>hendersonii</i> <i>poeticum</i> <i>cusickii</i> <i>conjugens</i> <i>cusickii</i> <i>pulchellum</i>	<i>media</i> <i>radicatum</i>
<i>Douglasia</i>			<i>montana</i> <i>hivalis</i> <i>laevigata</i>	
<i>Glaux</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>	<i>maritima</i>
<i>Hottonia</i>				<i>inflata</i>
<i>Lysimachia</i>	<i>thrysiflora</i> <i>clethroides</i> <i>mauritiana</i> <i>vulgaris</i> <i>barystachys</i> <i>pentapetala</i>	<i>thrysiflora</i> <i>clethroides</i> <i>mauritiana</i> <i>vulgaris</i> <i>japonica</i>	<i>thrysiflora</i> <i>ciliata</i> <i>terrestris</i> <i>lanceolata</i> <i>nummularia</i> <i>punctata</i>	<i>thrysiflora</i> <i>ciliata</i> <i>terrestris</i> <i>lanceolata</i> <i>quadriflora</i> <i>quadrifolia</i> <i>producta</i> <i>hybrida</i>
<i>Primula</i>	<i>jesoana</i> <i>modesta</i> <i>elatior</i> <i>sieboldii</i> <i>sibirica</i>	<i>jesoana</i> <i>modesta</i> <i>cuneifolia</i> <i>hidakana</i> <i>japonica</i>	<i>incana</i> <i>parryi</i> <i>cusickiana</i>	<i>laurentiana</i> <i>mistassinica</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>patens</i>	<i>takedana</i>		
	<i>saxatilis</i>			
	<i>fistulosa</i>			
	<i>farinosa</i>			
	<i>loeseneri</i>			
<i>Samolus</i>		<i>parviflorus</i>		<i>floribundus</i>
<i>Trientalis</i>	<i>europaea</i>	<i>europaea</i>	<i>arctica</i>	<i>borealis</i>
			<i>latifolia</i>	<i>macrocarpa</i>

ROSIDAE

Crassulaceae

<i>Sedum</i>	<i>rosea</i>	<i>rosea</i>	<i>rosea</i>	<i>rosea</i>
	<i>aizoon</i>	<i>aizoon</i>		
	<i>telephium</i>	<i>telephium</i>		
	<i>verticillatum</i>	<i>verticillatum</i>		
	<i>erubescens</i>	<i>cauticolum</i>	<i>debile</i>	<i>ternatum</i>
	<i>kamtschaticum</i>	<i>furusei</i>	<i>divergens</i>	<i>telephoides</i>
	<i>spectabile</i>	<i>pluricaule</i>	<i>lanceolata</i>	
	<i>cartilaginea</i>		<i>douglasii</i>	
	<i>polytrichoides</i>		<i>leibergeri</i>	
	<i>middendorffianum</i>		<i>rhodanthum</i>	
	<i>stellariaefolium</i>		<i>stenopetalum</i>	
	<i>viviparum</i>		<i>oreganse</i>	
	<i>minutus</i>		<i>spathulifolium</i>	
	<i>erythrostictum</i>			
	<i>spectabile</i>			
	<i>pallescent</i>			
	<i>purpureum</i>			
	<i>selkianum</i>			
	<i>malacophyllum</i>			
	<i>spinosus</i>			
	<i>fimbriatus</i>			
<i>Tillaea</i>	<i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
Penthoraceae				
<i>Penthorum</i>	<i>sedoides</i>			<i>sedoides</i>
Saxifragaceae				
<i>Astilbe</i>	<i>chinensis</i>	<i>platyphylla</i>		<i>bitemata</i>
<i>Astiboides</i>	<i>tabularis</i>			
<i>Bolandra</i>			<i>oregana</i>	
<i>Boykinia</i>		<i>lycoctonifolia</i>	<i>major</i> <i>elata</i>	<i>aconitifolia</i>
<i>Chrysosplenium</i>	<i>flagelliferum</i> <i>japonicum</i> <i>ramosum</i> <i>alternifolium</i> <i>pilosum</i> <i>sinicum</i> <i>trachyspermum</i> <i>lectus-cochlea</i>	<i>flagelliferum</i> <i>japonicum</i> <i>ramosum</i> <i>grayanum</i> <i>kamtschaticum</i>	<i>glechomaefolium</i> <i>tetrandrum</i>	<i>americana</i> <i>iowense</i>
<i>Conimitella</i>			<i>williamsii</i>	
<i>Deutzia</i>	<i>amurensis</i> <i>parviflora</i> <i>glabrata</i>	<i>crenata</i>		
<i>Elmera</i>			<i>racemosa</i>	
<i>Gillenia</i>				<i>trifoliata</i>
<i>Heuchera</i>			<i>richardsonii</i> <i>cylindrica</i> <i>glabra</i> <i>micrantha</i> <i>rubescens</i> <i>parvifolia</i> <i>chlorantha</i> <i>grossulariifolia</i>	<i>richardsonii</i> <i>americana</i> <i>hirsuticaulis</i> <i>pubescens</i> <i>villosa</i>
<i>Hydrangea</i>				<i>arborescens</i> <i>bretschneideri</i>
<i>Itea</i>			<i>virginica</i>	
<i>Leptarrhena</i>			<i>pyrolifolia</i>	
<i>Lithophragma</i>			<i>bulbifera</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>glabra</i>	
			<i>parviflora</i>	
			<i>tenella</i>	
<i>Mitella</i>	<i>nuda</i>	<i>nuda</i>	<i>nuda</i>	<i>nuda</i>
		<i>integripetala</i>	<i>caulescens</i>	<i>diphylla</i>
			<i>breweri</i>	
			<i>ovalis</i>	
			<i>pendandra</i>	
			<i>stauropetala</i>	
			<i>diversifolia</i>	
			<i>trifida</i>	
<i>Mukdenia</i>	<i>rossii</i>			
<i>Parnassia</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>
			<i>parviflora</i>	<i>parviflora</i>
			<i>fimbriata</i>	<i>glauca</i>
			<i>kotzebuei</i>	
<i>Peltiphyllum</i>			<i>peltatum</i>	
<i>Philadelphus</i>	<i>incanus</i>		<i>confusus</i>	<i>inodorus</i>
	<i>schrenkii</i>		<i>lewisii</i>	<i>pubescens</i>
	<i>chianshanensis</i>		<i>trichothecus</i>	
<i>Ribes</i>	<i>triste</i>	<i>triste</i>	<i>triste</i>	<i>triste</i>
	<i>diacanthum</i>	<i>japonica</i>	<i>americanum</i>	<i>americanum</i>
	<i>maximowiczianum</i>	<i>latifolium</i>	<i>hudsonianum</i>	<i>hudsonianum</i>
	<i>procumbens</i>		<i>lacustre</i>	<i>lacustre</i>
	<i>burejensis</i>		<i>oxyacanthoides</i>	<i>oxyacanthoides</i>
	<i>pauciflorum</i>		<i>setosum</i>	<i>setosum</i>
	<i>nigrum</i>	<i>sachalinense</i>	<i>aureum</i>	<i>glandulosum</i>
	<i>komarovi</i>		<i>cereum</i>	<i>cynosbati</i>
	<i>ussuriensis</i>		<i>cognatum</i>	<i>hirtellum</i>
	<i>pulchellum</i>		<i>inermis</i>	<i>rotundifolium</i>
			<i>irriguum</i>	
	spp (5)		<i>niveum</i>	
			<i>petiolare</i>	
			<i>reniforme</i>	
			<i>viscosissimum</i>	
			<i>velutinum</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>montigenum</i>	
			<i>divaricatum</i>	
			<i>klamathense</i>	
			<i>hendersonii</i>	
			<i>cruentum</i>	
			<i>menziesii</i>	
			<i>watsonianum</i>	
			<i>lobbii</i>	
			<i>odoratum</i>	
			<i>sanguineum</i>	
			<i>wolfii</i>	
			<i>nigrum</i>	
			<i>bracteosum</i>	
			<i>sativum</i>	
			<i>howellii</i>	
			<i>laxiflorum</i>	
<i>Rodgersia</i>	<i>podophylla</i>	<i>podophylla</i>		
<i>Saxifraga</i>	<i>cernua</i>		<i>cernua</i>	<i>cernua</i>
	<i>punctata</i>		<i>punctata</i>	
			<i>aizoides</i>	<i>aizoides</i>
		<i>mandshuriensis</i>	<i>cherlerioides</i>	<i>nidifica</i>
	<i>fortunei</i>	<i>fusca</i>	<i>integrifolia</i>	<i>aizoon</i>
	<i>laciniata</i>	<i>japonica</i>	<i>mertensiana</i>	<i>pensylvanica</i>
		<i>merki</i>	<i>idahoensis</i>	<i>stellaris</i>
	spp (7)	<i>sachalinensis</i>	<i>oppositifolia</i>	<i>oppositifolia</i>
		<i>laciniata</i>	<i>tricuspidata</i>	<i>tricuspidata</i>
		<i>nishidae</i>	<i>arguta</i>	
		<i>bracteata</i>	<i>organa</i>	<i>rivularis</i>
		<i>reniformis</i>	<i>occidentalis</i>	<i>virginiensis</i>
			<i>ferruginea</i>	
			<i>marshallii</i>	
			<i>lyallii</i>	
			<i>nuttallii</i>	
			<i>bronchialis</i>	
			<i>tolmiei</i>	
			<i>flagellaris</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>chrysantha</i>	
			<i>caespitosa</i>	
			<i>adscedens</i>	
			<i>debilis</i>	
			<i>rhomboides</i>	
<i>Schizophragma</i>		<i>hydrangeoides</i>		
<i>Sukdorfia</i>			<i>violacea</i>	
			<i>ranunculifolia</i>	
<i>Sullivantia</i>			<i>oregana</i>	<i>sullivantii</i>
<i>Telesonix</i>			<i>jamesii</i>	
<i>Tellima</i>			<i>grandiflorum</i>	
<i>Tiarella</i>	<i>polyphylla</i>	<i>polyphylla</i>	<i>unifoliata</i>	<i>cordifolia</i>
<i>Tolmiea</i>			<i>menziesii</i>	
<i>Whipplea</i>			<i>modesta</i>	
Rosaceae				
<i>Agrimonia</i>	<i>pilosa</i>	<i>pilosa</i>	<i>striata</i>	<i>striata</i>
				<i>gryposepala</i>
				<i>parviflora</i>
				<i>pubescens</i>
<i>Alchemilla</i>	<i>vulgaris</i>	<i>vulgaris</i>	<i>vulgaris</i>	
<i>Amelanchier</i>			<i>alnifolia</i>	<i>arborea</i>
			<i>utahensis</i>	<i>sanguinea</i>
				<i>laevis</i>
				<i>canadensis</i>
				<i>fernaldii</i>
				<i>spicata</i>
				<i>bartramiana</i>
<i>Aronia</i>				<i>arbutifolia</i>
				<i>melanocarpa</i>
<i>Aruncus</i>	<i>sylvester</i>	<i>sylvester</i>	<i>sylvester</i>	<i>sylvester</i>
<i>Cercocarpus</i>			<i>ledifolius</i>	
			<i>montanus</i>	
<i>Chamaebatiaria</i>			<i>millifolium</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Chamaerhodos</i>			<i>erecta</i>	<i>erecta</i>
<i>Cotoneaster</i>	<i>integerrimus</i> <i>melanocarpus</i> <i>rotundifolius</i>			
<i>Crataegus</i>	<i>dahurica</i> <i>maximowiczii</i> <i>pinnatifida</i> <i>sanguinea</i> <i>scabrifolia</i>	<i>maximowiczii</i> <i>chlorosarea</i>	<i>douglasii</i> <i>columbiana</i>	<i>douglasii</i> <i>cruggalii</i> <i>calpodendron</i> <i>coccinioides</i> <i>rotundifolia</i> <i>brainerdii</i> <i>uniflora</i> <i>chrysocarpa</i> <i>intricata</i> <i>macracantha</i> <i>macrocarpa</i> <i>mollis</i> <i>pruinosa</i> <i>punctata</i> <i>schuettei</i> <i>succulenta</i> <i>repens</i>
<i>Dalibarda</i>				<i>repens</i>
<i>Dryas</i>	<i>octopetala</i>	<i>octopetala</i>	<i>octopetala</i> <i>drumondii</i> <i>integrifolia</i>	<i>octopetala</i> <i>drumondii</i> <i>integrifolia</i>
<i>Duchesnea</i>	<i>indica</i>	<i>indica</i> <i>chrysantha</i>		
<i>Exochorda</i>	<i>girgaldii</i> <i>racemosa</i> <i>serratifolia</i>			
<i>Filipendula</i>	<i>angustiloba</i> <i>intermedia</i> <i>palmata</i> <i>purpurea</i>	<i>yezoensis</i>	<i>occidentalis</i>	<i>rubra</i>
<i>Fragaria</i>	<i>orientalis</i>	<i>vesca</i> <i>iinumae</i> <i>yezoensis</i>	<i>vesca</i> <i>virginiana</i> <i>chiloensis</i>	<i>vesca</i> <i>virginiana</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Geum</i>	<i>aleppicum</i>	<i>aleppicum</i> <i>macrophyllum</i> <i>calthaefolium</i> <i>pentapetalum</i>	<i>aleppicum</i> <i>macrophyllum</i> <i>rivale</i> <i>strictum</i> <i>rossii</i> <i>triflorum</i>	<i>aleppicum</i> <i>macrophyllum</i> <i>rivale</i> <i>laciniatum</i> <i>canadense</i> <i>peckii</i> <i>vernum</i> <i>virginianum</i>
<i>Holodiscus</i>			<i>dumosus</i> <i>discolor</i>	
<i>Horkelia</i>			<i>congesta</i> <i>fusca</i>	
<i>Ivesia</i>			<i>baileyi</i> <i>gordonii</i> <i>tweedyi</i> <i>uniflora</i>	
<i>Kelseya</i>				
<i>Kerria</i>	<i>japonica</i>	<i>japonica</i>		
<i>Luetkea</i>			<i>pectinata</i>	
<i>Malus</i>	<i>baccata</i> <i>manshurica</i> <i>asiatica</i> <i>nekii</i>	<i>baccata</i> <i>sieboldii</i>		<i>nubra</i> <i>cooronaria</i>
<i>Neillia</i>				
<i>Osmaronia</i>			<i>cerasiformis</i>	
<i>Peraphyllum</i>			<i>ramosissimum</i> <i>caespitosum</i> <i>cinerascens</i> <i>hendersonii</i>	
<i>Petrophytum</i>			<i>capitatus</i> <i>malvaceus</i>	<i>opulifolius</i>
<i>Physocarpus</i>	<i>amurensis</i> <i>ribesifolius</i>			
<i>Photinia</i>		<i>villosa</i>		
<i>Porteranthus</i>				<i>stipularis</i> <i>trifoliatus</i>
<i>Potentilla</i>	<i>fruticosa</i> <i>palustris</i> <i>anserina</i>	<i>fruticosa</i> <i>palustris</i> <i>norvegica</i>	<i>fruticosa</i> <i>palustris</i> <i>anserina</i> <i>norvegica</i>	<i>fruticosa</i> <i>palustris</i> <i>anserina</i> <i>norvegica</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>nivea</i>	<i>nivea</i>	<i>nivea</i>	
	<i>centigrana</i>	<i>centigrana</i>	<i>arguta</i>	<i>arguta</i>
	<i>fragarioides</i>	<i>fragarioides</i>	<i>hippiana</i>	<i>hippiana</i>
	<i>freyniana</i>	<i>freyniana</i>	<i>pensylvanica</i>	<i>pensylvanica</i>
	<i>cryptotaeniae</i>	<i>chryptotaeniae</i>	<i>rivalis</i>	<i>rivalis</i>
	<i>chinensis</i>	<i>egedei</i>	<i>brevifolia</i>	
	<i>conferta</i>	<i>nipponica</i>	<i>blaschkeana</i>	
	<i>yokussaiana</i>		<i>convallaria</i>	
	<i>discolor</i>	<i>miyabei</i>	<i>glandulosa</i>	<i>canadensis</i>
	<i>bifurca</i>	<i>dickinsii</i>	<i>rectiformis</i>	<i>effusa</i>
	<i>ancistrifolia</i>	<i>matsumurae</i>	<i>leurocarpa</i>	<i>flabelliformis</i>
	<i>inquinans</i>	<i>megalantha</i>	<i>millegrana</i>	
	<i>multicaulis</i>	<i>stolonifera</i>	<i>perollis</i>	<i>simplex</i>
	<i>verticillaris</i>		<i>nuttallii</i>	<i>tridentata</i>
	<i>aspermia</i>		<i>newberryi</i>	
	<i>paradoxa</i>		<i>paradoxa</i>	
	<i>amurensis</i>		<i>breweri</i>	
	<i>tanacetifolia</i>		<i>ovina</i>	
	<i>viscosa</i>		<i>concinna</i>	
	<i>kleiniana</i>		<i>villosa</i>	
	<i>flagellaris</i>		<i>flabellifolia</i>	
	<i>reptans</i>		<i>hookeriana</i>	
	<i>leucophylla</i>		<i>uniflora</i>	
			<i>gracilis</i>	
	spp (14)		<i>drummondii</i>	
			<i>quinquefolia</i>	
			<i>diversifolia</i>	
			<i>biennis</i>	
<i>Prinsepia</i>	<i>sinensis</i>			
<i>Prunus</i>	<i>padus</i>	<i>padus</i>	<i>pensylvanica</i>	<i>pensylvanica</i>
	<i>ssiori</i>	<i>ssiori</i>	<i>virginiana</i>	<i>virginiana</i>
	<i> davidiana</i>	<i>grayana</i>	<i>americana</i>	<i>americana</i>
	<i>manshurica</i>	<i>gargentii</i>	<i>cerasus</i>	<i>serotina</i>
	<i>humilis</i>	<i>vereeunda</i>	<i>emarginata</i>	<i>alleghsnensis</i>
	<i>asiatica</i>	<i>nipponica</i>	<i>avium</i>	<i>pumila</i>
	<i>maackii</i>		<i>domestica</i>	<i>nigra</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>laurocerasus</i>	<i>angustifolia</i>
			<i>mahaleb</i>	
			<i>subcordata</i>	
<i>Purshia</i>			<i>spinosa</i>	
			<i>tridentata</i>	
<i>Pyrus</i>	<i>ussurensis</i>	<i>ussurensis</i>	<i>scopolina</i>	<i>coronaria</i>
	<i>corymbifera</i>		<i>fusca</i>	<i>ioensis</i>
				<i>arbutifolia</i>
				<i>melanocarpa</i>
				<i>prunifolia</i>
<i>Rhodotypos</i>	<i>scandens</i>			
<i>Rosa</i>	<i>acicularis</i>	<i>acicularis</i>	<i>acicularis</i>	<i>acicularis</i>
	<i>davurica</i>	<i>davurica</i>	<i>arkansana</i>	<i>setigera</i>
	<i>rugosa</i>	<i>rugosa</i>	<i>gymnocarpa</i>	<i>virginiana</i>
	<i>multiflora</i>	<i>multiflora</i>	<i>eglanteria</i>	<i>nitida</i>
	<i>banksiae</i>		<i>pisocarpa</i>	<i>palustris</i>
	<i>davidii</i>		<i>woodsii</i>	<i>carolina</i>
			<i>nutkana</i>	<i>fendleri</i>
				<i>blanda</i>
<i>Rubus</i>	<i>chamaemorus</i>	<i>chamaemorus</i>	<i>chamaemorus</i>	<i>chamaemorus</i>
	<i>idaeus</i>	<i>idaeus</i>	<i>idaeus</i>	
	<i>crataegifolius</i>	<i>crataegifolius</i>		
	<i>phoenicolasius</i>		<i>phoenicolasius</i>	
		<i>parvifolius</i>	<i>parvifolius</i>	
			<i>acaulis</i>	<i>acaulis</i>
			<i>pubescens</i>	<i>pubescens</i>
	<i>saxatilis</i>		<i>bartonianus</i>	<i>arundelanus</i>
	<i>sachalinensis</i>	<i>pedus</i>	<i>discolor</i>	<i>allegheensis</i>
		<i>pseudojaponicus</i>	<i>laciniatus</i>	<i>hispidus</i>
		<i>mesogaeus</i>	<i>nigerrimus</i>	<i>flagellaris</i>
			<i>leucodermis</i>	<i>englenii</i>
			<i>macropetalus</i>	<i>setosus</i>
			<i>nivalis</i>	<i>orarius</i>
			<i>ursinus</i>	<i>odoratus</i>
			<i>spectabilis</i>	<i>strigosus</i>
			<i>pedatus</i>	<i>occidentalis</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>lasiococcus</i>	<i>canadensis</i> <i>ostryifolius</i> <i>pensilvanicus</i> <i>strigosus</i>
<i>Sanguisorba</i>	<i>officinalis</i> <i>sitchensis</i> <i>tenuifolia</i>	<i>officinalis</i> <i>tenuifolia</i> <i>stipulata</i>	<i>officinalis</i> <i>sitchensis</i> <i>stipulata</i>	
	<i>parviflora</i> <i>grandiflora</i>		<i>occidentalis</i> <i>menziesii</i>	<i>canadensis</i>
<i>Sibbaldia</i>	<i>procumbens</i>		<i>procumbens</i>	<i>procumbens</i>
<i>Sorbus</i>	<i>alnifolia</i> <i>sibirica</i> <i>pohuashanensis</i>	<i>alnifolia</i> <i>sambucifolia</i> <i>matsuyumura</i>	<i>sitchensis</i> <i>scopulina</i>	<i>sitchensis</i> <i>americana</i> <i>decora</i>
<i>Spiraea</i>	<i>betilifolia</i> <i>media</i> <i>salicifolia</i> <i>ussuriensis</i> <i>mongolica</i> <i>pubescens</i> <i>sericea</i> <i>dasyantha</i> <i>elegaans</i> <i>chamaedryfolia</i>	<i>betilifolia</i> <i>media</i> <i>salicifolia</i> <i>ussuriensis</i> <i>fauriana</i> <i>japonica</i>	<i>betilifolia</i> <i>douglasii</i> <i>densiflora</i> <i>pyramidata</i>	<i>douglasii</i> <i>alba</i> <i>latifolia</i> <i>beauverdiana</i> <i>tomentosa</i>
<i>Sorbaria</i>	<i>sorbifolia</i>	<i>sorbifolia</i>		
<i>Stephanandra</i>	<i>incisa</i>	<i>incisa</i>		
<i>Waldsteinia</i>	<i>ternata</i>	<i>ternata</i>	<i>idahoensis</i>	<i>fragarioides</i>
Leguminosae				
<i>Aeschynomene</i>	<i>indica</i>	<i>indica</i>		
<i>Amphicarpa</i>	<i>trisperma</i>	<i>trisperma</i>		<i>bracteata</i> <i>canescens</i> <i>frusticosa</i> <i>nana</i>
<i>Amophora</i>				<i>americana</i>
<i>Apios</i>		<i>forfurei</i>		<i>americana</i>
<i>Astragalus</i>	<i>adsurgens</i>	<i>adsurgens</i>	<i>adsurgens</i>	<i>adsurgens</i>

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>alpinus</i>	<i>alpinus</i>
			<i>lotiflorus</i>	<i>lotiflorus</i>
			<i>agrestis</i>	<i>agrestis</i>
			<i>canadensis</i>	<i>canadensis</i>
	<i>chinensis</i>	<i>japonicus</i>	<i>collinus</i>	<i>neglectus</i>
	<i>dahuricus</i>	<i>secundus</i>	<i>arectus</i>	<i>glycyphyllos</i>
	<i>membranaceous</i>	<i>shinanensis</i>	<i>convallaris</i>	<i>tenellus</i>
	<i>mongolicus</i>	<i>yamamotoi</i>	<i>arthuri</i>	<i>eucosmus</i>
	<i>capillipes</i>		<i>beckwithii</i>	<i>robbinsii</i>
	<i>complanatus</i>		<i>conjunctus</i>	
	<i>galactites</i>		<i>peckii</i>	
	<i>melilotoides</i>		<i>cusickii</i>	
	<i>marinus</i>		<i>impensus</i>	
	<i>scaberrimus</i>		<i>inflexus</i>	
	<i>uliginosus</i>		<i>atrans</i>	
			<i>grayi</i>	
	spp (13)		<i>pectinatus</i>	
			<i>toanus</i>	
			<i>ceramicus</i>	
			<i>mulfloridae</i>	
			<i>filipes</i>	
			<i>kentrophyta</i>	
			<i>gilviflorus</i>	
			<i>sparulatus</i>	
			<i>terminalis</i>	
			<i>missouriensis</i>	
			<i>lentiginosus</i>	
			<i>miser</i>	
			<i>mortoni</i>	
			<i>purshii</i>	
			<i>reventus</i>	
			<i>riparius</i>	
			<i>spaldingii</i>	
			<i>striatus</i>	
			<i>whitheyi</i>	
			<i>sclerocarpus</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>speirocarpus</i>	
			<i>sinuatus</i>	
			<i>lentiginosus</i>	
			<i>cibarius</i>	
			<i>howellii</i>	
			<i>umbraticus</i>	
			<i>americanus</i>	
			<i>amnisamissii</i>	
			<i>riparius</i>	
			<i>arrectus</i>	
			<i>salmonis</i>	
			<i>spaldingii</i>	
			<i>tyghensis</i>	
			<i>obscurus</i>	
			<i>arthuri</i>	
			<i>geyeri</i>	
			<i>diaphanus</i>	
			<i>lemmonii</i>	
			<i>newberryi</i>	
			<i>nudisiliquus</i>	
			<i>inflexus</i>	
			<i>purshii</i>	
			<i>argophyllus</i>	
			<i>malacus</i>	
			<i>beckwithii</i>	
			<i>tweedyi</i>	
			<i>collinus</i>	
			<i>curvicarpus</i>	
			<i>vallaris</i>	
			<i>scaphoides</i>	
			<i>eremiticus</i>	
			<i>atropubescens</i>	
			<i>columbianus</i>	
			<i>adarius</i>	
			<i>reventus</i>	
			<i>sheldonii</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>crassicaarpus</i>	
			<i>lentiginosus</i>	
			<i>drummondii</i>	
			<i>cicer</i>	
			<i>agrestis</i>	
			<i>bisculatus</i>	
			<i>hoodianus</i>	
			<i>reventiformis</i>	
			<i>leibergii</i>	
			<i>cottonii</i>	
			<i>oboriginum</i>	
			<i>alpinus</i>	
			<i>leptaleus</i>	
			<i>flexuosus</i>	
			<i>bourgovii</i>	
			<i>robbinsii</i>	
			<i>whitneyi</i>	
			<i>lyallii</i>	
			<i>caricinus</i>	
			<i>tegetarioides</i>	
			<i>gracilis</i>	
			<i>eucosmus</i>	
			<i>microcystis</i>	
			<i>tenellus</i>	
			<i>vexilliflexus</i>	
			<i>amblytropis</i>	
			<i>platytropis</i>	
			<i>succumbens</i>	
			<i>collinus</i>	
			<i>curvicarpus</i>	
			<i>pulsiferae</i>	
			<i>paysonii</i>	
			<i>aquilonius</i>	
<i>Baptisia</i>				<i>alba</i>
				<i>australis</i>
				<i>cinerea</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
				<i>leucantha</i> <i>leucophaea</i> <i>tinctoria</i>
<i>Caragana</i>	<i>microphylla</i> <i>ussuriensis</i> <i>zajlbruckueri</i>			
<i>Cassia</i>	<i>nomame</i>	<i>nomame</i>		<i>herbecarpa</i>
<i>Cercis</i>				<i>canadensis</i>
<i>Chamaecrista</i>				<i>fasciculata</i> <i>nictitanus</i>
<i>Cladrastis</i>				<i>lutea</i>
<i>Crotalaria</i>	<i>sessiliflora</i>			<i>sagittalis</i>
<i>Cytisus</i>			<i>scoparius</i> <i>monspessulanus</i>	
<i>Desmanthus</i>				<i>illinoensis</i>
<i>Desmodium</i>	<i>fallax</i> <i>oldhami</i>	<i>fallax</i> <i>oxyphyllum</i>		<i>canadense</i> <i>ciliare</i> <i>cuspidatum</i> <i>glabellum</i> <i>glutinosum</i> <i>marilandicum</i> <i>paniculatum</i> <i>pauciflorum</i> <i>rigidum</i> <i>regularis</i> <i>volubilis</i> <i>triacanthos</i>
<i>Galactia</i>				
<i>Gleditsia</i>	<i>japonica</i>			
<i>Glycine</i>	<i>soja</i>			
<i>Glycyrrhiza</i>	<i>pallidiflora</i> <i>uralensis</i>		<i>lepidota</i>	
<i>Gueldenstaedtia</i>	<i>verna</i>			
<i>Gymnocladus</i>				<i>dioica</i>
<i>Hedysarum</i>	<i>fruticosum</i> <i>ussuriense</i>	<i>nedysaroides</i> <i>vicioides</i>	<i>boreale</i> <i>occidentale</i> <i>sulphurescens</i>	<i>alpinum</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Indigofera</i>	<i>kirilowii</i>			
<i>Kummerwia</i>	<i>striata</i>	<i>striata</i>		
	<i>stipulacea</i>			
<i>Lathyrus</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>
	<i>dauidii</i>	<i>dauidii</i>		
	<i>pratensis</i>		<i>pratensis</i>	
		<i>maritimus</i>	<i>bijugatus</i>	<i>maritimus</i>
	<i>humilis</i>		<i>lanszwertii</i>	<i>ochroleucus</i>
	<i>komarovii</i>		<i>nevadensis</i>	<i>vernus</i>
	<i>quinquenervius</i>		<i>pauciflorus</i>	
	<i>vaniotii</i>		<i>vestitus</i>	
			<i>holochlorus</i>	
			<i>littoralis</i>	
			<i>rigidus</i>	
			<i>ochroleucus</i>	
			<i>polyphyllus</i>	
<i>Lespedeza</i>	<i>bicolor</i>	<i>bicolor</i>		<i>capitata</i>
	<i>cuneata</i>	<i>cuneata</i>		
	<i>dahurica</i>			
	<i>hedysaroides</i>			
	<i>tomentosa</i>			
	<i>repens</i>			
<i>Lotus</i>	<i>corniculatus</i>	<i>corniculatus</i>	<i>corniculatus</i>	
	<i>tenius</i>		<i>purshianus</i>	<i>purshianus</i>
			<i>douglasii</i>	
			<i>formosissimus</i>	
			<i>micranthus</i>	
			<i>nevadensis</i>	
			<i>crassifolius</i>	
			<i>denticulatus</i>	
<i>Lupinus</i>			<i>arbustus</i>	<i>perennis</i>
			<i>latifolius</i>	
			<i>lepidus</i>	
			<i>saxosus</i>	
			<i>polyphyllus</i>	
			<i>argenteus</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>arboreus</i>	
			<i>littoralis</i>	
			<i>rivularis</i>	
			<i>albicaulis</i>	
			<i>condatus</i>	
			<i>sabinii</i>	
			<i>albifronis</i>	
			<i>holosericeus</i>	
			<i>laxiflorus</i>	
			<i>microcarpus</i>	
			<i>pusillus</i>	
			<i>micranthus</i>	
			<i>affinis</i>	
			<i>bicolor</i>	
			<i>burkei</i>	
			<i>laxispicatus</i>	
			<i>lepidus</i>	
			<i>sulphurens</i>	
			<i>leucophyllus</i>	
			<i>leucopsis</i>	
			<i>minimus</i>	
			<i>ornatus</i>	
			<i>sericeus</i>	
			<i>wyethii</i>	
<i>Maackia</i>	<i>amuriensis</i>	<i>amuriensis</i>		
<i>Medicago</i>	<i>lupulina</i>			
<i>Melilotus</i>	<i>suaveolens</i>			
	<i>dentatus</i>			
<i>Oxytropis</i>	<i>deflexa</i>		<i>deflexa</i>	
	<i>anertii</i>	<i>megalantha</i>	<i>splendens</i>	<i>splendens</i>
	<i>hirta</i>	<i>rishiriensis</i>	<i>viscida</i>	<i>viscida</i>
	<i>bicolor</i>	<i>hidakamontana</i>	<i>campestris</i>	<i>campestris</i>
	<i>glabra</i>	<i>kudoana</i>	<i>parryi</i>	<i>lambertii</i>
		<i>shokanbetsuensis</i>	<i>lagopus</i>	
		<i>yezoensis</i>	<i>besseyi</i>	
			<i>sericea</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Petaostemom</i>			<i>podocarpa</i> <i>canadidum</i> <i>ornatum</i>	<i>purpureum</i>
<i>Pocockia</i>	<i>liaosiensis</i>			
<i>Psoralea</i>			<i>argophylla</i> <i>hypogaea</i> <i>lanceolata</i> <i>tenuiflora</i> <i>physodes</i> <i>scabra</i>	<i>argophylla</i> <i>cuspidata</i> <i>esculenta</i>
<i>Pueraria</i>	<i>lobata</i>	<i>lobata</i>		
<i>Robinia</i>				<i>pseudocacia</i> <i>viscosa</i> <i>hebecarpa</i> <i>marilandica</i>
<i>Senna</i>				
<i>Sophora</i>	<i>flavescens</i>			
<i>Strophostyles</i>				<i>helveola</i> <i>leiosperma</i> <i>umbellata</i> <i>biflora</i> <i>spicata</i> <i>virginiana</i>
<i>Stylosanthes</i>				
<i>Tephrosia</i>				
<i>Thermopsis</i>	<i>lupinoides</i>	<i>lupinoides</i>	<i>montana</i> <i>rhombofolia</i>	
<i>Trifolium</i>	<i>lupinaster</i>	<i>lupinaster</i>	<i>dubium</i> <i>eriocephalum</i> <i>plumosum</i> <i>latifolium</i> <i>multipedunculatum</i> <i>gracilentum</i> <i>bifidum</i> <i>procumbens</i> <i>agrarium</i> <i>douglasii</i> <i>repens</i> <i>hybridum</i>	<i>reflexum</i> <i>carolianum</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>howellii</i>	
			<i>haydenii</i>	
			<i>procluctum</i>	
			<i>beckwithii</i>	
			<i>longipes</i>	
			<i>gymnocarpon</i>	
			<i>nanum</i>	
			<i>dasyphyllum</i>	
			<i>parryi</i>	
			<i>wormskjoldii</i>	
			<i>thompsonii</i>	
			<i>macrocephalum</i>	
			<i>microcephalum</i>	
			<i>microdon</i>	
			<i>cyathiferum</i>	
			<i>fucatum</i>	
			<i>depauperatum</i>	
			<i>variegatum</i>	
			<i>oligathum</i>	
			<i>tridentatum</i>	
			<i>incarnatum</i>	
			<i>striatum</i>	
			<i>arvense</i>	
			<i>macraei</i>	
			<i>ciliolatum</i>	
			<i>subterraneum</i>	
<i>Vicia</i>	<i>amoena</i>	<i>amoena</i>	<i>americana</i>	<i>americana</i>
	<i>cracca</i>	<i>cracca</i>	<i>cracca</i>	
	<i>japonica</i>	<i>japonica</i>	<i>hirsuta</i>	
	<i>pseudoorobus</i>	<i>pseudoorobus</i>	<i>disperma</i>	
	<i>unijuga</i>	<i>unijuga</i>	<i>gigantea</i>	
	<i>amurensis</i>	<i>angustifolia</i>	<i>pannonica</i>	<i>caroliniana</i>
	<i>baicalensis</i>	<i>faurrei</i>	<i>sativa</i>	
	<i>bungei</i>	<i>nipponica</i>	<i>tetrasperma</i>	
	<i>multicaulis</i>			
	<i>ramuliflora</i>			

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Wisteria</i>	<i>venosa</i>			<i>macrostachya</i>
Elaegnaceae				
<i>Elaeagnus</i>		<i>multiflora</i>	<i>commutata</i>	<i>commutata</i>
<i>Shepherdia</i>			<i>argentea</i>	<i>argentea</i>
			<i>canadensis</i>	<i>canadensis</i>
Podostemaceae				
<i>Cladopus</i>	<i>chinensis</i>			
<i>Podostemum</i>				<i>ceratophyllum</i>
<i>Terniopsis</i>	<i>sessilis</i>			
Haloragaceae				
<i>Haloragis</i>	<i>micrantha</i>	<i>micrantha</i>		
<i>Myriophyllum</i>	<i>spicatum</i>	<i>spicatum</i>	<i>spicatum</i>	<i>spicatum</i>
	<i>verticillatum</i>			<i>verticillatum</i>
	<i>ussuriense</i>	<i>ussuriense</i>	<i>elatinoides</i>	<i>alterniflorum</i>
			<i>exalbescens</i>	<i>farwellii</i>
			<i>hippurioides</i>	<i>neterophyllum</i>
				<i>pinnatum</i>
<i>Proserpinaca</i>				<i>palustris</i>
Lythraceae				
<i>Ammannia</i>			<i>coccinea</i>	<i>coccinea</i>
<i>Cuphea</i>				<i>petiolata</i>
<i>Decodon</i>				<i>verticillatus</i>
<i>Lythrum</i>	<i>salicaria</i>	<i>salicaria</i>	<i>salicaria</i>	
			<i>alatum</i>	<i>alatum</i>
			<i>hyssopifolia</i>	<i>hyssopifolia</i>
<i>Rotala</i>	<i>indica</i>		<i>ramosior</i>	<i>ramosior</i>
	<i>pusina</i>			
Thymelaeaceae				
<i>Daphne</i>	<i>kamtschatica</i>	<i>kamtschatica</i>		

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Dirca</i>	<i>koreana</i>	<i>miyabeana</i>		<i>palustris</i>
<i>Diarthron</i>	<i>linifolium</i>			
<i>Stellera</i>	<i>chamaejasme</i>			
Onagraceae				
<i>Boisduvalia</i>			<i>densiflora</i> <i>glabella</i> <i>salicina</i> <i>stricta</i>	
<i>Calylophus</i>				<i>serrulatus</i>
<i>Circaea</i>	<i>alpina</i> <i>lutetiana</i> <i>cordata</i> <i>erubescens</i>	<i>alpina</i> <i>lutetiana</i> <i>cordata</i> <i>erubescens</i> <i>mollis</i>	<i>alpina</i>	<i>alpina</i> <i>lutetiana</i>
<i>Clarkia</i>			<i>amoena</i> <i>gracilis</i> <i>pulchella</i> <i>rhomboideae</i> <i>purpurea</i> <i>viminea</i> <i>quadrivulnera</i>	
<i>Epilobium</i>	<i>angustifolium</i> <i>glandulosum</i> <i>palustre</i> <i>amurense</i> <i>fastigiatoramosum</i> <i>cylindrostigma</i> <i>hirsutum</i> <i>negulatum</i> <i>propinquum</i> <i>tenue</i>	<i>angustifolium</i> <i>glandulosum</i> <i>palustre</i> <i>amurense</i> <i>fastigiatoramosum</i> <i>dielsii</i> <i>cephalostigma</i> <i>fauriei</i> <i>foucaudianum</i> <i>montanum</i> <i>pyricholopum</i> <i>shiroumense</i>	<i>angustifolium</i> <i>glandulosum</i> <i>palustre</i> <i>alpinum</i> <i>paniculatum</i> <i>boreale</i> <i>exaltatum</i> <i>minutum</i> <i>obcordatum</i> <i>suffruticosum</i> <i>hornemanni</i> <i>glaberrimum</i> <i>luteum</i>	<i>angustifolium</i> <i>glandulosum</i> <i>palustre</i> <i>alpinum</i> <i>paniculatum</i> <i>ciliatum</i> <i>coloratum</i> <i>strictum</i>

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Gaura</i>			<i>parviflora</i>	<i>biennis</i>
			<i>coccinea</i>	
<i>Gayophytum</i>			<i>decipiens</i>	
			<i>diffusum</i>	
			<i>humile</i>	
			<i>ramosissimum</i>	
			<i>racemosum</i>	
<i>Ludwigia</i>	<i>prostrata</i>	<i>stipulacea</i>	<i>palustris</i>	<i>alternifolia</i>
				<i>polycarpa</i>
<i>Oenothera</i>			<i>andina</i>	<i>biennis</i>
			<i>caespitosae</i>	<i>fruticosa</i>
			<i>contorta</i>	<i>parviflora</i>
			<i>heterantha</i>	<i>perennis</i>
			<i>hookeri</i>	<i>pilosella</i>
			<i>pallida</i>	<i>rhombipetala</i>
			<i>atrigosa</i>	<i>tetragona</i>
			<i>tannacetifolia</i>	<i>clendunii</i>
			<i>pubens</i>	
			<i>minor</i>	
			<i>pygmaea</i>	
			<i>boothii</i>	
			<i>andina</i>	
			<i>hilgardii</i>	
			<i>serrulata</i>	
			<i>scapoidea</i>	
			<i>claviformis</i>	
			<i>nuttallii</i>	
			<i>deltoides</i>	
			<i>flava</i>	
			<i>palmeri</i>	
			<i>subacaulis</i>	
			<i>breviflora</i>	
Trapaceae				
<i>Trapa</i>	<i>japonica</i>	<i>japonica</i>		
	<i>manshurica</i>			

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>maximowiczii</i>			
	<i>potaninii</i>			
	<i>pseudoincisa</i>			
	<i>arcuata</i>			
Melastomaceae				
<i>Rhexia</i>				<i>virginica</i>
Garryaceae				
<i>Garrya</i>			<i>elliptica</i>	
			<i>fremontii</i>	
Alangiaceae				
<i>Alangium</i>		<i>platanifolium</i>		
Cornaceae				
<i>Aucuba</i>		<i>japonica</i>		
<i>Cornus</i>	<i>controversa</i>	<i>controversa</i>	<i>stolonifera</i>	<i>stolonifera</i>
		<i>canadensis</i>	<i>canadensis</i>	<i>canadensis</i>
	<i>coreana</i>	<i>suecica</i>	<i>nuttallii</i>	<i>florida</i>
	<i>alba</i>		<i>occidentalis</i>	<i>alternifolia</i>
				<i>racemosa</i>
				<i>drummondii</i>
				<i>amomum</i>
				<i>obliqua</i>
				<i>suecica</i>
				<i>rugosa</i>
				<i>purpusi</i>
<i>Helwingia</i>		<i>japonica</i>		
Nyssaceae				
<i>Nyssa</i>				<i>sylvatica</i>
Santalaceae				
<i>Commandra</i>			<i>livida</i>	<i>livida</i>
			<i>umbellata</i>	<i>umbellata</i>

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Thesium</i>	<i>refractum</i> <i>chinensis</i>	<i>refractum</i>		
Loranthaceae				
<i>Arceuthobium</i>			<i>americanum</i> <i>campylopodium</i> <i>douglasii</i>	<i>pusillum</i>
<i>Phoradendron</i>			<i>flavescens</i> <i>bolleanum</i> <i>juniperinum</i>	<i>flavescens</i>
<i>Viacum</i>	<i>coloratum</i>	<i>coloratum</i>		
Celastraceae				
<i>Celastrus</i>	<i>flagellaris</i> <i>orbiculatus</i>	<i>orbiculatus</i>		<i>scandens</i> <i>vitacea</i>
<i>Euonymus</i>	<i>alatus</i> <i>verrucosus</i> <i>pauciflorus</i> <i>maackii</i> <i>bungeanus</i> <i>macroptera</i> <i>sacrosancta</i>	<i>alatus</i> <i>japonicus</i> <i>tricarpos</i> <i>fortunei</i> <i>macropterus</i> <i>sieboldianus</i> <i>oxyphyllus</i>	<i>occidentalis</i>	<i>americanus</i> <i>atropurpurens</i> <i>obovatus</i>
<i>Glossopetalon</i>			<i>nevadense</i>	
<i>Pachistima</i>			<i>mysinites</i>	
<i>Tripterygium</i>	<i>regelii</i>			
Malvaceae				
<i>Hibiscus</i>	<i>trionum</i>			<i>moscheutos</i>
<i>Ilia</i>			<i>longisepala</i> <i>rivularis</i>	
<i>Malva</i>	<i>mauritiana</i> <i>mohileviensis</i>		<i>sylvestris</i> <i>neglecta</i> <i>parviflora</i> <i>monschata</i>	<i>sylvestris</i> <i>neglecta</i> <i>parviflora</i>
<i>Sida</i>			<i>hederacea</i>	<i>spinosa</i>
<i>Sidalcea</i>			<i>campestris</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>oregana</i>	
			<i>nemexicana</i>	
			<i>hendersonii</i>	
			<i>nelsoniana</i>	
			<i>nirtipes</i>	
			<i>cusickii</i>	
			<i>virgata</i>	
<i>Sphaeralcea</i>			<i>monroana</i>	
			<i>coccinea</i>	
			<i>grossulariarifolia</i>	
Aquifoliaceae				
<i>Ilex</i>		<i>crenata</i>		<i>laevigata</i>
		<i>macropoda</i>		<i>verticillata</i>
		<i>rugosa</i>		
		<i>sugerokii</i>		
<i>Nemopanthus</i>				<i>mucronata</i>
Buxaceae				
<i>Pachysandra</i>		<i>terminalis</i>		
Euphorbiaceae				
<i>Acalypha</i>	<i>australis</i>	<i>australis</i>		<i>gracilens</i>
				<i>rhomboidea</i>
<i>Crotonopsis</i>				<i>elliptica</i>
<i>Eremocarpus</i>			<i>setigerus</i>	
<i>Euphorbia</i>	<i>sieboldiana</i>	<i>sieboldiana</i>	<i>maculata</i>	<i>maculata</i>
	<i>helioscopia</i>	<i>supina</i>	<i>glyptosperema</i>	<i>glyptosperema</i>
	<i>lunulata</i>		<i>serpyllifolia</i>	<i>serpyllifolia</i>
	<i>mandshurica</i>	<i>adenochlora</i>	<i>crenulata</i>	<i>corollata</i>
	<i>esula</i>	<i>ebracteolata</i>		<i>hexagona</i>
	<i>humifusa</i>			<i>marginata</i>
	<i>fischeriana</i>			<i>missurica</i>
	<i>lucorum</i>			<i>polygonifolia</i>
	<i>pekinensis</i>			<i>preslii</i>
				<i>serpens</i>

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Phyllanthus</i>	<i>ussuriensis</i>			<i>vermiculata</i>
<i>Securinega</i>	<i>suffruticosa</i>			<i>carolinensis</i>
Rhamnaceae				
<i>Berchemia</i>		<i>racemosa</i>		
<i>Ceanothus</i>			<i>sanguineus</i> <i>cuneatus</i> <i>integerrimus</i> <i>velutinus</i> <i>prostratus</i>	<i>sanguineus</i> <i>americanus</i> <i>herbaceus</i>
<i>Rhamnus</i>	<i>yoshinoi</i> <i>koraiensis</i> <i>dahurica</i> <i>parvifolia</i> <i>schnederii</i> <i>globosa</i> <i>diamantica</i>	<i>yoshinoi</i> <i>koraiensis</i> <i>japonica</i>	<i>alnifolia</i> <i>purshiana</i>	<i>alnifolia</i>
Vitaceae				
<i>Ampelopsis</i>	<i>brevipedunculata</i>	<i>brevipedunculata</i>		
<i>Parthenocissus</i>	<i>tricuspidata</i>	<i>tricuspidata</i>		<i>vitacea</i>
<i>Vitis</i>	<i>amurensis</i>	<i>coignetiae</i> <i>thunbergii</i>		<i>aestivalis</i> <i>riparia</i>
Linaceae				
<i>Linum</i>	<i>perenne</i> <i>stelleroides</i>	<i>perenne</i> <i>stelleroides</i>	<i>perenne</i> <i>angustifolium</i> <i>lewisii</i> <i>digynum</i> <i>micranthum</i>	<i>sulcatum</i> <i>striatum</i> <i>virginianum</i>
Polygalaceae				
<i>Polygala</i>	<i>japonica</i> <i>sibirica</i> <i>tatarinowii</i>	<i>japonica</i>	<i>californica</i> <i>cornuta</i> <i>subspinosa</i>	<i>ambigua</i> <i>polygama</i> <i>paucifolia</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>tenuifolia</i>			<i>sanguinea</i> <i>verticillata</i> <i>cruciata</i> <i>incarnata</i>
Staphyleaceae				
<i>Staphylea</i>	<i>bumalda</i>	<i>bumalda</i>		<i>trifolia</i>
Hippocastanaceae				
<i>Aesculus</i>		<i>turbinata</i>		<i>glabra</i>
Aceraceae				
<i>Acer</i>	<i>mono</i>	<i>mono</i>	<i>circinatum</i>	<i>nigrum</i>
	<i>tegmentosum</i>	<i>japonicum</i>	<i>glabrum</i>	<i>rubrum</i>
	<i>ukurunduense</i>	<i>ukurunduense</i>	<i>grandidentatum</i>	<i>spicatum</i>
	<i>mandshuricum</i>	<i>carpinifolium</i>	<i>macrophyllum</i>	<i>saccharinum</i>
	<i>triflorum</i>	<i>miyabei</i>		<i>saccharum</i>
	<i>pseudosieboianum</i>	<i>palmatum</i>		<i>negundo</i>
	<i>barbinerve</i>	<i>schonoskii</i>		<i>pensylvanicum</i>
	<i>ginnala</i>	<i>ginnala</i>		
		<i>cissifolium</i>		
Sapindaceae				
<i>Xanthoceras</i>	<i>sorbifolia</i>			
Anacardiaceae				
<i>Rhus</i>	<i>chinensis</i>	<i>chinensis</i>	<i>radicans</i>	<i>radicans</i>
			<i>glabra</i>	<i>glabra</i>
			<i>trilobata</i>	<i>trilobata</i>
	<i>verniciflurum</i>	<i>trichocarpa</i>	<i>diversiloba</i>	<i>vernix</i>
		<i>ambigua</i>		<i>typhina</i>
				<i>copallina</i>
				<i>atromatica</i>
Simaroubaceae				
<i>Picrasma</i>	<i>quassiodes</i>	<i>quassiodes</i>		

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>ailanthoides</i>			
Rutaceae				
<i>Dictamnus</i>	<i>albus</i>			
<i>Phellodendron</i>	<i>amurense</i>	<i>amurense</i>		
<i>Ptelea</i>				<i>trifoliata</i>
<i>Skimmia</i>		<i>japonica</i>		
<i>Zanthoxylum</i>	<i>piperitum</i> <i>schinifolium</i>	<i>piperitum</i>		<i>americana</i>
Oxaliaceae				
<i>Oxalis</i>	<i>acetosella</i> <i>stricta</i> <i>obtriangulata</i>	<i>acetosella</i> <i>stricta</i> <i>obtriangulata</i> <i>corniculata</i> <i>fontana</i>	<i>acetosella</i> <i>stricta</i> <i>montana</i> <i>dillenii</i> <i>oregana</i> <i>suckdorii</i> <i>trillifolia</i>	<i>acetosella</i> <i>stricta</i> <i>montana</i> <i>dillenii</i> <i>grandis</i> <i>violacea</i>
Geraniaceae				
<i>Erodium</i>	<i>stephanianum</i>			
<i>Geranium</i>	<i>sibiricum</i> <i>eriosomon</i> <i>wifordii</i> <i>krameri</i> <i>paishanense</i> <i>soboliferum</i> <i>wlassowianum</i> <i>maximowiczii</i> <i>soboliferum</i> <i>koreanum</i> <i>dahuricum</i> <i>japonicum</i>	<i>sibiricum</i> <i>eriosomon</i> <i>wifordii</i> <i>erianthum</i> <i>yezoense</i>	<i>bicknellii</i> <i>carolinaianum</i> <i>oreganum</i> <i>columbinum</i> <i>richardsonii</i> <i>sphaerospermum</i> <i>viscosissimum</i>	<i>bicknellii</i> <i>carolinaianum</i>
Limnanthaceae				
<i>Floerkea</i>			<i>roserpinacoides</i>	<i>roserpinacoides</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Limnanthes</i>			<i>douglasii</i> <i>macounii</i>	
Balsaminaceae				
<i>Impatiens</i>	<i>moli-tangere</i> <i>textori</i> <i>furcillata</i>	<i>moli-tangere</i> <i>textori</i>	<i>moli-tangere</i> <i>capensis</i> <i>ecalcarata</i> <i>aurella</i> <i>grandulifera</i>	<i>capensis</i> <i>biflora</i> <i>pallida</i>
Araliaceae				
<i>Acanthopanax</i>	<i>senticosus</i> <i>sessiliflorus</i>	<i>senticosus</i> <i>divaricatus</i> <i>sciadophylloides</i> <i>innovans</i>		
<i>Aralia</i>	<i>manshurica</i> <i>continentalis</i>	<i>manshurica</i>	<i>nudicaulis</i>	<i>nudicaulis</i> <i>hispida</i> <i>spinosa</i> <i>racemosa</i>
<i>Kalopanax</i>	<i>septemlobus</i>	<i>septemlobus</i>		
<i>Oplopanax</i>	<i>elatus</i>	<i>japonicus</i>	<i>horridus</i>	<i>horridus</i>
<i>Panax</i>	<i>ginseng</i>	<i>ginseng</i>		<i>quinquefolium</i> <i>trifolium</i>
Apiaceae (Umbelliferae)				
<i>Aegopodium</i>	<i>alpestre</i>	<i>alpestre</i>		
<i>Anethum</i>				<i>graveolens</i>
<i>Angelica</i>	<i>anomala</i> <i>lucida</i> <i>gigas</i> <i>dahurica</i> <i>polymorpha</i> <i>czernaevia</i> <i>amurensis</i> <i>cartilaginomarginata</i>	<i>anomala</i> <i>genuflexa</i> <i>edulis</i> <i>ginata</i> <i>acutiloba</i> <i>ursina</i>	<i>lucida</i> <i>genuflexa</i> <i>canbyi</i> <i>pinnata</i> <i>bendersonii</i> <i>roseana</i>	<i>atropurpurea</i> <i>venenosa</i>

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Anthriscus</i>	<i>sylvestris</i>	<i>sylvestris</i>		
<i>Bupleurum</i>	<i>longiradiatum</i> <i>marginatum</i> <i>chinense</i> <i>euphorbioides</i> <i>scorzonerifolium</i>	<i>longiradiatum</i> <i>triradiatum</i>	<i>americanum</i>	
<i>Carum</i>	<i>angustissimum</i>		<i>carvi</i> <i>gairdneri</i>	<i>carvi</i>
<i>Chaemele</i>		<i>decumbens</i>		
<i>Chaerophyllum</i>			<i>procumbens</i>	
<i>Cicuta</i>	<i>virosa</i>	<i>virosa</i>	<i>bulbifera</i> <i>douglasii</i>	<i>bulbifera</i> <i>maculata</i>
<i>Cnidium</i>	<i>japonicum</i> <i>dahuricum</i> <i>monnieri</i>	<i>japonicum</i>		
<i>Coelopleurum</i>	<i>saxatile</i> <i>nakaianum</i>			
<i>Conioselinum</i>	<i>chinense</i> <i>saxatile</i>	<i>filicinum</i> <i>kamtschaticum</i>	<i>chinense</i> <i>pacificum</i>	<i>chinense</i>
<i>Cryptotaenia</i>	<i>japonica</i>	<i>japonica</i>	<i>canadensis</i>	<i>canadensis</i>
<i>Cymopterus</i>			<i>acaulis</i> <i>glaucus</i> <i>bipinnatus</i> <i>hendersonii</i> <i>nivalis</i> <i>petraeus</i> <i>terebinthinus</i>	
<i>Czernaevia</i>	<i>laevigata</i>			
<i>Daucus</i>			<i>pusillus</i>	
<i>Erigenia</i>				<i>bulbosa</i>
<i>Eryngium</i>			<i>articulatum</i> <i>petiolatum</i>	<i>yuccifolium</i>
<i>Glenhia</i>	<i>littoralis</i>	<i>littoralis</i>	<i>leiocarpa</i>	
<i>Heracleum</i>	<i>dissectum</i> <i>lanatum</i>		<i>maximum</i> <i>lanatum</i>	<i>maximum</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>moellendorffii</i>			
<i>Hydrocotyle</i>	<i>ramiflora</i>	<i>ramiflora</i>	<i>ranunculoides</i>	<i>americana</i>
<i>Leibergia</i>			<i>orogenioides</i>	
<i>Libanotis</i>	<i>amurensis</i>			
	<i>seseloides</i>			
<i>Ligusticum</i>	<i>jeholense</i>	<i>hulternii</i>	<i>canbyi</i>	
	<i>tenuissimum</i>		<i>filicinum</i>	
			<i>grayi</i>	
			<i>alpinifolium</i>	
			<i>tenuifolium</i>	
			<i>verticillatum</i>	
			<i>caeruleimon</i>	
			<i>tanum</i>	
			<i>leibergi</i>	
<i>Lilaeopsis</i>			<i>occidentalis</i>	
<i>Lomatium</i>			<i>ambiguum</i>	
			<i>anomalum</i>	
			<i>bicolor</i>	
			<i>canyi</i>	
			<i>circundatum</i>	
			<i>columbianum</i>	
			<i>cocus</i>	
			<i>dissectum</i>	
			<i>donnellii</i>	
			<i>farinosum</i>	
			<i>geyeri</i>	
			<i>grayi</i>	
			<i>gormani</i>	
			<i>macrocarpum</i>	
			<i>orientale</i>	
			<i>rollinsii</i>	
			<i>salmoniflorum</i>	
			<i>serpentinum</i>	
			<i>triernatum</i>	
			<i>cuspidatum</i>	
			<i>tuberosum</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>minus</i>	
			<i>donnellii</i>	
			<i>hendersonii</i>	
			<i>macrocarpum</i>	
			<i>hallii</i>	
			<i>serpentinum</i>	
			<i>vaginaturn</i>	
			<i>foeniculaceum</i>	
			<i>nevadense</i>	
			<i>watsonii</i>	
			<i>greenmanii</i>	
			<i>oregonum</i>	
			<i>salmoniflorum</i>	
			<i>martindalei</i>	
			<i>nudicaule</i>	
			<i>brandegei</i>	
			<i>idahoense</i>	
			<i>orogenioides</i>	
			<i>leptocarpum</i>	
			<i>cusickii</i>	
			<i>farinosum</i>	
			<i>gormanii</i>	
			<i>geyeri</i>	
			<i>hambleniae</i>	
			<i>rollinsii</i>	
			<i>dissectum</i>	
			<i>columbianum</i>	
			<i>brandegei</i>	
			<i>laevigatum</i>	
			<i>suksdorfii</i>	
			<i>thompsonii</i>	
			<i>bradshani</i>	
			<i>utriculatum</i>	
<i>Musineon</i>			<i>divaricatum</i>	
			<i>vaginaturn</i>	
<i>Oenanthe</i>	<i>javanica</i>	<i>javanica</i>	<i>sarmentosa</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Orogenia</i>			<i>linearifolia</i> <i>fusiformis</i>	
<i>Osmorhiza</i>	<i>aristata</i>	<i>aristata</i>	<i>chilensis</i> <i>depauperata</i> <i>purpurea</i> <i>occidentalis</i>	<i>chilensis</i> <i>depauperata</i> <i>claytoni</i>
<i>Osterium</i>	<i>maximowiczii</i> <i>grosserratum</i> <i>viridiflorum</i> <i>sieboldi</i>			
<i>Oxypolis</i>				<i>rigidior</i>
<i>Peucedanum</i>	<i>terebinthaceum</i> <i>baicalense</i> <i>stepposum</i> <i>elegens</i>	<i>terebinthaceum</i> <i>multivittatum</i>		
<i>Pimpinella</i>	<i>thellungiana</i>			
<i>Pleurospermum</i>	<i>uralense</i>	<i>uralense</i>		
<i>Polytaenia</i>				<i>nuttallii</i>
<i>Porphyroscias</i>	<i>decursiva</i>			
<i>Perideridia</i>			<i>bolanderi</i> <i>gairdneri</i> <i>oregana</i>	
<i>Pteryxia</i>				<i>terebinthina</i>
<i>Rhysopterus</i>				<i>plurijugus</i>
<i>Sanicula</i>	<i>chinensis</i> <i>rubriflora</i>	<i>chinensis</i>	<i>marilandica</i> <i>nevadensis</i> <i>arctopoides</i> <i>graveblens</i> <i>bipinnatifida</i> <i>crassicaulis</i>	<i>marilandica</i> <i>gregaria</i> <i>canadensis</i> <i>trifoliata</i>
<i>Saposhnikovia</i>	<i>divaricata</i>			
<i>Sphenosciadium</i>			<i>capitellatum</i>	
<i>Sphallerocarpus</i>	<i>gracilis</i>			
<i>Sium</i>	<i>suave</i> <i>tennue</i>	<i>suave</i> <i>sisarum</i> <i>serra</i>	<i>suave</i>	<i>suave</i>

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Spuriopimpinella</i>	<i>brachycarpa</i>	<i>calyclina</i>		
<i>Taenidia</i>				<i>integerrima</i>
<i>Tanschia</i>				<i>hooveri</i>
				<i>stricklandii</i>
<i>Thaspium</i>				<i>barbinode</i>
				<i>trifoliatum</i>
<i>Tilingia</i>	<i>tachiroei</i>	<i>tachiroei</i>		
<i>Torilis</i>	<i>japonica</i>	<i>japonica</i>		
<i>Zizia</i>			<i>aptera</i>	<i>aptera</i>
				<i>aurea</i>
ASTERIDAE				
Gentianaceae				
<i>Bartonia</i>				<i>paniculata</i>
				<i>virginica</i>
<i>Fauria</i>		<i>crista-galli</i>		
<i>Frasera</i>				<i>caroliniensis</i>
<i>Gentiana</i>	<i>algida</i>	<i>algida</i>	<i>algida</i>	
	<i>jamesii</i>	<i>jamesii</i>		
	<i>thunbergii</i>	<i>thunbergii</i>		
	<i>scabra</i>	<i>scabra</i>		
	<i>triflora</i>	<i>triflora</i>		
	<i>zollingeri</i>	<i>zollingeri</i>		
		<i>glauca</i>	<i>glauca</i>	
	<i>contorta</i>	<i>nipponica</i>	<i>affinis</i>	<i>puberula</i>
	<i>dahurica</i>		<i>simplex</i>	<i>quiquefolia</i>
	<i>squarrosa</i>	<i>yuparensis</i>	<i>detonsa</i>	<i>rubricaulis</i>
	<i>uchiyamai</i>	<i>auriculata</i>	<i>douglaiana</i>	<i>linearis</i>
	<i>pseudoaquatica</i>		<i>tenella</i>	<i>procera</i>
	<i>macrophylla</i>		<i>amarella</i>	<i>amarella</i>
	<i>manshurica</i>		<i>oregana</i>	<i>andrewsii</i>
			<i>newberryi</i>	<i>clausa</i>
			<i>calycosa</i>	<i>flavida</i>
<i>Gentinella</i>	<i>acuta</i>		<i>acuta</i>	<i>quiquefolia</i>
<i>Gentianopsis</i>	<i>contorta</i>			<i>procera</i>
<i>Halenia</i>	<i>corniculata</i>	<i>corniculata</i>	<i>deflexa</i>	<i>deflexa</i>

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Lamotogonium</i>	<i>totatum</i>		<i>totatum</i>	
<i>Menyanthes</i>	<i>trifoliata</i>	<i>trifoliata</i>	<i>trifoliata</i>	<i>trifoliata</i>
<i>Microcala</i>			<i>quadrangularis</i>	
<i>Nephrophyllidium</i>			<i>crista-gali</i>	
<i>Nymphoides</i>	<i>peltatum</i> <i>indicum</i> <i>coreanum</i>		<i>cordata</i>	
<i>Pterygocalyx</i>	<i>volubilis</i>	<i>volubilis</i>		
<i>Sabatia</i>				<i>angularis</i> <i>camprestris</i> <i>carolinensis</i>
<i>Swertia</i>	<i>diluta</i> <i>manshurica</i> <i>tetrapetala</i> <i>wilfordi</i> <i>veratroides</i> <i>pseudochinensis</i>	<i>bimaculata</i> <i>japonica</i> <i>tetrapetala</i> <i>perennis</i>	<i>albicaulis</i> <i>fastigiata</i>	
<i>Tripterospermum</i>	<i>japonicum</i>	<i>japonicum</i>		
Apocynaceae				
<i>Amsonia</i>		<i>elliptica</i>		
<i>Apocynum</i>	<i>sibiricum</i>		<i>sibiricum</i> <i>androsaemifolium</i> <i>cannabinum</i> <i>medium</i> <i>pumilum</i> <i>suksdorfii</i>	<i>sibiricum</i> <i>androsaemifolium</i> <i>cannabinum</i>
Asclepidaceae				
<i>Asclepias</i>			<i>speciosa</i> <i>cryptoceras</i> <i>fascicularis</i>	<i>speciosa</i> <i>quadrifolia</i> <i>incarnata</i> <i>syriaca</i> <i>sullivantii</i>
<i>Cynanchum</i>	<i>atratum</i> <i>inamoenum</i> <i>paniculatum</i>	<i>atratum</i> <i>inamoenum</i> <i>paniculatum</i>		

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>amplexicaule</i>	<i>caudatum</i>		
	<i>ascyrifolium</i>			
	<i>chinense</i>			
	<i>bungei</i>			
	<i>purpureum</i>			
	<i>thesioides</i>			
	<i>volubile</i>			
	<i>wilfordii</i>			
<i>Metaplexis</i>	<i>japonica</i>	<i>japonica</i>		
<i>Periploca</i>	<i>sepium</i>			
<i>Pycnostelma</i>	<i>paniculatum</i>			
<i>Tylophora</i>		<i>aristolochioides</i>		
Solanaceae				
<i>Chamaesaracha</i>			<i>nana</i>	
<i>Leucophysalis</i>				<i>grandiflora</i>
<i>Lycium</i>	<i>chinense</i>			
<i>Nicotiana</i>			<i>attenuata</i>	
<i>Physalis</i>	<i>alkekengi</i>	<i>alkekengi</i>		<i>heterophylla</i>
				<i>grandiflora</i>
			<i>longifolia</i>	<i>longifolia</i>
				<i>pubescens</i>
			<i>rostratum</i>	<i>virginiana</i>
<i>Physaliastrum</i>	<i>japonicum</i>	<i>japonicum</i>	<i>dulcamara</i>	
<i>Solanum</i>	<i>japonense</i>	<i>japonense</i>	<i>dodiflorum</i>	
	<i>nigrum</i>	<i>nigrum</i>	<i>triflorum</i>	
		<i>lyratum</i>		
		<i>megacarpum</i>		
Convolvaceae				
<i>Calystegia</i>	<i>sepium</i>	<i>sepium</i>		<i>sepium</i>
	<i>japonica</i>	<i>japonica</i>		
	<i>soldanella</i>	<i>soldanella</i>		
	<i>dahurica</i>			<i>spithamea</i>

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Cuscuta</i>	<i>pellita</i>			
	<i>hederacea</i>			
	<i>japonica</i>	<i>japonica</i>	<i>pentagona</i>	<i>pentagona</i>
	<i>europaea</i>	<i>europaea</i>		
	<i>chinensis</i>		<i>cephalanthi</i>	<i>cephalanthi</i>
		<i>australis</i>	<i>indecora</i>	<i>coryli</i>
			<i>californica</i>	<i>compacta</i>
			<i>occidentalis</i>	
			<i>approximata</i>	<i>polygonorum</i>
			<i>suksdiorfii</i>	
<i>Convolvulus</i>			<i>salina</i>	
			<i>denticulata</i>	
			<i>umbrosa</i>	
			<i>subinclusa</i>	
	<i>chinensis</i>		<i>sepium</i>	<i>sepium</i>
	<i>amurensis</i>		<i>japonicus</i>	
			<i>arvensis</i>	
<i>Evolvulus</i>			<i>polymorphus</i>	
			<i>nyctagineus</i>	
<i>Ipomaea</i>	<i>sibirica</i>		<i>soldanella</i>	
				<i>pilosus</i>
				<i>pandurata</i>
Polemoniaceae				
<i>Collomia</i>			<i>linearis</i>	<i>linearis</i>
			<i>muscoides</i>	
			<i>hendersonii</i>	
			<i>hoodii</i>	
			<i>kelseyi</i>	
			<i>diffusa</i>	
			<i>multiflora</i>	
			<i>alyssifolia</i>	
			<i>caespitosa</i>	
			<i>pulvinata</i>	
			<i>albomarginata</i>	
			<i>tinctoria</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>macrocalyx</i>	
			<i>tenella</i>	
			<i>debilis</i>	
			<i>heterophylla</i>	
			<i>grandiflora</i>	
<i>Eriastrum</i>			<i>sparsiflorum</i>	
<i>Gilia</i>			<i>capillaris</i>	
			<i>tenerrima</i>	
			<i>minutiflora</i>	
			<i>squarrosa</i>	
			<i>spicata</i>	
			<i>sinuata</i>	
			<i>ceptomera</i>	
			<i>septentrionalis</i>	
			<i>nuttallii</i>	
			<i>pharnaceoides</i>	
			<i>propinqua</i>	
			<i>pungens</i>	
			<i>aggregata</i>	
			<i>capitata</i>	
			<i>congesta</i>	
			<i>gracilis</i>	
			<i>inconspicua</i>	
<i>Gymnosteris</i>			<i>nudicaulis</i>	
			<i>parvule</i>	
<i>Langloisia</i>			<i>setosissima</i>	
<i>Leptodactylon</i>			<i>pungens</i>	
<i>Linanthastrum</i>			<i>nuttallii</i>	
<i>Linanthus</i>			<i>bicolor</i>	
			<i>harknessii</i>	
			<i>barkeri</i>	
			<i>septentrionalis</i>	
			<i>pharnaceoides</i>	
<i>Microstris</i>			<i>gracilis</i>	
<i>Navarretia</i>			<i>breweri</i>	
			<i>squarrosa</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>divaricata</i>	
			<i>tagetina</i>	
			<i>intertexta</i>	
			<i>minima</i>	
<i>Phlox</i>			<i>aculeata</i>	<i>divaricata</i>
			<i>idahonis</i>	<i>maculata</i>
			<i>adsurgens</i>	<i>bifida</i>
			<i>austromontana</i>	<i>sublata</i>
			<i>culubrina</i>	
			<i>douglasii</i>	
			<i>longifolia</i>	
			<i>mollis</i>	
			<i>speciosa</i>	
			<i>viscida</i>	
<i>Polemoniella</i>			<i>micrantha</i>	
<i>Polemonium</i>	<i>acutiflorum</i>	<i>acutiflorum</i>	<i>elegans</i>	<i>reptans</i>
	<i>liniflorum</i>	<i>yezoense</i>	<i>californicum</i>	<i>van-bruntiae</i>
			<i>delicatum</i>	
			<i>pectinatum</i>	
			<i>occidentalis</i>	
			<i>micranthum</i>	
			<i>cerneum</i>	
Hydrophyllaceae				
<i>Ellisia</i>			<i>hyctelea</i>	<i>hyctelea</i>
<i>Hesperochiron</i>			<i>californicus</i>	
			<i>pumilus</i>	
<i>Hydrophyllum</i>			<i>capitatum</i>	<i>appendiculatum</i>
			<i>fendleri</i>	<i>virgianum</i>
			<i>occidentale</i>	
			<i>tenuipes</i>	
<i>Nama</i>			<i>aretioides</i>	
			<i>densum</i>	
<i>Nemophila</i>			<i>breviflora</i>	
			<i>kirtleyi</i>	
			<i>parviflora</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Phalelia</i>			<i>pedunculata</i>	
			<i>bicolor</i>	<i>dubia</i>
			<i>glandulosa</i>	
			<i>heterophylla</i>	
			<i>idahoensis</i>	
			<i>leucophylla</i>	
			<i>linearis</i>	
			<i>ramosissima</i>	
			<i>tetramera</i>	
			<i>lutea</i>	
			<i>nemoralis</i>	
			<i>hastata</i>	
			<i>humilis</i>	
			<i>minutissima</i>	
			<i>sericea</i>	<i>incana</i>
			<i>franklinii</i>	
			<i>grandulifera</i>	
			<i>rattanii</i>	
			<i>lyallii</i>	
			<i>thermalis</i>	
			<i>procera</i>	
<i>Romanzoffia</i>			<i>bolanderi</i>	
			<i>californica</i>	
			<i>sitchensis</i>	
Boraginaceae				
<i>Amsinckia</i>			<i>lycopsoides</i>	
			<i>tessellata</i>	
			<i>spectabilis</i>	
			<i>retrorsa</i>	
			<i>intermedia</i>	
			<i>menziesii</i>	
			<i>californica</i>	
			<i>cusickii</i>	
			<i>densirugosa</i>	
			<i>hendersonii</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>diffusa</i>	
			<i>lycopsoides</i>	
			<i>micrantha</i>	
			<i>davisi</i>	
			<i>retrorsa</i>	
			<i>washingtoniensis</i>	
			<i>patens</i>	
<i>Anchusa</i>			<i>officinalis</i>	
			<i>azurea</i>	
<i>Bothriospermum</i>	<i>tenellum</i>	<i>tenellum</i>		
	<i>chinense</i>			
	<i>kusnezowii</i>			
	<i>secundum</i>			
<i>Brachybotrys</i>	<i>paridiormis</i>			
<i>Buglossoides</i>	<i>zollingeri</i>	<i>zollingeri</i>		
	<i>arvensis</i>			
<i>Coldenia</i>			<i>nuttallii</i>	
<i>Cryptantha</i>			<i>leucophaea</i>	
			<i>watsonii</i>	
			<i>fendleri</i>	
			<i>torreyana</i>	
			<i>affinis</i>	
			<i>pterocarya</i>	
			<i>kelseyana</i>	
			<i>scoparia</i>	
			<i>simulans</i>	
			<i>ambigua</i>	
			<i>echinella</i>	
			<i>salmonensis</i>	
			<i>propria</i>	
			<i>celosioides</i>	
			<i>interrupta</i>	
			<i>nubigena</i>	
			<i>thompsonii</i>	
			<i>circumscissa</i>	
			<i>rostellata</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Cynoglossum</i>	<i>divaricatum</i>	<i>asperrimum</i>	<i>flaccida</i> <i>boreale</i> <i>offinale</i> <i>grande</i> <i>occidentale</i>	<i>boreale</i> <i>offinale</i>
<i>Dasynotus</i>			<i>daubenmirei</i>	
<i>Erithichium</i>	<i>mandshuricum</i>	<i>nipponicum</i>	<i>nanum</i> <i>howardii</i>	
<i>Hackelia</i>	<i>deflexa</i>	<i>deflexa</i>	<i>deflexa</i> <i>floribunda</i> <i>arida</i> <i>venusta</i> <i>ciliata</i> <i>cinerea</i> <i>jessicae</i> <i>redowskii</i>	<i>deflexa</i> <i>floribunda</i> <i>virginiana</i>
<i>Lappula</i>	<i>redowskii</i> <i>echinata</i>			
<i>Lithospermum</i>	<i>erythrorhizon</i>	<i>erythrorhizon</i>	<i>incisium</i> <i>arvense</i> <i>ruderae</i>	<i>incisium</i> <i>caroliniense</i> <i>canescens</i> <i>latifolium</i>
<i>Mertensia</i>	<i>asiatica</i>	<i>asiatica</i> <i>pierocarpa</i>	<i>paniculata</i> <i>longiflora</i> <i>oblongifolia</i> <i>umbratilis</i> <i>bulbosa</i> <i>campanulata</i> <i>ciliata</i> <i>platyphylla</i> <i>alpina</i> <i>perplexa</i> <i>viridis</i>	<i>paniculata</i> <i>maritima</i> <i>virginica</i>
<i>Messerschmidia</i>	<i>sibirica</i>	<i>sibirica</i>		
<i>Myosotis</i>	<i>sylvatica</i> <i>suaveolens</i> <i>caespitosa</i>	<i>sylvatica</i> <i>scorpioides</i>	<i>sylvatica</i> <i>laxa</i> <i>verna</i>	<i>laxa</i> <i>verna</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>macrosperma</i>	
			<i>micrantha</i>	
			<i>discolor</i>	
<i>Omphalodes</i>		<i>krameri</i>		
<i>Onosmodium</i>			<i>molle</i>	<i>molle</i>
				<i>virginianum</i>
<i>Playiobothrys</i>			<i>tenellus</i>	
			<i>cognatus</i>	
			<i>hispidulus</i>	
			<i>leptocaladus</i>	
			<i>scouleri</i>	
			<i>nothofulvus</i>	
			<i>harknessii</i>	
			<i>mollis</i>	
			<i>flaguratus</i>	
<i>Stenosolenium</i>	<i>saxatile</i>			
<i>Trigonotis</i>	<i>peduncularis</i>	<i>peduncularis</i>		
	<i>nakaii</i>	<i>guilielmii</i>		
	<i>radicans</i>			
	<i>amblyosepala</i>			
	<i>myosotideia</i>			
Verbenaceae				
<i>Caryopteris</i>	<i>divaricata</i>	<i>divaricata</i>		
	<i>incana</i>			
<i>Clerodendron</i>	<i>trichotomum</i>	<i>trichotomum</i>		
(<i>Siphonanthus</i>)				
<i>Phyla</i>				<i>lanceolata</i>
<i>Verbena</i>			<i>bracteata</i>	<i>bracteata</i>
			<i>hastata</i>	<i>hastata</i>
			<i>stricta</i>	<i>stricta</i>
				<i>simplex</i>
<i>Vitex</i>	<i>incisa</i>			
Phrymaceae				
<i>Phryma</i>	<i>leptostachya</i>	<i>leptostachya</i>		<i>leptostachya</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
Lamiaceae (Labiatae)				
<i>Agastache</i>	<i>rugosa</i>	<i>rugosa</i>	<i>cusickii</i> <i>occidentalis</i> <i>uticifolia</i>	<i>foeniculum</i> <i>nepetoides</i> <i>scrophula</i>
<i>Ajuga</i>	<i>multiflora</i>	<i>ciliata</i> <i>yesoensis</i>		
<i>Amethystea</i>	<i>caerulea</i>			
<i>Blephilia</i>				<i>ciliata</i> <i>hirsuta</i>
<i>Chelonopsis</i>		<i>moschata</i>		
<i>Clinopodium</i>	<i>chinense</i>	<i>chinense</i> <i>gracile</i> <i>micranthum</i>		
<i>Collinsonia</i>				<i>canadensis</i>
<i>Cunila</i>				<i>origonoides</i>
<i>Datura</i>			<i>stramonium</i>	<i>stramonium</i>
<i>Dracocephalum</i>	<i>argunense</i> <i>moldavica</i> <i>rupestre</i>	<i>argunense</i>	<i>parviflorum</i> <i>thymiflorum</i>	<i>parviflorum</i>
<i>Dysophylla</i>	<i>fauriei</i>			
<i>Elsholtzia</i>	<i>ciliata</i> <i>pseudocristata</i>	<i>patrinia</i>		
<i>Galeopsis</i>	<i>bifida</i>	<i>bifida</i>		
<i>Glechoma</i>	<i>hederacea</i>	<i>hederacea</i>		<i>parviflorum</i>
<i>Hedeoma</i>			<i>hispidu</i> <i>drummondii</i>	<i>hispida</i> <i>pulegioides</i> <i>branchiatus</i>
<i>Isanthus</i>				
<i>Lagopsis</i>	<i>supina</i>			
<i>Lamium</i>	<i>album</i>	<i>album</i>	<i>amplexicaule</i> <i>maculatum</i> <i>purpureum</i>	
<i>Leonurus</i>	<i>macranthus</i> <i>japonicus</i> <i>sibiricus</i>	<i>macranthus</i>		
<i>Leucosceptrum</i>		<i>japonicum</i>		

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Lycopus</i>	<i>lucidus</i> <i>ramosissimus</i> <i>coreanus</i> <i>parviflorus</i>	<i>uniflorus</i> <i>lucidus</i> <i>ramosissimus</i> <i>maackianus</i>	<i>uniflorus</i> <i>americanus</i> <i>asper</i>	<i>uniflorus</i> <i>americanus</i> <i>virginicus</i>
<i>Meehania</i>	<i>urticifolia</i>			
<i>Mentha</i>	<i>arvensis</i> <i>dahurica</i>	<i>arvensis</i> <i>japonica</i>	<i>arvensis</i> <i>citrata</i> <i>rotundifolia</i> <i>alopecuroides</i> <i>spicata</i> <i>piperita</i> <i>odoratissima</i>	<i>arvensis</i>
<i>Monardella</i>				
<i>Monarda</i>			<i>fistulosa</i> <i>didyma</i>	<i>fistulosa</i> <i>didyma</i> <i>media</i>
<i>Mosla</i>	<i>scabra</i> <i>grosseserrata</i>	<i>scabra</i> <i>dianthera</i> <i>japonica</i>		
<i>Nepeta</i>	<i>manchuriensis</i>	<i>subsessilis</i>		
<i>Phlomis</i>	<i>koraiensis</i> <i>umbrosa</i> <i>tuberosa</i> <i>maximowiczii</i>			
<i>Phyostegia</i>			<i>parviflora</i>	<i>virginiana</i>
<i>Plectranthus</i>	<i>inflexus</i> <i>excisus</i> <i>glaucoalyx</i> <i>serra</i> <i>websteri</i>	<i>inflexus</i> <i>trichocarpus</i>		
<i>Prunella</i>	<i>vulgaris</i>	<i>vulgaris</i>	<i>vulgaris</i>	<i>vulgaris</i>
<i>Pycnanthemum</i>			<i>pratensis</i>	<i>flexosum</i> <i>muticum</i> <i>pilosum</i> <i>incanum</i>
<i>Salvia</i>	<i>multiorrhiza</i>		<i>dorrii</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Satureja</i>			<i>sclarea</i> <i>acinos</i> <i>douglassii</i>	<i>glabella</i>
<i>Schizonejeta</i>	<i>tenuifolia</i> <i>multifida</i>			
<i>Scutellaria</i>	<i>dependens</i> <i>pekinensis</i> <i>strigillosa</i> <i>baicalensis</i> <i>scordifolia</i> <i>ussuriensis</i> <i>regeliana</i> <i>planipes</i> <i>moniliorrhiza</i> <i>ikonnikovii</i>	<i>dependens</i> <i>pekinensis</i> <i>strigillosa</i>	<i>lateriflora</i> <i>galericulata</i> <i>angustifolia</i> <i>nana</i>	<i>lateriflora</i> <i>galericulata</i> <i>churchilliana</i> <i>hervosa</i> <i>integrifolia</i> <i>leonardi</i> <i>ovata</i> <i>parvula</i>
<i>Stachys</i>	<i>japonica</i> <i>baicalensis</i> <i>chinensis</i> <i>sylvaticas</i>	<i>japonica</i>	<i>palustris</i> <i>cooleyae</i> <i>mexicana</i> <i>rigida</i>	<i>palustris</i> <i>hyssopifolia</i> <i>tenuifolia</i> <i>hispida</i>
<i>Teucrium</i>	<i>ussuriense</i>	<i>japonicum</i> <i>teinense</i> <i>veronicoides</i>	<i>canadense</i>	
<i>Thymus</i>	<i>dahurica</i> <i>mongolicus</i> <i>nervulosus</i> <i>przewalskii</i>	<i>quinquecostatus</i>		
<i>Trichostema</i>			<i>lanceolatum</i> <i>oblongum</i>	<i>dichotomum</i>
<i>Trisostegia</i>				<i>virginiana</i>
Hippuridaceae				
<i>Hippuris</i>	<i>vulgaris</i>	<i>vulgaris</i>	<i>vulgaris</i> <i>montana</i>	<i>vulgaris</i>
Callitrichaceae				
<i>Callitriche</i>	<i>hermaphoditica</i>		<i>hermaphoditica</i>	<i>hermaphoditica</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>palustris</i>		<i>palustris</i>	
			<i>heterophylla</i>	<i>heterophylla</i>
		<i>japonica</i>	<i>anceps</i>	<i>deflexa</i>
		<i>verna</i>	<i>fassettii</i>	
			<i>marginata</i>	
			<i>trochlearis</i>	
Plantaginaceae				
<i>Littorella</i>				<i>uniflora</i>
<i>Plantago</i>	<i>asiatica</i>	<i>asiatica</i>	<i>major</i>	<i>major</i>
	<i>camtschatica</i>	<i>camtschatica</i>	<i>maritima</i>	<i>maritima</i>
	<i>depressa</i>		<i>eriopoda</i>	<i>eriopoda</i>
	<i>media</i>		<i>elongata</i>	<i>cordata</i>
	<i>hostifolia</i>		<i>macrocarpa</i>	
			<i>purshii</i>	<i>rugelii</i>
			<i>tweedyi</i>	<i>virginica</i>
			<i>patagonica</i>	
Buddlejaceae				
<i>Buddleja</i>	<i>japonica</i>	<i>japonica</i>	<i>davidii</i>	
Oleaceae				
<i>Forsythia</i>	<i>mandshurica</i>			
<i>Fraxinus</i>	<i>manshurica</i>	<i>manshurica</i>	<i>latifolia</i>	<i>nigra</i>
	<i>rhynchophylla</i>	<i>lanuginosa</i>		<i>americana</i>
	<i>chinensis</i>			<i>pensylvanica</i>
	<i>bungeana</i>			<i>lanceolata</i>
<i>Ligustrum</i>		<i>obtusifolium</i>		
		<i>tschonoskii</i>		
<i>Syringa</i>	<i>amurensis</i>			
	<i>reticulata</i>	<i>reticulata</i>		
Scrophulariaceae				
<i>Agalinis</i>				<i>skinneriana</i>
				<i>tenuifolia</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Antirrhinum</i>			<i>majus</i> <i>orontium</i>	
<i>Aureolaria</i>				<i>flava</i> <i>pedicularia</i> <i>virginica</i>
<i>Bacopa</i>			<i>rotundifolia</i>	
<i>Besseyia</i>			<i>pilosa</i> <i>wyomingensis</i>	<i>bullii</i>
<i>Buchnera</i>				<i>americana</i>
<i>Castilleja</i>			<i>exilis</i> <i>sessiliflora</i> <i>pilosa</i> <i>longispica</i> <i>nubra</i> <i>arachnoidea</i> <i>nivea</i> <i>inverta</i> <i>oresbia</i> <i>pallescens</i> <i>thompsonii</i> <i>cervina</i> <i>occidentalis</i> <i>aplegatei</i> <i>pruinosa</i> <i>lineariaefolia</i> <i>fraterna</i> <i>rexifolia</i> <i>hispida</i> <i>angustifolia</i> <i>chromosa</i> <i>christa-galli</i> <i>rupicola</i> <i>cusickii</i> <i>chrysantha</i> <i>pulchella</i> <i>cryptantha</i>	<i>coccinea</i> <i>septentrionalis</i>

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>xanthotricha</i>	
			<i>levisecta</i>	
			<i>chlorotica</i>	
			<i>viscidula</i>	
			<i>glandulifera</i>	
			<i>rustica</i>	
			<i>flava</i>	
			<i>lutescens</i>	
			<i>sulphurea</i>	
			<i>gracillima</i>	
			<i>parviflora</i>	
			<i>elmeri</i>	
			<i>miniata</i>	
			<i>littoralis</i>	
			<i>suksdorfii</i>	
			<i>convilleana</i>	
<i>Chelone</i>				<i>glabra</i>
<i>Chionophila</i>			<i>tweedyi</i>	
<i>Collinsia</i>			<i>parviflora</i>	<i>parviflora</i>
			<i>rattanii</i>	<i>verna</i>
			<i>sparsiflora</i>	
			<i>grandiflora</i>	
<i>Cordylanthus</i>			<i>ramosus</i>	
			<i>capitatus</i>	
<i>Dasistoma</i>			<i>cassioides</i>	
<i>Deinostema</i>	<i>violaceum</i>			
<i>Euphrasia</i>	<i>maximowiczii</i>	<i>maximowiczii</i>	<i>arctica</i>	<i>arctica</i>
	<i>amurensis</i>			<i>bottnica</i>
				<i>oakesii</i>
<i>Gerardia</i>				<i>acuta</i>
				<i>gattingeri</i>
				<i>skinneriana</i>
				<i>tenuifolia</i>
<i>Gratiola</i>	<i>japonica</i>		<i>neglecta</i>	<i>neglecta</i>
			<i>ebracteata</i>	<i>aurea</i>
<i>Lotis</i>		<i>glauca</i>		

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
		<i>stelleri</i>		
<i>Leucospora</i>				<i>multifida</i>
<i>Limnophila</i>	<i>indica</i>			
<i>Limosella</i>	<i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>	<i>aquatica</i>
<i>Linaria</i>	<i>japonica</i>	<i>japonica</i>	<i>canadensis</i> <i>genistifolia</i>	<i>canadensis</i>
<i>Lindernia</i>	<i>pyxidaria</i>	<i>pyxidaria</i>	<i>anagallida</i> <i>dubia</i>	<i>anagallida</i> <i>dubia</i>
<i>Mazus</i>	<i>japonica</i>	<i>japonica</i>		
<i>Melampyrum</i>	<i>roseum</i> <i>setaceum</i>	<i>roseum</i> <i>laxum</i>	<i>lineare</i>	<i>lineare</i>
<i>Mimulus</i>	<i>tenellus</i>	<i>nepalensis</i> <i>sessilifolius</i>	<i>moschatus</i> <i>glabratus</i> <i>alsinoides</i> <i>ringens</i> <i>lewisii</i> <i>tilingii</i> <i>guttatus</i> <i>dentatus</i> <i>jungermannioides</i> <i>primuloides</i> <i>washingtonensis</i> <i>floribundus</i> <i>pulsiferae</i> <i>brewiflorus</i> <i>suksdorfii</i> <i>breweri</i> <i>cusickii</i> <i>nanus</i> <i>clivicola</i> <i>tricolor</i> <i>nemorosa</i>	<i>moschatus</i> <i>glabratus</i> <i>alatus</i> <i>ringens</i>
<i>Nothochelone</i>				
<i>Omphalothrix</i>	<i>longipes</i>			
<i>Orthocarpus</i>			<i>luteus</i> <i>bracteosus</i> <i>imbricatus</i>	<i>luteus</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>tenuifolius</i>	
			<i>barbatus</i>	
			<i>hispidus</i>	
			<i>attenuatus</i>	
			<i>purpurascens</i>	
			<i>castillejoides</i>	
			<i>pusillus</i>	
			<i>erianthus</i>	
<i>Pedicularis</i>	<i>chamissionis</i>	<i>chamissionis</i>		
	<i>oederi</i>	<i>oederi</i>		
	<i>resupinata</i>	<i>resupinata</i>		
	<i>spicata</i>	<i>spicata</i>		
	<i>verticillata</i>	<i>verticillata</i>		
	<i>floribunda</i>	<i>apodochila</i>	<i>attollens</i>	<i>canadensis</i>
	<i>lineata</i>	<i>koidzumiana</i>	<i>groenlandica</i>	<i>furbishiae</i>
	<i>rubens</i>	<i>venusta</i>	<i>racemosa</i>	<i>lanceolata</i>
	<i>striata</i>	<i>yezoensis</i>	<i>parviflora</i>	<i>palustris</i>
	<i>euphrasioides</i>		<i>bracteosa</i>	
	<i>mandshurica</i>		<i>capitata</i>	
			<i>rainierensis</i>	
	<i>ssp (9)</i>		<i>oederi</i>	
			<i>pulchella</i>	
			<i>cystopteridifolia</i>	
			<i>langsдорffii</i>	
			<i>ornithorhyncha</i>	
			<i>parryi</i>	
			<i>contorta</i>	
<i>Pentstemon</i>	<i>frutescens</i>	<i>frutescens</i>	<i>attenatus</i>	<i>calycosus</i>
			<i>gairdneri</i>	<i>hirsurus</i>
			<i>pumilus</i>	<i>pallidus</i>
			<i>radicosus</i>	<i>digitalis</i>
			<i>humilis</i>	
			<i>miser</i>	
			<i>subserratus</i>	
			<i>pruinosis</i>	
			<i>ovatus</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>wilcoxii</i>	
			<i>elegantulus</i>	
			<i>albertinus</i>	
			<i>laxus</i>	
			<i>rydbergii</i>	
			<i>globosus</i>	
			<i>confertus</i>	
			<i>flavescens</i>	
			<i>albidus</i>	
			<i>whippleanus</i>	
			<i>eriantherus</i>	
			<i>gracilis</i>	
			<i>peckii</i>	
			<i>washingtonensis</i>	
			<i>aridus</i>	
			<i>spatulatus</i>	
			<i>cusickii</i>	
			<i>serrulatus</i>	
			<i>venustus</i>	
			<i>glandulosus</i>	
			<i>laetus</i>	
			<i>triphyllus</i>	
			<i>diphyllus</i>	
			<i>richardsonii</i>	
			<i>lemhiensis</i>	
			<i>speciosus</i>	
			<i>cinicola</i>	
			<i>procerus</i>	
			<i>euglaucus</i>	
			<i>lyallii</i>	
			<i>montanus</i>	
			<i>barrettiae</i>	
			<i>ellipticus</i>	
			<i>rupicola</i>	
			<i>davidsonii</i>	
			<i>cardwellii</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>fruticosus</i>	
			<i>deustus</i>	
			<i>acuminatus</i>	
			<i>nitidus</i>	
			<i>payettensis</i>	
			<i>perpulcher</i>	
			<i>pennellianus</i>	
			<i>cyaneus</i>	
<i>Phtheirospermum</i>	<i>japonicum</i>	<i>japonicum</i>		
<i>Rhinanthus</i>	<i>crista-galli</i>	<i>crista-galli</i>	<i>crista-galli</i>	
<i>Scrophularia</i>	<i>buergeriana</i>	<i>grayana</i>	<i>lanceolata</i>	<i>lanceolata</i>
	<i>amunensis</i>	<i>kakudensis</i>	<i>californica</i>	<i>marilandica</i>
<i>Schwalbea</i>				<i>americana</i>
<i>Siphonostega</i>	<i>chinensis</i>	<i>chinensis</i>		
<i>Synthyris</i>			<i>reniformis</i>	
			<i>missurica</i>	
			<i>schizantha</i>	
			<i>platycarpa</i>	
			<i>canbyi</i>	
			<i>pinnatifida</i>	
<i>Tonella</i>			<i>floribunda</i>	
			<i>tenella</i>	
<i>Vandellia</i>		<i>crustacea</i>		
<i>Veronica</i>	<i>didyma</i>	<i>didyma</i>	<i>scutellata</i>	<i>scutellata</i>
	<i>laxa</i>	<i>laxa</i>	<i>serpyllifolia</i>	<i>serpyllifolia</i>
	<i>stelleri</i>	<i>stelleri</i>	<i>wormskjoldii</i>	<i>wormskjoldii</i>
	<i>tenella</i>	<i>tenella</i>	<i>peregrina</i>	<i>peregrina</i>
		<i>americana</i>	<i>americana</i>	<i>americana</i>
	<i>incana</i>	<i>schmidtiana</i>	<i>anagallisaquatica</i>	<i>anagallisaquatica</i>
	<i>spuria</i>	<i>subincanovelutina</i>	<i>cusickii</i>	
	<i>rotunda</i>		<i>filiformis</i>	
	<i>teucrium</i>		<i>hederaefolia</i>	
	<i>grandis</i>		<i>persica</i>	
	<i>dahurica</i>		<i>officinalis</i>	
	<i>komarovii</i>		<i>chamaedrys</i>	
			<i>biloba</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>catenata</i>	
<i>Veronicastrum</i>	<i>sibiricum</i>	<i>sibiricum</i>		<i>virginicum</i>
Acanthaceae				
<i>Justicia</i>	<i>procumbens</i>			<i>americana</i>
Lentibulariaceae				
<i>Pinguicula</i>	<i>vulgaris</i>	<i>vulgaris</i>	<i>vulgaris</i>	<i>vulgaris</i>
<i>Utricularia</i>	<i>intermedia</i>	<i>intermedia</i>	<i>intermedia</i>	<i>intermedia</i>
	<i>minor</i>	<i>minor</i>	<i>minor</i>	<i>minor</i>
	<i>vulgaris</i>		<i>vulgaris</i>	<i>vulgaris</i>
	<i>japonica</i>	<i>japonica</i>	<i>gibba</i>	<i>gibba</i>
	<i>bifida</i>	<i>multispinosa</i>		<i>cornuta</i>
		<i>racemosa</i>		<i>geminiscapa</i>
		<i>yakusimensis</i>		<i>purpurea</i>
				<i>radiata</i>
				<i>resupinata</i>
Orobanchaceae				
<i>Aeginetia</i>	<i>indica</i>	<i>indica</i>		
<i>Boschniakia</i>	<i>rossica</i>	<i>rossica</i>	<i>hookeri</i>	
<i>Conopholis</i>				<i>americana</i>
<i>Epifagus</i>				<i>virginiana</i>
<i>Orobanche</i>	<i>coerulescens</i>	<i>coerulescens</i>	<i>fasciculata</i>	<i>fasciculata</i>
	<i>amurensis</i>		<i>uniflora</i>	<i>uniflora</i>
			<i>corymbosa</i>	
			<i>ludoviciana</i>	
<i>Phacellanthus</i>	<i>tubiflorus</i>	<i>tubiflorus</i>		
Campanulaceae				
<i>Adenophora</i>	<i>borealis</i>	<i>triphylla</i>		
	<i>pereskiaefolia</i>	<i>pereskiaefolia</i>		
	<i>divaricata</i>			
	<i>gmelini</i>			
	<i>grundiflora</i>			
	<i>polyantha</i>			

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>palustris</i>			
	<i>paniculata</i>			
	<i>remotiflora</i>			
	<i>trachelioides</i>			
	<i>tetraphylla</i>			
<i>Campanula</i>	<i>punctata</i>	<i>punctata</i>	<i>americana</i>	<i>americana</i>
		<i>lasiocarpa</i>	<i>lasiocarpa</i>	
			<i>rotundifolia</i>	<i>rotundifolia</i>
	<i>glomerata</i>	<i>chamissonis</i>	<i>piperi</i>	
			<i>parryi</i>	<i>aparinoides</i>
			<i>uniflora</i>	
			<i>scouleri</i>	
			<i>rapunculoides</i>	
			<i>medium</i>	
			<i>persicifolia</i>	
			<i>prenanthoides</i>	
			<i>scabrella</i>	
<i>Codonopsis</i>	<i>lanceolata</i>	<i>lanceolata</i>		
	<i>ussuriensis</i>	<i>ussuriensis</i>		
	<i>pilosula</i>			
<i>Downingia</i>			<i>elegans</i>	
			<i>laeta</i>	
			<i>yina</i>	
<i>Githopsis</i>			<i>specularioides</i>	
<i>Heterocodon</i>			<i>rariflorum</i>	
<i>Howellia</i>			<i>aquatilis</i>	
<i>Lobelia</i>	<i>chinensis</i>	<i>chinensis</i>	<i>dortamanna</i>	<i>dortamanna</i>
	<i>sessilifolia</i>	<i>sessilifolia</i>	<i>kalmii</i>	<i>kalmii</i>
				<i>siphilitica</i>
				<i>spicata</i>
<i>Peracarpa</i>	<i>carnosa</i>	<i>carnosa</i>		
<i>Phyteuma</i>	<i>japonicum</i>			
<i>Platycodon</i>	<i>grandiflorum</i>	<i>grandiflorum</i>		
<i>Porterella</i>			<i>carnulosa</i>	
<i>Triodanis</i>			<i>leptocarpa</i>	<i>leptocarpa</i>
			<i>perfoliata</i>	<i>perfoliata</i>

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Genus	E-Asia	Japan	WN-America	EN-America
Rubiaceae				
<i>Asperula</i>	<i>odorata</i>	<i>odorata</i>		
<i>Cephalanthus</i>				<i>occidentalis</i>
<i>Galium</i>	<i>boreale</i>	<i>boreale</i>	<i>boreale</i>	<i>boreale</i>
	<i>kamtschaticum</i>	<i>kamtschaticum</i>	<i>kamtschaticum</i>	<i>kamtschaticum</i>
	<i>aparine</i>		<i>aparine</i>	<i>aparine</i>
	<i>dahuricum</i>	<i>dahuricum</i>	<i>trifidum</i>	<i>trifidum</i>
	<i>paradoxum</i>	<i>paradoxum</i>	<i>triflorum</i>	<i>triflorum</i>
	<i>pseudoaspidium</i>	<i>pseudoaspidium</i>		
	<i>spurium</i>	<i>spurium</i>		
	<i>trifidum</i>	<i>trifidum</i>		
	<i>trifloriforme</i>	<i>trifloriforme</i>		
	<i>verum</i>	<i>verum</i>		
	<i>mandshuricum</i>	<i>japonicum</i>	<i>oregnum</i>	<i>asprellum</i>
	<i>oliganthum</i>	<i>kikumugura</i>	<i>bifolium</i>	<i>circaezans</i>
	<i>uliginosum</i>	<i>nakaii</i>	<i>multiflorum</i>	<i>labradoricum</i>
		<i>trachyspermum</i>	<i>cymosum</i>	<i>obtusum</i>
				<i>palustre</i>
				<i>tinctarium</i>
				<i>lanceolatum</i>
				<i>brevipes</i>
				<i>mollugo</i>
<i>Houstonia</i>				<i>caerulea</i>
				<i>canadensis</i>
				<i>longifolia</i>
<i>Kelloggia</i>			<i>galioides</i>	
<i>Mitchella</i>		<i>undulata</i>		<i>repens</i>
<i>Paederia</i>	<i>scandens</i>	<i>scandens</i>		
<i>Rubia</i>	<i>chinensis</i>	<i>chinensis</i>		
	<i>jesoensis</i>	<i>jesoensis</i>		
	<i>cordifolia</i>			
	<i>sylvatica</i>			
Caprifoliaceae				
<i>Abelia</i>	<i>coreana</i>			

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Diervilla</i>				<i>lonicera</i>
<i>Linnaea</i>	<i>boreale</i>	<i>boreale</i>	<i>boreale</i>	<i>boreale</i>
<i>Lonicera</i>	<i>caerulea</i>	<i>caerulea</i>	<i>caerulea</i>	
	<i>chrysantha</i>	<i>chrysantha</i>	<i>dioica</i>	<i>dioica</i>
	<i>chamissoi</i>	<i>chamissoi</i>	<i>involucara</i>	<i>involucara</i>
	<i>maximowiczii</i>	<i>maximowiczii</i>		
	<i>japonica</i>	<i>japonica</i>		
	<i>harae</i>	<i>alpigena</i>	<i>utahensis</i>	<i>villosa</i>
	<i>praeiflorens</i>	<i>strophophora</i>	<i>eratulata</i>	<i>canadensis</i>
	<i>maackii</i>	<i>morrowii</i>	<i>conjugialis</i>	<i>hirsuta</i>
	<i>ruprechtiana</i>		<i>ciliosa</i>	<i>oblongifolia</i>
	<i>praeiflorense</i>		<i>etrusca</i>	
<i>Symphoricarpos</i>			<i>albus</i>	<i>albus</i>
			<i>occidentalis</i>	<i>occidentalis</i>
			<i>mollis</i>	
			<i>oreophilus</i>	
<i>Triosteum</i>	<i>pinnatifidum</i>			<i>perfoliatum</i>
				<i>aurantiacum</i>
				<i>angustifolium</i>
<i>Viburnum</i>	<i>opulus</i>	<i>opulus</i>	<i>opulus</i>	<i>opulus</i>
	<i>sargentii</i>	<i>furcatum</i>	<i>edule</i>	<i>edule</i>
	<i>uliginosum</i>	<i>wrightii</i>	<i>ellipticum</i>	<i>lentago</i>
	<i>burejaeticum</i>			<i>acerifolium</i>
				<i>dentatum</i>
				<i>prunifolium</i>
				<i>alnifolium</i>
				<i>nudum</i>
				<i>rafinesquianum</i>
<i>Weigela</i>	<i>praecox</i>	<i>coreensis</i>		
	<i>florida</i>	<i>hortensis</i>		
	<i>middendorffiana</i>	<i>middendorffiana</i>		
Adoxaceae				
<i>Adoxa</i>	<i>moschatellina</i>	<i>moschatellina</i>	<i>moschatellina</i>	<i>moschatellina</i>
<i>Sambucus</i>	<i>racemosa</i>	<i>racemosa</i>	<i>racemosa</i>	<i>racemosa</i>
	<i>bergeriana</i>		<i>cerulea</i>	<i>canadensis</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>williamsii</i>			
Valerianaceae				
<i>Patrinia</i>	<i>scabiosaefolia</i> <i>sibirica</i> <i>villosa</i> <i>rupestris</i>	<i>scabiosaefolia</i> <i>sibirica</i> <i>villosa</i> <i>gibbosa</i>		
<i>Plectritis</i>			<i>ciliosa</i> <i>congesta</i> <i>macrocera</i>	
<i>Valeriana</i>	<i>fauriei</i> <i>amurensis</i> <i>officinalis</i>	<i>fauriei</i>	<i>edulis</i> <i>sitchensis</i> <i>occidentalis</i> <i>scouleri</i> <i>acutiloba</i> <i>columbiana</i>	<i>edulis</i> <i>uliginosa</i>
<i>Valerianella</i>			<i>carinata</i>	<i>chenopodifolia</i> <i>umbilicata</i>
Dipsacaceae				
<i>Dipsacus</i>	<i>japonicus</i>			
<i>Scabiosa</i>	<i>comosa</i>	<i>comosa</i>		
Asteraceae (Compositae)				
<i>Achillea</i>	<i>sibirica</i> <i>millefolium</i> <i>ptarmica</i> <i>setacea</i> <i>ptarmicoides</i>	<i>sibirica</i> <i>ptarmica</i>	<i>sibirica</i> <i>millefolium</i>	<i>sibirica</i> <i>millefolium</i>
<i>Adenocaulon</i>	<i>himalaicium</i> <i>adhaerescens</i>	<i>himalaicium</i>	<i>bicolor</i>	<i>bicolor</i>
<i>Ainsliaea</i>	<i>acerifolia</i>	<i>apiculata</i>		
<i>Ambrosia</i>			<i>artemisiifolia</i> <i>psilostachya</i> <i>chamissonis</i>	<i>artemisiifolia</i> <i>psilostachya</i>

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>acanthicarpa</i>	
			<i>trifida</i>	
<i>Anaphalis</i>		<i>margaritacea</i>	<i>margaritacea</i>	<i>margaritacea</i>
		<i>alpicola</i>		
<i>Antennaria</i>	<i>dioica</i>	<i>dioica</i>	<i>neglecta</i>	<i>neglecta</i>
			<i>microphylla</i>	<i>microphylla</i>
			<i>anaphaloides</i>	<i>plantaginifolia</i>
			<i>geyeri</i>	
			<i>lanata</i>	
			<i>corymbola</i>	
			<i>argentea</i>	
<i>Apargidium</i>			<i>boreale</i>	
<i>Arctium</i>	<i>lappa</i>		<i>lappa</i>	
<i>Arnica</i>		<i>sachaliensis</i>	<i>cordifolia</i>	<i>cordifolia</i>
		<i>unalascensis</i>	<i>latifolia</i>	<i>longchophylla</i>
			<i>fulgens</i>	
			<i>parryi</i>	
			<i>sororiahardinae</i>	
			<i>foliosa</i>	
			<i>chamissonis</i>	
			<i>discoidea</i>	
			<i>longifolia</i>	
			<i>diversifolia</i>	
			<i>mollis</i>	
			<i>nevadensis</i>	
			<i>alpina</i>	
			<i>sororia</i>	
			<i>rydbergii</i>	
<i>Atractylodes</i>	<i>japonica</i>			
<i>Artemisia</i>	<i>dracunculus</i>	<i>dracunculus</i>	<i>dracunculus</i>	
		<i>stelleriana</i>	<i>stelleriana</i>	
	<i>capillaris</i>	<i>capillaris</i>	<i>campestris</i>	<i>campestris</i>
	<i>iwavomogi</i>	<i>iwavomogi</i>	<i>ludoviciana</i>	<i>ludoviciana</i>
	<i>keiskeana</i>	<i>keiskeana</i>		
	<i>laciniata</i>	<i>laciniata</i>		
	<i>frigida</i>		<i>frigida</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>annua</i>	<i>arctica</i>	<i>cana</i>	<i>serrata</i>
	<i>apiacea</i>	<i>congesta</i>	<i>arbuscula</i>	
	<i>dubia</i>	<i>koidzumii</i>	<i>papposa</i>	
	<i>feddei</i>	<i>montana</i>	<i>douglasiana</i>	
	<i>argyi</i>	<i>schmidtiana</i>	<i>lindleyana</i>	
	<i>glomerata</i>	<i>trifucara</i>	<i>michauxiana</i>	
	<i>largyi</i>		<i>rigida</i>	
	<i>mongolica</i>		<i>tridentata</i>	
	<i>rubripes</i>		<i>tripartita</i>	
	<i>scoparia</i>		<i>trifurcata</i>	
	<i>stolonifera</i>		<i>norvergica</i>	
	<i>sylvatica</i>		<i>tilesii</i>	
	<i>integifolia</i>		<i>longifolia</i>	
	<i>lavandulaefolia</i>		<i>suksdorfii</i>	
	<i>leucophylla</i>		<i>biennis</i>	
	<i>sacrorum</i>		<i>scopulorum</i>	
	<i>selengensis</i>		<i>spinescens</i>	
	<i>siversiana</i>		<i>pedatifida</i>	
	<i>vulgaris</i>			
Aster	<i>scaber</i>	<i>scaber</i>	<i>cilliolatus</i>	<i>cilliolatus</i>
	<i>tripolium</i>	<i>tripolium</i>	<i>ericoides</i>	<i>ericoides</i>
	<i>alpinus</i>		<i>alpinus</i>	
	<i>brachyactis</i>		<i>brachyactis</i>	
	<i>sibiricus</i>		<i>sibiricus</i>	
	<i>fastigiatus</i>		<i>junciformis</i>	<i>junciformis</i>
	<i>maackii</i>		<i>laevis</i>	<i>laevis</i>
	<i>senecioides</i>		<i>pilosus</i>	<i>pilosus</i>
	<i>tataricus</i>		<i>adscens</i>	<i>dumosus</i>
	<i>ageratoides</i>		<i>campestris</i>	<i>acuminatus</i>
	<i>integrifolia</i>		<i>canescens</i>	<i>azureus</i>
	<i>lautureana</i>		<i>columbianus</i>	<i>blakei</i>
	<i>incisa</i>		<i>conspicuus</i>	<i>concolor</i>
	<i>mongolica</i>		<i>cordatenus</i>	<i>divaricatus</i>
			<i>eatonii</i>	<i>cordifolius</i>
			<i>foliaceus</i>	<i>crenifolius</i>
			<i>fremontii</i>	<i>lateriflorus</i>

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>frondosus</i>	<i>linariifolius</i>
			<i>integrifolius</i>	<i>macrophyllus</i>
			<i>jessicae</i>	<i>nemoralis</i>
			<i>occidentalis</i>	<i>novae-angliae</i>
			<i>pickettianus</i>	<i>novi-belgii</i>
			<i>stenomeres</i>	<i>patens</i>
			<i>subspicatus</i>	<i>paternus</i>
			<i>hesperius</i>	<i>praealtus</i>
			<i>chilensis</i>	<i>puniceus</i>
			<i>modestus</i>	<i>pubentior</i>
			<i>perelegans</i>	<i>schreberi</i>
			<i>glaucescens</i>	<i>sericeus</i>
			<i>engelmannii</i>	<i>simplex</i>
			<i>paucicapitatus</i>	<i>subulatus</i>
			<i>gormanii</i>	<i>tenuifolius</i>
			<i>ledophyllus</i>	<i>tradescanti</i>
			<i>falcatus</i>	<i>umbellatus</i>
			<i>radulinus</i>	<i>undulatus</i>
			<i>vialis</i>	<i>vimineus</i>
<i>Asteromoea</i>	<i>integrifolia</i>			
	<i>incisa</i>			
	<i>lautureana</i>			
<i>Baccharis</i>			<i>pilularis</i>	<i>halimifolia</i>
<i>Bahia</i>			<i>oppositifolia</i>	
<i>Balsamorhiza</i>			<i>careyana</i>	
			<i>sagittata</i>	
			<i>deltoides</i>	
			<i>macrophylla</i>	
			<i>incana</i>	
			<i>rosea</i>	
			<i>serrata</i>	
			<i>hirsuta</i>	
			<i>hookeri</i>	
<i>Blepharioxanthus</i>		<i>scaber</i>		
<i>Bidens</i>	<i>cernua</i>	<i>cernua</i>	<i>cernua</i>	<i>cernua</i>
	<i>tripartita</i>	<i>tripartita</i>	<i>tripartita</i>	<i>tripartita</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>radiata</i>	<i>radiata</i>	<i>beckii</i>	<i>beckii</i>
	<i>bipinnata</i>		<i>amplissima</i>	<i>aristosa</i>
	<i>bitermata</i>		<i>frondosa</i>	<i>frondosa</i>
			<i>vulgata</i>	<i>vulgata</i>
	<i>maximowicziana</i>			<i>coronata</i>
	<i>parviflora</i>			<i>discoidea</i>
				<i>comosa</i>
				<i>connata</i>
				<i>eatoni</i>
				<i>hyperborea</i>
				<i>laevis</i>
<i>Boltonia</i>			<i>asteroides</i>	
<i>Breea</i>	<i>setosum</i>	<i>setosum</i>		
	<i>segetum</i>			
<i>Brickellia</i>			<i>grandiflora</i>	
			<i>microphylla</i>	
			<i>oblongifolia</i>	
<i>Cacalia</i>	<i>auriculata</i>	<i>auriculata</i>	<i>plantaginea</i>	<i>plantaginea</i>
	<i>delphiniifolia</i>	<i>delphiniifolia</i>	<i>mulhlenbergii</i>	<i>suaveolens</i>
	<i>hastata</i>	<i>hastata</i>		
	<i>kamtschatica</i>			
<i>Calatella</i>	<i>dahurica</i>			
<i>Callistephus</i>	<i>chinensis</i>			
<i>Carduus</i>	<i>crispus</i>			
<i>Carpesium</i>	<i>abrotanoides</i>	<i>abrotanoides</i>		
	<i>cernuum</i>	<i>cernuum</i>		
	<i>divaricatum</i>			
	<i>macrocephalum</i>			
<i>Centipeda</i>	<i>minima</i>	<i>minima</i>		
<i>Chaenactis</i>			<i>nevii</i>	
			<i>alpina</i>	
			<i>cusickii</i>	
			<i>evermannii</i>	
			<i>thompsonii</i>	
			<i>ramosa</i>	
			<i>douglasii</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Chrysanthemum</i>	<i>boreale</i> <i>lineare</i> <i>vulgare</i> <i>zawadskii</i>	<i>weyrichii</i> <i>yezoense</i>	<i>balsamita</i> <i>maximum</i> <i>parthenium</i> <i>leucanthemum</i>	
<i>Chrysopsis</i>				<i>mariana</i>
<i>Chrysothamnus</i>			<i>humilis</i> <i>parryi</i> <i>nauseosus</i> <i>viscidiflorus</i>	
<i>Cirsium</i>	<i>pendulum</i> <i>japonicus</i> <i>schantarense</i> <i>vassovianum</i> <i>maackii</i> <i>uninervium</i>	<i>pendulum</i> <i>aomorense</i> <i>apoiense</i> <i>heilianum</i> <i>kamtschaticum</i> <i>pectinellum</i>	<i>hillii</i> <i>arvense</i> <i>brevifolium</i> <i>brevistylum</i> <i>foliosum</i> <i>canovirens</i> <i>edule</i> <i>undulatum</i> <i>hookeri</i> <i>subniveum</i> <i>utahense</i> <i>tweedyi</i> <i>callilepis</i> <i>longistylum</i> <i>magnificum</i> <i>scariosum</i> <i>remotifolium</i>	<i>hillii</i> <i>altissimum</i> <i>muticum</i> <i>horridulum</i> <i>pitcheri</i> <i>nuttallii</i> <i>pumilum</i>
<i>Conyza</i>			<i>canadensis</i> <i>flodmanii</i>	<i>canadensis</i>
<i>Coreopsis</i>			<i>atkinsoniana</i> <i>tinctoria</i> <i>villosa</i>	<i>lanceolata</i> <i>palmata</i> <i>tripteris</i>
<i>Crepis</i>	<i>crocea</i> <i>tectoum</i>	<i>gymnopus</i> <i>hokkaidoensis</i>	<i>atrabarba</i> <i>barbigera</i> <i>modocensis</i> <i>acuminata</i> <i>intermedia</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>occidentalis</i>	
			<i>runcinata</i>	
			<i>setosa</i>	
			<i>nicaeensis</i>	
			<i>capillaris</i>	
			<i>nana</i>	
			<i>elegans</i>	
			<i>bakeri</i>	
<i>Crocidium</i>			<i>multicaule</i>	
<i>Crupina</i>			<i>vulgaris</i>	
<i>Dimeresia</i>			<i>howelli</i>	
<i>Dyssodia</i>			<i>papposa</i>	
<i>Eatonella</i>			<i>nivea</i>	
<i>Echinacea</i>			<i>pallida</i>	<i>pallida</i>
			<i>arguta</i>	<i>purpurea</i>
			<i>hieracifolia</i>	
<i>Eclipta</i>	<i>alba</i>		<i>alba</i>	<i>alba</i>
<i>Enceliopsis</i>			<i>nudicaulis</i>	
<i>Erechtites</i>			<i>minima</i>	<i>hieracifolia</i>
<i>Erigeron</i>	<i>acris</i>	<i>acris</i>	<i>acris</i>	<i>acris</i>
	<i>thunbergii</i>	<i>thunbergii</i>	<i>annuus</i>	<i>annuus</i>
	<i>komarovii</i>		<i>longchophyllus</i>	<i>strigosus</i>
	<i>elongatus</i>		<i>strigosus</i>	<i>hyssopifolius</i>
			<i>foliosus</i>	<i>pulchellus</i>
	spp (6)		<i>inornatus</i>	<i>philadelphicus</i>
			<i>glaucus</i>	
			<i>coulteri</i>	
			<i>aliceae</i>	
			<i>howellii</i>	
			<i>pergrinus</i>	
			<i>phildadelphicus</i>	
			<i>speciosus</i>	
			<i>subtrinervis</i>	
			<i>formosissimus</i>	
			<i>glabellus</i>	
			<i>oreganus</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>basalticus</i>	
			<i>flabellifolius</i>	
			<i>pallens</i>	
			<i>vagus</i>	
			<i>compositus</i>	
			<i>aureus</i>	
			<i>humilis</i>	
			<i>lanatus</i>	
			<i>flettii</i>	
			<i>grandiflorus</i>	
			<i>simplex</i>	
			<i>linearis</i>	
			<i>piperianus</i>	
			<i>chrysopsidis</i>	
			<i>aphanactis</i>	
			<i>piliospermus</i>	
			<i>blooneri</i>	
			<i>beilbergii</i>	
			<i>cascadensis</i>	
			<i>glabellus</i>	
			<i>ursinus</i>	
			<i>gracilis</i>	
			<i>flagellaris</i>	
			<i>eleganthulus</i>	
			<i>filifolius</i>	
			<i>leiomerus</i>	
			<i>engelmannii</i>	
			<i>eatonii</i>	
			<i>decumbens</i>	
			<i>radicatus</i>	
			<i>ochroleucus</i>	
			<i>evermannii</i>	
			<i>leiomerus</i>	
			<i>tweedyi</i>	
			<i>tener</i>	
			<i>divergens</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>caespitosus</i>	
			<i>corymbosus</i>	
			<i>asperugineus</i>	
			<i>radicatus</i>	
			<i>rydbergii</i>	
			<i>poliospermus</i>	
			<i>disparipilus</i>	
			<i>pumilus</i>	
<i>Eriophyllum</i>			<i>lanatum</i>	
<i>Eupatorium</i>	<i>chinense</i>	<i>chinense</i>	<i>maculatum</i>	<i>maculatum</i>
	<i>lindeyanum</i>	<i>lindeyanum</i>		
			<i>occidentale</i>	<i>fistulosum</i>
				<i>leucolepis</i>
				<i>perfoliatum</i>
				<i>rotundifolium</i>
<i>Euthamia</i>				<i>graminifolia</i>
				<i>remota</i>
<i>Filifolium</i>	<i>sibiricum</i>			
<i>Galatella</i>	<i>dahurica</i>			
<i>Gallardia</i>			<i>aristata</i>	<i>aristata</i>
<i>Gnaphalium</i>	<i>uliginosum</i>	<i>uliginosum</i>	<i>viscosum</i>	<i>viscosum</i>
			<i>purpureum</i>	<i>purpureum</i>
		<i>affine</i>	<i>chilense</i>	<i>helleri</i>
			<i>macounii</i>	<i>obtusifolium</i>
			<i>palustre</i>	<i>supinum</i>
			<i>termale</i>	<i>sylvaticum</i>
			<i>californicum</i>	
<i>Grindelia</i>			<i>squarrosa</i>	<i>squarrosa</i>
			<i>columbiana</i>	
			<i>nana</i>	
			<i>integrifolia</i>	
			<i>howellii</i>	
<i>Gutierrezia</i>			<i>sarothrae</i>	
<i>Haplopappus</i>			<i>carthamoides</i>	
			<i>suffruticosus</i>	
			<i>resinosus</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>nanus</i>	
			<i>bloomeri</i>	
			<i>greenei</i>	
			<i>carrhamoides</i>	
			<i>aberrans</i>	
			<i>spinulosus</i>	
			<i>lyallii</i>	
			<i>pygmaeus</i>	
			<i>langinosus</i>	
			<i>stenophyllus</i>	
			<i>armerioides</i>	
			<i>acaulis</i>	
			<i>hallii</i>	
			<i>radiatus</i>	
			<i>hirtus</i>	
			<i>integrifolius</i>	
			<i>uniflorus</i>	
			<i>liateriformis</i>	
			<i>racemosus</i>	
			<i>lanceolatus</i>	
			<i>insecticruris</i>	
<i>Helenium</i>			<i>autumnale</i>	<i>autumnale</i>
<i>Helianthella</i>			<i>quinquenervis</i>	
<i>Helianthus</i>			<i>annuus</i>	<i>annuus</i>
			<i>petiolaris</i>	
			<i>cusickii</i>	<i>decapetalus</i>
			<i>rigidus</i>	<i>giganteus</i>
			<i>nuttallii</i>	<i>laetiflorus</i>
				<i>grosseserratus</i>
				<i>mollis</i>
				<i>strumosus</i>
				<i>tuberosus</i>
				<i>divaricatus</i>
				<i>paniciflorus</i>
<i>Heliopsis</i>			<i>helianthoides</i>	<i>helianthoides</i>
<i>Hemistepta</i>	<i>lyrata</i>			

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Heteropappus</i>	<i>hispidus</i> <i>altaicus</i> <i>meyendorffii</i>			
<i>Hieracium</i>	<i>umbellatum</i> <i>hololeion</i> <i>coreanum</i>	<i>umbellatum</i>	<i>umbellatum</i> <i>canadense</i> <i>albiflorum</i> <i>albertinum</i> <i>pratense</i> <i>cusickii</i> <i>gracile</i> <i>scabriusculum</i> <i>pilosella</i> <i>aurantiacum</i> <i>longiberbe</i> <i>scouleri</i> <i>cyglossoides</i> <i>richardsonii</i>	<i>umbellatum</i> <i>canadense</i> <i>gronovis</i> <i>paniculatum</i> <i>robinsonii</i> <i>scabrum</i> <i>venosum</i> <i>kalmii</i>
<i>Hololeion</i>	<i>maximowiczii</i>			
<i>Hymenoxys</i>			<i>acaulis</i> <i>grandiflora</i>	<i>herbacea</i>
<i>Hypochoeris</i>		<i>erepidioides</i>		
<i>Inula</i>	<i>britannica</i> <i>salicina</i>	<i>britannica</i> <i>salicina</i>		
<i>Iva</i>			<i>xanthifolia</i> <i>axillaris</i>	<i>xanthifolia</i>
<i>Ixeris</i>	<i>dentata</i> <i>repens</i> <i>stolonifera</i> <i>denticulata</i> <i>chinensis</i> <i>saxatilis</i>	<i>dentata</i> <i>repens</i> <i>stolonifera</i> <i>japonica</i>		
<i>Jaumea</i>			<i>carnea</i>	
<i>Kalimeris</i>	<i>incisa</i>			
<i>Krigia</i>				<i>biflora</i> <i>virginica</i>
<i>Kuhnia</i>			<i>eupatorioides</i>	
<i>Lactuca</i>	<i>indica</i>	<i>indica</i>	<i>canadensis</i>	<i>canadensis</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>sibirica</i>	<i>sibirica</i>	<i>biennis</i>	<i>biennis</i>
	<i>triangulata</i>	<i>triangulata</i>	<i>ludoviciana</i>	<i>ludoviciana</i>
	<i>grandiflora</i>	<i>raddeana</i>	<i>pulchella</i>	
	<i>raddeana</i>			<i>floridana</i>
	<i>tatarica</i>			<i>hirsuta</i>
<i>Lagophylla</i>			<i>ramosissima</i>	
<i>Lapsana</i>	<i>apogonoides</i>	<i>humilis</i>		
<i>Lasthenia</i>			<i>glaberrima</i>	
			<i>minor</i>	
<i>Layia</i>			<i>glandulosa</i>	
<i>Leibnitzia</i>	<i>anandra</i>	<i>anandra</i>		
<i>Leontopodium</i>	<i>japonicum</i>	<i>japonicum</i>		
	<i>leotopoides</i>	<i>discolor</i>		
<i>Liatris</i>			<i>punctata</i>	<i>punctata</i>
				<i>aspera</i>
				<i>cylindraceae</i>
				<i>novae-angliae</i>
				<i>spicata</i>
				<i>scariosa</i>
<i>Ligularia</i>	<i>japonica</i>	<i>hodgsonii</i>	<i>holmii</i>	
	<i>mongolica</i>			
	<i>sibirica</i>			
	<i>fischeri</i>			
	<i>jaluensis</i>			
<i>Luina</i>			<i>nardosmia</i>	
			<i>serpentina</i>	
			<i>hypoleuca</i>	
			<i>stricta</i>	
<i>Lygodesmia</i>			<i>juncea</i>	
			<i>spinosa</i>	
<i>Machaeranthera</i>			<i>canescens</i>	
			<i>commixta</i>	
			<i>grindeloides</i>	
			<i>tanacetifolia</i>	
			<i>laetevirens</i>	
			<i>shastensis</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Madia</i>			<i>exigua</i> <i>minima</i> <i>glomerata</i> <i>gracilis</i> <i>sativa</i> <i>madioides</i> <i>elgans</i> <i>citriodora</i>	
<i>Malacothrix</i>			<i>torreyi</i>	
<i>Matricaria</i>	<i>matricaroides</i> <i>tetragonosperma</i>	<i>matricaroides</i> <i>tetragonosperma</i>	<i>matricaroides</i>	
<i>Micropus</i>			<i>carifornicus</i>	
<i>Microseris</i>			<i>lindleyi</i> <i>bigelovii</i> <i>nutanus</i> <i>laciniata</i> <i>troximoides</i> <i>nigrescens</i> <i>alpestris</i> <i>cuspidata</i>	
<i>Mikania</i>				<i>scandens</i>
<i>Petasites</i>	<i>japonicus</i> <i>palmaus</i>	<i>japonicus</i>	<i>fragidus</i> <i>sagittatus</i>	<i>fragidus</i>
<i>Picris</i>	<i>hieracioides</i>	<i>hieracioides</i>		
<i>Pluchea</i>				<i>odorata</i>
<i>Polymnia</i>				<i>canadensis</i> <i>ivedalia</i>
<i>Prenanthes</i>	<i>macrophylla</i>		<i>sagittata</i> <i>alata</i>	<i>alba</i> <i>altissima</i> <i>boottii</i> <i>crepidinea</i> <i>nana</i> <i>racemosa</i> <i>serpentaria</i> <i>trifoliolata</i>
<i>Psilocarphus</i>			<i>brevissimus</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>elator</i>	
			<i>oregonus</i>	
			<i>tenellus</i>	
<i>Raillardella</i>			<i>argentea</i>	
			<i>scaposa</i>	
<i>Ratibida</i>			<i>columnifera</i>	<i>pinnata</i>
<i>Rhapontica</i>	<i>uniflora</i>			
<i>Rigiopappus</i>			<i>leptocladus</i>	
<i>Rudbeckia</i>			<i>occidentalis</i>	<i>fulgida</i>
			<i>laciniata</i>	<i>laciniata</i>
				<i>hirta</i>
				<i>triloba</i>
<i>Saussurea</i>	<i>acuminata</i>	<i>acuminata</i>		
	<i>pulchella</i>	<i>pulchella</i>		
	<i>amurensis</i>	<i>chionophylla</i>	<i>americana</i>	
	<i>anara</i>	<i>fauriei</i>	<i>densa</i>	
	<i>bodinieri</i>	<i>riederi</i>		
	<i>cordifolia</i>	<i>yangisawae</i>		
	<i>deltoidea</i>			
	<i>japonica</i>			
	<i>maximowiczii</i>			
	<i>neofranchetii</i>			
	<i>odontolepis</i>			
	<i>serrata</i>			
	<i>umbrosa</i>			
	<i>sinuata</i>			
	<i>ussuriensis</i>			
	<i>grandifolia</i>			
	<i>mandshurica</i>			
<i>Scorzonera</i>	<i>albicaulis</i>	<i>rebunensis</i>		
	<i>glabra</i>			
	<i>sinensis</i>			
	<i>radiata</i>			
<i>Senecio</i>	<i>cannabifolius</i>	<i>cannabifolius</i>	<i>pauperculus</i>	<i>pauperculus</i>
	<i>nemorensis</i>	<i>nemorensis</i>	<i>indecorus</i>	<i>indecorus</i>
	<i>pseudoarnica</i>	<i>pseudoarnica</i>		

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>argunensis</i>	<i>hikoensis</i>		<i>aureus</i>
	<i>dubius</i>	<i>kawakamii</i>	<i>fuscatus</i>	<i>congestus</i>
	<i>flammens</i>		<i>megacephalus</i>	<i>pseudoarnica</i>
	<i>integrifolius</i>		<i>integerrimus</i>	<i>schweinitzianus</i>
	<i>kirilowii</i>		<i>shaerocephalus</i>	
	<i>manshuricus</i>		<i>elmeri</i>	
	<i>scandens</i>		<i>werneriaefolius</i>	
	<i>palustris</i>		<i>macounii</i>	
	<i>pierotii</i>		<i>canus</i>	
			<i>cymbalarioides</i>	
	spp (8)		<i>resdifolius</i>	
			<i>porteri</i>	
			<i>pauciflorus</i>	
			<i>debilis</i>	
			<i>dimorphophyllus</i>	
			<i>eremophilus</i>	
			<i>crassulus</i>	
			<i>neawebsteri</i>	
			<i>foetidus</i>	
			<i>flettii</i>	
			<i>bolanderi</i>	
			<i>pseudodaureus</i>	
			<i>streptanthifolius</i>	
			<i>fremontis</i>	
			<i>sylvaticus</i>	
			<i>serra</i>	
			<i>triangularis</i>	
			<i>vulgaris</i>	
			<i>jacobaea</i>	
<i>Serratula</i>	<i>coronata</i>			
	<i>cupuliformis</i>			
	<i>komarovi</i>			
	<i>yamatsutana</i>			
<i>Siegesbeckia</i>	<i>glabrescens</i>	<i>glabrescens</i>		
	<i>pubescens</i>	<i>pubescens</i>		
<i>Silphium</i>				<i>perfoliatum</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
				<i>terebinthaceum</i> <i>integrifolium</i>
<i>Sonchus</i>	<i>oleraceus</i> <i>brachyotis</i>	<i>oleraceus</i> <i>brachyotis</i>		
<i>Solidago</i>	<i>virga-aurea</i> <i>japonica</i>	<i>virga-aurea</i>	<i>uliginosus</i> <i>canadensis</i> <i>missouriensis</i> <i>graminifolia</i> <i>nemoralis</i> <i>rigida</i> <i>nana</i> <i>gigantea</i> <i>occidentalis</i> <i>mollis</i> <i>multiradiata</i> <i>spatulata</i>	<i>canadensis</i> <i>missouriensis</i> <i>graminifolia</i> <i>nemoralis</i> <i>rigida</i> <i>arguta</i> <i>bicolor</i> <i>calcicola</i> <i>cutleri</i> <i>erecta</i> <i>hispida</i> <i>caesia</i> <i>houghtonii</i> <i>juncea</i> <i>macrophylla</i> <i>odora</i> <i>puberula</i> <i>remota</i> <i>riddellii</i> <i>rugosa</i> <i>speciosa</i> <i>squarrosa</i> <i>tenuifolia</i> <i>uliginosa</i>
<i>Stephanomeria</i>		<i>lactucina</i>	<i>runcinata</i> <i>tenuifolia</i> <i>paniculata</i> <i>exigua</i>	
<i>Stylochne</i>			<i>psilocarphoides</i> <i>filaginea</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Syneilesis</i>	<i>aconitifolia</i>			
<i>Synurus</i>	<i>pungens</i> <i>deltoides</i>	<i>pungens</i>		
<i>Tanacetum</i>			<i>douglasii</i> <i>capitatum</i> <i>nuttallii</i> <i>potentilloides</i> <i>vulgare</i>	<i>huronense</i>
<i>Taraxacum</i>	<i>platypecidum</i> <i>leucanthum</i> <i>ohwianum</i> <i>mongolicum</i> <i>brassicaefolium</i> <i>coreanum</i> <i>pseudoalbidum</i> spp (8)	<i>platypecidum</i> <i>shikotanense</i> <i>trigonolobum</i> <i>yuparense</i>	<i>ceratophorum</i> <i>eriphorum</i> <i>lyratum</i>	<i>ceratophorum</i>
<i>Tetradymia</i>			<i>glabrata</i> <i>canescens</i> <i>spinosa</i> <i>subnudum</i> <i>condensata</i> <i>florifer</i> <i>leptotes</i> <i>montana</i> <i>parryi</i> <i>hookeri</i> <i>exscapa</i>	
<i>Thelesperma</i>			<i>alternifolia</i>	
<i>Townsendia</i>			<i>missurica</i> <i>noveboracensis</i> <i>multiflora</i> <i>amplexicaulis</i> <i>helianthoides</i> <i>angustifolia</i>	
<i>Verbesina</i>			<i>strumarium</i>	<i>strumarium</i>
<i>Vernonia</i>			<i>spinosa</i>	
<i>Viguiera</i>				
<i>Wyethia</i>				
<i>Xanthium</i>	<i>mongolicum</i>			

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Youngia</i>	<i>denticulata</i> <i>chelidoniifolia</i>	<i>denticulata</i> <i>japonica</i>		
ALISMATIDAE				
Alismataceae				
<i>Alisma</i>	<i>plantagoaquatica</i> <i>gramineum</i> <i>prientale</i> <i>orientale</i>	<i>plantagoaquatica</i> <i>gramineum</i> <i>canaliculatum</i>	<i>plantagoaquatica</i> <i>gramineum</i>	<i>plantagoaquatica</i> <i>gramineum</i> <i>trivale</i>
<i>Echinodorus</i>				<i>parrulus</i>
<i>Machaerocarpus</i>			<i>californicus</i>	
<i>Sagittaria</i>	<i>natans</i> <i>trifolia</i> <i>sagittifolia</i>	<i>natans</i> <i>trifolia</i> <i>aginashi</i>	<i>cuneata</i> <i>latifolia</i> <i>subulata</i>	<i>cuneata</i> <i>latifolia</i> <i>subulata</i> <i>graminea</i> <i>engelmanniana</i> <i>montevidensis</i> <i>teres</i> <i>rigida</i> <i>calycina</i> <i>spatulata</i> <i>australis</i> <i>brevirostra</i>
Hydrocharitaceae				
<i>Anacharis</i>			<i>canadensis</i> <i>nuttallii</i>	<i>canadensis</i> <i>nuttallii</i> <i>dense</i>
<i>Blyxa</i>	<i>japonica</i>			
<i>Elodea</i>			<i>canadensis</i> <i>nuttallii</i> <i>densa</i> <i>longivaginata</i>	<i>canadensis</i> <i>nuttallii</i>
<i>Halophila</i>	<i>ovalis</i>			

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Hydrilla</i>	<i>verticillata</i>	<i>verticillata</i>		
<i>Limnobium</i>				<i>spongia</i>
<i>Ottelia</i>	<i>alsmoides</i>			
<i>Vallisneria</i>	<i>asiatica</i>	<i>asiatica</i>		
	<i>spiralis</i>			<i>americana</i>
Scheuchzeriaceae				
<i>Lilaea</i>			<i>scilloides</i>	
<i>Scheuchzeria</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>	<i>palustris</i>
<i>Triglochin</i>	<i>palustre</i>	<i>palustre</i>	<i>palustre</i>	<i>palustre</i>
		<i>maritimum</i>	<i>maritimum</i>	<i>mariitimum</i>
			<i>concinnum</i>	
Potamogetonaceae				
<i>Potamogeton</i>	<i>natans</i>	<i>natans</i>	<i>natans</i>	<i>natans</i>
	<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>	<i>alpinus</i>
	<i>perfoliatus</i>	<i>perfoliatus</i>	<i>perfoliatus</i>	<i>perfoliatus</i>
	<i>pectinatus</i>	<i>pectinatus</i>	<i>pectinatus</i>	<i>pectinatus</i>
	<i>pusillus</i>		<i>pusillus</i>	<i>pusillus</i>
	<i>zosteriformis</i>		<i>zosteriformis</i>	<i>zosteriformis</i>
		<i>praelongus</i>	<i>praelongus</i>	<i>praelongus</i>
	<i>crispus</i>	<i>crispus</i>	<i>foliosus</i>	<i>foliosus</i>
	<i>distinctus</i>	<i>distinctus</i>	<i>diversifolius</i>	<i>diversifolius</i>
	<i>octandrus</i>	<i>octandrus</i>	<i>hillii</i>	<i>hillii</i>
	<i>oxyphyllus</i>	<i>oxyphyllus</i>	<i>filiformis</i>	<i>filiformis</i>
	<i>heterophyllus</i>	<i>heterophyllus</i>	<i>gemmiparus</i>	<i>gemmiparus</i>
			<i>richardsonii</i>	<i>richardsonii</i>
			<i>illinoensis</i>	<i>illinoensis</i>
			<i>nodosus</i>	<i>nodosus</i>
			<i>gramineus</i>	<i>gramineus</i>
			<i>robbinsii</i>	<i>robbinsii</i>
	<i>cristatus</i>	<i>berchtoldii</i>	<i>fibrillosus</i>	<i>amplifolius</i>
	<i>malaiunus</i>	<i>compressus</i>	<i>nodosus</i>	<i>epiphydrus</i>
	<i>mandshuriensis</i>	<i>fryeri</i>	<i>panormitanus</i>	<i>conferviodes</i>
		<i>malaianus</i>	<i>vaginatus</i>	<i>lateralis</i>
		<i>maackianus</i>	<i>berchtoldii</i>	<i>friesii</i>

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>foliosus</i> <i>amplifolius</i>	<i>bicupulatus</i> <i>oakesianus</i> <i>obtusifolius</i> <i>pulcher</i> <i>spirillus</i> <i>strictifolius</i> <i>vaseyi</i> <i>viginatus</i>
<i>Ruppia</i>		<i>trunctifolia</i>	<i>maritima</i>	<i>maritima</i>
<i>Zannichellia</i>	<i>palustris</i>		<i>palustris</i>	<i>palustris</i>
Najadaceae				
<i>Najas</i>	<i>marina</i> <i>graminea</i> <i>minor</i>	<i>marina</i> <i>yezoensis</i>	<i>marina</i> <i>flexilis</i> <i>guadalupensis</i>	<i>marina</i> <i>flexilis</i> <i>guadalupensis</i> <i>gracillima</i>
Zosteraceae				
<i>Phyllospadix</i>		<i>iwatensis</i>	<i>scouleri</i> <i>torreyi</i>	
<i>Zostera</i>	<i>marina</i> <i>nana</i>	<i>marina</i> <i>nana</i> <i>asiatica</i> <i>caespitosa</i>	<i>marina</i> <i>nana</i>	<i>marina</i>
Triuridaceae				
<i>Sciaphila</i>	<i>tenella</i>			
ARECIDAE				
Lemnaceae				
<i>Lemna</i>	<i>trisulca</i> <i>minor</i>	<i>trisulca</i> <i>paucicostata</i>	<i>trisulca</i> <i>minor</i>	<i>trisulca</i> <i>minor</i> <i>perpusilla</i> <i>valdiviana</i>

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Spirodela</i>	<i>polyrhiza</i>	<i>polyrhiza</i>	<i>polyrhiza</i>	<i>polyrhiza</i>
<i>Wolffia</i>			<i>columbiana</i>	<i>columbiana</i>
			<i>punctata</i>	<i>punctata</i>
				<i>papulifera</i>
<i>Wolffiella</i>			<i>floridana</i>	<i>floridana</i>
Araceae				
<i>Acorus</i>	<i>calamus</i>			<i>americanus</i>
<i>Arisaema</i>	<i>peninsula</i>	<i>peninsula</i>		
	<i>parvum</i>	<i>proliferum</i>		<i>dracontium</i>
	<i>amurense</i>	<i>robustum</i>		<i>triphylllum</i>
	<i>heterophyllum</i>	<i>urashima</i>		
		<i>takedae</i>		
<i>Calla</i>	<i>palustris</i>	<i>palustris</i>		<i>palustris</i>
<i>Lysichiton</i>		<i>camtschaticense</i>	<i>americanum</i>	
<i>Peltandra</i>				<i>virginica</i>
<i>Pinellia</i>	<i>ternata</i>	<i>ternata</i>		
<i>Symplocarpus</i>	<i>renifolius</i>	<i>renifolius</i>		
		<i>nipponicus</i>		<i>foetidus</i>
COMMELINIDAE				
Xyridaceae				
<i>Xyris</i>				<i>caroliniana</i>
				<i>difformis</i>
				<i>torta</i>
Commelinaceae				
<i>Commelina</i>	<i>communis</i>	<i>communis</i>		<i>erecta</i>
<i>Tradescantia</i>				<i>ohiensis</i>
				<i>virginiana</i>
Eriocaulaceae				
<i>Eriocaulon</i>	<i>decemflorum</i>	<i>decemflorum</i>		
	<i>buergerianum</i>	<i>atrum</i>		<i>parkeri</i>
	<i>nenryanum</i>	<i>hondoense</i>		<i>septangulare</i>

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Genus	E-Asia	Japan	WN-America	EN-America
		<i>pallescens</i>		<i>aquaticum</i>
		<i>perplexum</i>		
		<i>robustius</i>		
		<i>sachalinse</i>		
		<i>sikokianum</i>		
Juncaceae				
<i>Juncus</i>	<i>bufonius</i>	<i>bufonius</i>	<i>bufonius</i>	<i>bufonius</i>
	<i>effusus</i>	<i>effusus</i>	<i>effusus</i>	<i>effusus</i>
	<i>beringensis</i>	<i>beringensis</i>	<i>acuminatus</i>	<i>acuminatus</i>
	<i>gracillimus</i>	<i>gracillimus</i>	<i>brachycephalus</i>	<i>brachycephalus</i>
	<i>gerardi</i>	<i>gerardi</i>	<i>gerardi</i>	<i>gerardi</i>
	<i>articularis</i>	<i>articularis</i>	<i>articularis</i>	<i>articularis</i>
	<i>papillosus</i>	<i>papillosus</i>	<i>papillosus</i>	
	<i>supinus</i>	<i>supinus</i>	<i>supinus</i>	
		<i>tenulis</i>	<i>tenulis</i>	<i>tenulis</i>
		<i>filiformis</i>	<i>filiformis</i>	<i>filiformis</i>
		<i>potentilla</i>	<i>dudleyi</i>	<i>dudleyi</i>
		<i>triceps</i>	<i>longistylis</i>	<i>longistylis</i>
			<i>nodosus</i>	<i>nodosus</i>
			<i>vaseyi</i>	<i>vaseyi</i>
	<i>alatus</i>	<i>ensifolius</i>	<i>balticus</i>	
	<i>elegans</i>	<i>fauiensis</i>	<i>confusus</i>	<i>dichotomus</i>
	<i>gracillimus</i>	<i>mertensianus</i>	<i>drummondii</i>	<i>biflorus</i>
	<i>przewalskii</i>	<i>diastrophanthus</i>	<i>macer</i>	<i>brevicandatus</i>
	<i>decipiens</i>	<i>kamtschatcensis</i>	<i>mertensianus</i>	
		<i>krameri</i>	<i>nevadensis</i>	<i>canadensis</i>
	spp (10)	<i>leschenaultii</i>	<i>orthophylus</i>	<i>brachycarpus</i>
			<i>congestus</i>	
		<i>prominens</i>	<i>parri</i>	<i>marginatus</i>
		<i>triglumis</i>	<i>sphaerocarpus</i>	<i>pelocarpus</i>
		<i>wallichianus</i>	<i>torreyi</i>	<i>subtilis</i>
			<i>yokoscensis</i>	<i>xihnioides</i>
			<i>hemiendytus</i>	<i>secundus</i>
			<i>keltoggii</i>	<i>stygius</i>

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>hallii</i>	<i>trifidus</i>
			<i>parens</i>	
			<i>lesueurii</i>	
			<i>biglumis</i>	
			<i>triglumis</i>	
			<i>castaneus</i>	
			<i>oxymetris</i>	
			<i>ensifolius</i>	
			<i>mertensianus</i>	
			<i>covillei</i>	
			<i>regelii</i>	
			<i>howellii</i>	
			<i>alpina</i>	
			<i>torreyi</i>	
			<i>acuminatus</i>	
			<i>tweedyi</i>	
			<i>supiniformis</i>	
			<i>bolanderi</i>	
			<i>falcatus</i>	
			<i>brachyphyllus</i>	
<i>Luzula</i>	<i>multiflora</i>	<i>multiflora</i>	<i>multiflora</i>	<i>multiflora</i>
	<i>arcuata</i>	<i>arcuata</i>	<i>arcuata</i>	
	<i>capitata</i>	<i>capitata</i>	<i>parviflora</i>	<i>parviflora</i>
	<i>oligantha</i>	<i>oligantha</i>	<i>spicata</i>	<i>spicata</i>
	<i>effusa</i>	<i>plumosa</i>	<i>campestris</i>	<i>acuminata</i>
	<i>rufescens</i>	<i>rostrata</i>	<i>piperi</i>	<i>confusa</i>
		<i>wahlenbergii</i>	<i>divaricata</i>	
			<i>hitchcockii</i>	
Cyperaceae				
<i>Carex</i>	<i>aquatilis</i>	<i>aquatilis</i>	<i>aquatilis</i>	
	<i>lyngbyei</i>	<i>lyngbyei</i>	<i>lyngbyei</i>	
	<i>flava</i>	<i>flava</i>	<i>flava</i>	
	<i>buxbaumii</i>	<i>buxbaumii</i>	<i>buxbaumii</i>	
	<i>obtusata</i>	<i>obtusata</i>	<i>obtusata</i>	
	<i>norvegia</i>	<i>norvegia</i>	<i>norvegia</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>atrata</i>	<i>atrata</i>	<i>atrata</i>	
	<i>livida</i>	<i>livida</i>	<i>livida</i>	
	<i>stenophylla</i>	<i>stenophylla</i>	<i>stenophylla</i>	
	<i>misandra</i>	<i>misandra</i>	<i>misandra</i>	
	<i>paupercula</i>	<i>paupercula</i>	<i>paupercula</i>	
	<i>limosa</i>	<i>limosa</i>	<i>limosa</i>	
	<i>capillaris</i>	<i>capillaris</i>	<i>capillaris</i>	
	<i>eleusinoides</i>		<i>eleusinoides</i>	
	<i>arenicola</i>	<i>arenicola</i>	<i>disperma</i>	<i>disperma</i>
	<i>capricornis</i>	<i>capricornis</i>	<i>arcta</i>	<i>arcta</i>
	<i>dispalata</i>	<i>dispalata</i>		
	<i>doniana</i>	<i>doniana</i>		
	<i>gmelinii</i>	<i>gmelinii</i>		
	<i>humilis</i>	<i>humilis</i>		
	<i>kobomugi</i>	<i>kobomugi</i>		
	<i>lanceolata</i>	<i>lanceolata</i>		
	<i>latisquamea</i>	<i>latisquamea</i>		
	<i>loliacea</i>	<i>loliacea</i>		
	<i>maackii</i>	<i>maackii</i>		
	<i>maximowiczii</i>	<i>maximowiczii</i>		
	<i>pallida</i>	<i>pallida</i>		
	<i>planiculmis</i>	<i>planiculmis</i>		
	<i>quadriflora</i>	<i>quadriflora</i>		
	<i>remotiuscula</i>	<i>remotiuscula</i>		
	<i>rugulosa</i>	<i>rugulosa</i>		
	<i>scabrifolia</i>	<i>scabrifolia</i>		
	<i>schmidtii</i>	<i>schmidtii</i>		
	<i>scita</i>	<i>scita</i>		
	<i>siderosticta</i>	<i>siderosticta</i>		
	<i>vanheurckii</i>	<i>vanheurckii</i>		
		<i>lasiocarpa</i>	<i>lasiocarpa</i>	
	<i>agglomerata</i>	<i>albata</i>	<i>atherodes</i>	<i>agryrantha</i>
	<i>biwensis</i>	<i>asphanolepis</i>	<i>dioica</i>	<i>aenea</i>
	<i>capilliformis</i>	<i>bigelowii</i>	<i>breweri</i>	<i>adusta</i>
	<i>coriophora</i>	<i>breviculmis</i>	<i>athrostachya</i>	<i>lopecoidea</i>
	<i>dimorpholepis</i>	<i>brunescens</i>	<i>bolanderi</i>	<i>annectens</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>gentilis</i>	<i>capillacea</i>	<i>brevior</i>	
	<i>inanis</i>	<i>caespitosa</i>	<i>cephalantha</i>	<i>bromoides</i>
	<i>japonica</i>	<i>angustinowiczii</i>	<i>comosa</i>	<i>brunnescens</i>
	<i>laevirostris</i>	<i>caryophyllea</i>	<i>concinnoides</i>	<i>capitata</i>
	<i>laticeps</i>	<i>cyper</i>	<i>cusickii</i>	<i>cephalophora</i>
	<i>lehmanii</i>	<i>buxbaumii</i>	<i>geyeri</i>	<i>chordorrhiza</i>
	<i>leiorhyncha</i>	<i>curta</i>	<i>douglasii</i>	<i>conjuncta</i>
	<i>lithophila</i>	<i>cyperoides</i>	<i>exsiccata</i>	<i>crawfordii</i>
	<i>longirostrata</i>	<i>diandra</i>	<i>festivella</i>	<i>decomposita</i>
	<i>maubertiana</i>	<i>dickinsii</i>	<i>filifolia</i>	<i>deweyana</i>
	<i>meyeriana</i>	<i>disperma</i>	<i>garberi</i>	<i>diandra</i>
	<i>minuta</i>	<i>dissitiflora</i>	<i>haydeniana</i>	
	<i>orbicularis</i>	<i>rugata</i>	<i>hoodii</i>	<i>eleocharis</i>
	<i>peiktusanii</i>	<i>drymophila</i>	<i>interior</i>	<i>exilis</i>
	<i>polyschoena</i>	<i>dolichostachya</i>	<i>kelloggii</i>	<i>glareosa</i>
	<i>pumila</i>	<i>echinata</i>	<i>laeviculmis</i>	<i>gravida</i>
	<i>quadriflora</i>	<i>eleusinoides</i>	<i>languginosa</i>	<i>gynocrates</i>
	<i>raddei</i>	<i>fernaldiana</i>	<i>amplifolia</i>	<i>howei</i>
	<i>rugulosa</i>	<i>flavocuspis</i>	<i>leptalea</i>	<i>incomperta</i>
	<i>rhynchophysa</i>	<i>foliossissima</i>	<i>nardina</i>	<i>laevivaginata</i>
	<i>schmidtii</i>	<i>hakonensis</i>	<i>elynoides</i>	<i>mackenziei</i>
	<i>siderostieta</i>	<i>hakkodensis</i>	<i>hystricina</i>	<i>muhlenbergii</i>
	<i>tangiana</i>	<i>incisa</i>	<i>concinna</i>	<i>muricata</i>
	<i>neurocarpa</i>	<i>insaniae</i>	<i>brevicaulis</i>	<i>muskingumensis</i>
	<i>ussuriensis</i>	<i>japonica</i>	<i>halliuna</i>	<i>oronensis</i>
		<i>jacens</i>	<i>backii</i>	<i>praticola</i>
	spp (10)	<i>laehenalii</i>	<i>macrochaeta</i>	<i>prairea</i>
		<i>lasiolepis</i>	<i>circinata</i>	<i>projecta</i>
			<i>aboriginum</i>	<i>sartwellii</i>
		<i>laxa</i>	<i>albonigra</i>	<i>scoparia</i>
			<i>luzulina</i>	<i>seorsa</i>
			<i>siccata</i>	
		<i>kabanovii</i>	<i>hendersonii</i>	<i>stipata</i>
		<i>mackenziei</i>	<i>crawei</i>	<i>synchocephala</i>
		<i>macrocephala</i>	<i>californica</i>	<i>tenuiflora</i>
		<i>melanocarpa</i>	<i>vaginata</i>	<i>tribuloides</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
		<i>mertensii</i>	<i>aurea</i>	<i>wiegandii</i>
		<i>michauxiana</i>	<i>obnupta</i>	<i>xerantica</i>
		<i>middendorffii</i>	<i>nudata</i>	<i>sparganioides</i>
		<i>miyabei</i>	<i>eurycarpa</i>	spp (10)
		<i>mollicula</i>	<i>aperta</i>	
		<i>nemurensis</i>	<i>leporina</i>	
		<i>nervatya</i>	<i>leporinella</i>	
		<i>oligosperma</i>	<i>praticola</i>	
		<i>olivacea</i>	<i>scoparia</i>	
		<i>omiana</i>	<i>tenera</i>	
		<i>onoei</i>	<i>straminiformis</i>	
		<i>oxyandra</i>	<i>xerantica</i>	
		<i>papulosa</i>	<i>interrupta</i>	
		<i>pauciflora</i>	<i>scopulorum</i>	
		<i>phacota</i>	<i>prionophylla</i>	
		<i>pilosa</i>	<i>sitchensis</i>	
		<i>planata</i>	<i>foetida</i>	
		<i>podogyna</i>	<i>simuata</i>	
		<i>pseudocurrica</i>	<i>pansa</i>	
		<i>pseudocyperus</i>	<i>praeegracilis</i>	
		<i>pseudololiacea</i>	<i>sartwellii</i>	
		<i>pumila</i>	<i>siccata</i>	
		<i>pyrenaica</i>	<i>vallicola</i>	
		<i>ramenskii</i>	<i>tumulicola</i>	
		<i>rhizopoda</i>	<i>densa</i>	
		<i>rhynchophysa</i>	<i>vulpinoidea</i>	
		<i>sabynensis</i>	<i>diantra</i>	
		<i>sadoensis</i>	<i>stipata</i>	
		<i>schimidzensis</i>	<i>jonesii</i>	
		<i>stenantha</i>	<i>neurophora</i>	
		<i>stipata</i>	<i>bipartita</i>	
		<i>subumbellata</i>	<i>brunnescens</i>	
		<i>subspathacea</i>	<i>laerviculmis</i>	
		<i>tenuiflora</i>	<i>praeceptorum</i>	
		<i>tenuiformis</i>	<i>canescens</i>	
		<i>thunbergii</i>	<i>deweyana</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
		<i>traiziscana</i>	<i>liota</i>	
		<i>uda</i>	<i>interior</i>	
		<i>vaginata</i>	<i>muricata</i>	
		<i>vesicaria</i>	<i>phyllomanica</i>	
		<i>viridula</i>	<i>sychnocephala</i>	
			<i>unilateralis</i>	
			<i>athrostachya</i>	
			<i>feta</i>	
			<i>fracta</i>	
			<i>phaeocephala</i>	
			<i>multicostata</i>	
			<i>illota</i>	
			<i>integra</i>	
			<i>linnophila</i>	
			<i>subfusa</i>	
			<i>petasata</i>	
			<i>crawfordii</i>	
			<i>pachystachya</i>	
			<i>microptera</i>	
			<i>haydeniana</i>	
			<i>proposita</i>	
			<i>parryana</i>	
			<i>mertensii</i>	
			<i>oederi</i>	
			<i>microglochis</i>	
			<i>leptopock</i>	
			<i>madoviuna</i>	
			<i>microptera</i>	
			<i>multicostata</i>	
			<i>nebrascens</i>	
			<i>petasata</i>	
			<i>praeagracilis</i>	
			<i>presii</i>	
			<i>prionophylla</i>	
			<i>retrorsa</i>	
			<i>rossii</i>	

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Genus	E-Asia	Japan	WN-America	EN-America
			<i>rostrata</i>	
			<i>saximontana</i>	
			<i>sheldonii</i>	
			<i>stipata</i>	
			<i>vesicaria</i>	
			<i>subnigricans</i>	
			<i>pyrenaica</i>	
			<i>nigricans</i>	
			<i>scirpoidea</i>	
			<i>rupestris</i>	
			<i>saxatilis</i>	
			<i>pensylvanica</i>	
			<i>macrocephala</i>	
			<i>pluriflora</i>	
<i>Cladium</i>				<i>mariscoides</i>
<i>Cyperus</i>	<i>difformis</i>	<i>difformis</i>	<i>aristatus</i>	<i>aristatus</i>
	<i>orthostachyus</i>	<i>orthostachyus</i>	<i>erythrothizos</i>	<i>erythrothizos</i>
	<i>serotinus</i>	<i>serotinus</i>	<i>esculentus</i>	<i>esculentus</i>
			<i>rivularis</i>	<i>rivularis</i>
			<i>schueinitzii</i>	<i>schueinitzii</i>
			<i>strigosus</i>	<i>strigosus</i>
	<i>amuriens</i>	<i>brevifolius</i>	<i>acuminatus</i>	<i>dentatus</i>
	<i>diaphanus</i>	<i>pacificus</i>	<i>filiculmis</i>	<i>diandrus</i>
	<i>globosus</i>	<i>sanguinolentus</i>	<i>houghtonii</i>	
	<i>exaltatus</i>			<i>flavescens</i>
	<i>nipponicus</i>			<i>polystachyos</i>
	<i>truncatus</i>			<i>filicinus</i>
				<i>engelmanni</i>
<i>Dulichium</i>			<i>arundinaceum</i>	<i>arundinaceum</i>
<i>Eleocharis</i>	<i>acicularis</i>	<i>acicularis</i>	<i>acicularis</i>	<i>acicularis</i>
	<i>ovata</i>	<i>ovata</i>	<i>ovata</i>	<i>ovata</i>
	<i>pauciflora</i>		<i>pauciflora</i>	<i>pauciflora</i>
	<i>congesta</i>	<i>congesta</i>	<i>tenuis</i>	<i>tenuis</i>
	<i>intersita</i>	<i>intersita</i>	<i>palustris</i>	<i>palustris</i>
	<i>kamtschatiaca</i>	<i>kamtschatiaca</i>	<i>parvula</i>	<i>parvula</i>
	<i>mamillata</i>	<i>mamillata</i>	<i>obtusata</i>	<i>obtusata</i>

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>valleculosa</i>	<i>valleculosa</i>		
	<i>wichurae</i>	<i>wichurae</i>		
	<i>dulcis</i>	<i>margaritacea</i>	<i>bella</i>	<i>compressa</i>
	<i>plantagineiformis</i>		<i>rostellata</i>	<i>fallax</i>
			<i>atropurpurea</i>	<i>equisetoides</i>
			<i>bolanderi</i>	<i>geniculata</i>
			<i>flavescens</i>	<i>intermedia</i>
				<i>melanocarpa</i>
				<i>quadrangulata</i>
				<i>olivacea</i>
<i>Eriophorum</i>	<i>brachyantherum</i>	<i>brachyantherum</i>	<i>brachyantherum</i>	<i>brachyantherum</i>
	<i>chamissonis</i>	<i>chamissonis</i>	<i>chamissonis</i>	<i>chamissonis</i>
	<i>scheuchzeri</i>	<i>scheuchzeri</i>	<i>scheuchzeri</i>	<i>scheuchzeri</i>
	<i>virginicum</i>			<i>virginicum</i>
	<i>polystachion</i>	<i>polystachion</i>	<i>polystachion</i>	
		<i>gracile</i>	<i>gracile</i>	<i>gracile</i>
	<i>vaginatum</i>	<i>vaginatum</i>	<i>viridicarinatum</i>	<i>vidicarinatum</i>
	<i>comosum</i>			<i>angustifolium</i>
	<i>latifolium</i>			<i>opacum</i>
	<i>fauriei</i>			<i>spissum</i>
				<i>tenellum</i>
<i>Fimbristylis</i>	<i>squarrosa</i>	<i>squarrosa</i>		
		<i>autumnalis</i>		<i>autumnalis</i>
	<i>stauntonii</i>	<i>dichotoma</i>		<i>caroliniana</i>
	<i>verrucifera</i>	<i>subbispicata</i>		
	<i>velata</i>	<i>densa</i>		
	<i>longispica</i>			
<i>Hemicarpha</i>			<i>micrantha</i>	<i>micrantha</i>
			<i>occidentalis</i>	
<i>Kobresia</i>	<i>myosuroides</i>	<i>myosuroides</i>	<i>myosuroides</i>	
	<i>simpliciascula</i>	<i>simpliciascula</i>	<i>simpliciascula</i>	
		<i>bellardii</i>		
<i>Rhynchospora</i>	<i>alba</i>	<i>alba</i>	<i>alba</i>	<i>alba</i>
	<i>chinensis</i>	<i>faberi</i>		<i>capillacea</i>
	<i>brownii</i>	<i>fauriei</i>		<i>capitellata</i>
		<i>fujiana</i>		<i>fusca</i>

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Genus	E-Asia	Japan	WN-America	EN-America
		<i>yasudana</i>		<i>inundata</i>
				<i>macrostachya</i>
				<i>terreyana</i>
<i>Scirpus</i>	<i>hudsonianus</i>	<i>hudsonianus</i>	<i>hudsonianus</i>	<i>hudsonianus</i>
	<i>fluviatilis</i>	<i>fluviatilis</i>	<i>fluviatilis</i>	<i>fluviatilis</i>
		<i>caespitosus</i>	<i>caespitosus</i>	<i>caespitosus</i>
	<i>juncoides</i>	<i>juncoides</i>	<i>americanus</i>	<i>americanus</i>
	<i>komarovii</i>	<i>komarovii</i>	<i>heterochaetus</i>	<i>heterochaetus</i>
	<i>lacustris</i>	<i>lacustris</i>	<i>cyperinus</i>	<i>cyperinus</i>
	<i>sylvaticus</i>	<i>sylvaticus</i>	<i>microcarpus</i>	<i>microcarpus</i>
	<i>planiculmis</i>	<i>planiculmis</i>	<i>validus</i>	<i>validus</i>
	<i>triangulatus</i>	<i>triangulatus</i>	<i>subterminalis</i>	<i>subterminalis</i>
	<i>triqueter</i>	<i>triqueter</i>		
	<i>matfeldianus</i>	<i>radicans</i>	<i>pumilus</i>	<i>atrovirens</i>
	<i>tabernaemontani</i>	<i>maximowiczii</i>	<i>pallidus</i>	<i>clintonii</i>
	<i>karuizawensis</i>		<i>olneyi</i>	<i>peckii</i>
	<i>rosthornii</i>			<i>verecundus</i>
	<i>japonicus</i>		<i>paludosus</i>	<i>acutus</i>
	<i>orientalis</i>			<i>torreyi</i>
			<i>cernus</i>	<i>expansus</i>
			<i>nevadensis</i>	<i>rufus</i>
			<i>maritimus</i>	<i>polyphyllus</i>
			<i>congdonii</i>	<i>lineatus</i>
				<i>pendulus</i>
				<i>smithii</i>
				<i>wichurae</i>
<i>Scleria</i>				<i>nitida</i>
				<i>pauciflora</i>
				<i>triglomerata</i>
<i>Tunzellus</i>	<i>serotinus</i>			
Poaceae (Gramineae)				
<i>Achnantherum</i>	<i>chingii</i>	<i>pekinense</i>		<i>avenacea</i>
	<i>exteriorientale</i>			<i>spartea</i>
	<i>sibiricum</i>			
	<i>splendens</i>			

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Agropyron</i>	<i>caninum</i>	<i>caninum</i>	<i>caninum</i>	<i>caninum</i>
	<i>cristatum</i>	<i>ciliare</i>	<i>dasytachyum</i>	<i>dasytachyum</i>
		<i>tsukushiense</i>	<i>trachycaulum</i>	<i>trachycaulum</i>
		<i>yezoense</i>	<i>smithii</i>	
			<i>spicatum</i>	
<i>Agrostis</i>	<i>scabra</i>	<i>scribneri</i>		
		<i>scabra</i>	<i>scabra</i>	<i>scabra</i>
		<i>borealis</i>	<i>borealis</i>	<i>borealis</i>
		<i>stolonifera</i>	<i>stolonifera</i>	<i>stolonifera</i>
	<i>clavata</i>	<i>clavata</i>		
	<i>myriantha</i>	<i>flaccida</i>	<i>hallii</i>	<i>perennans</i>
	<i>sibirica</i>	<i>gigantea</i>	<i>variabilis</i>	
			<i>idahoensis</i>	
			<i>oregonensis</i>	
			<i>howellii</i>	
			<i>aequalis</i>	
			<i>pallens</i>	
			<i>diegoensis</i>	
			<i>semiverticillata</i>	
			<i>longiligula</i>	
<i>Alopecurus</i>			<i>thurberiana</i>	
			<i>humilis</i>	
			<i>rossiae</i>	
			<i>microphylla</i>	
			<i>exarata</i>	
<i>Alopecurus</i>	<i>aequalis</i>	<i>aequalis</i>	<i>aequalis</i>	<i>aequalis</i>
	<i>amurensis</i>		<i>carolinianus</i>	<i>carolinianus</i>
	<i>japonica</i>		<i>alpinus</i>	
			<i>geniculatus</i>	
			<i>pratensis</i>	
<i>Ammophila</i> <i>Andropogon</i>			<i>saccatus</i>	
			<i>arenaria</i>	<i>breviligulata</i>
			<i>gerardi</i>	<i>gerardi</i>
			<i>scoparius</i>	<i>scoparius</i>
			<i>hallii</i>	
<i>Anthoxanthum gracile</i>				

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Aristida</i>			<i>longespica</i> <i>oligantha</i> <i>longiseta</i>	<i>longespica</i> <i>oligantha</i> <i>purpurascens</i> <i>basiramea</i> <i>dichotoma</i> <i>tuberculosa</i>
<i>Arthraxon</i>		<i>hispidus</i>		
<i>Arundinella</i>	<i>hirta</i> <i>nepalensis</i> <i>setosa</i>	<i>hirta</i>		
<i>Arundo</i>	<i>donax</i>			
<i>Asperella</i>	<i>duthiei</i>	<i>longearistata</i>		
<i>Beckmannia</i>	<i>syzigachne</i>	<i>syzigachne</i>	<i>syzigachne</i>	
<i>Bouteloua</i>			<i>curtipedula</i> <i>gracilis</i>	<i>curtipedula</i>
<i>Brachyelytrum</i>				<i>erectum</i>
<i>Brachypodium</i>	<i>sylvaticum</i>	<i>sylvaticum</i>		
<i>Bromus</i>	<i>inermis</i> <i>japonicus</i> <i>remotiflorus</i> <i>sinensis</i> <i>richardsonii</i> <i>sibiricus</i>	<i>inermis</i> <i>japonicus</i> <i>pauciflorus</i> <i>yezoensis</i>	<i>inermis</i> <i>ciliatus</i> <i>anomalus</i> <i>vulgaris</i> <i>sitchensis</i> <i>marginatus</i> <i>carinatus</i> <i>suksdorfii</i> <i>orcuttianus</i>	<i>ciliatus</i> <i>kalmii</i> <i>latiglumis</i> <i>purgans</i>
<i>Brylkinia</i>	<i>caudata</i>	<i>caudata</i>		
<i>Buchloe</i>			<i>dactyloides</i>	
<i>Calamagrostis</i>	<i>epigeios</i> <i>pseudophragmites</i>	<i>epigeios</i> <i>pseudophragmites</i> <i>neglecta</i> <i>purpurascens</i>	<i>neglecta</i> <i>purpurascens</i> <i>canadensis</i> <i>inexpansa</i> <i>breweri</i> <i>howellii</i>	<i>neglecta</i> <i>purpurascens</i> <i>canadensis</i> <i>inexpansa</i> <i>pickeringii</i> <i>cinnoides</i>
	<i>mongolicola</i> <i>distantiflora</i>	<i>hakonensis</i> <i>arundinacea</i>		

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Genus	E-Asia	Japan	WN-America	EN-America
	<i>hinganensis</i>	<i>gigas</i> <i>sachalinensis</i>	<i>rubescens</i> <i>sesquiflora</i> <i>tweedyi</i> <i>crassiglumis</i> <i>montanensis</i> <i>nutkaeensis</i> <i>koelerioides</i> <i>scopulorum</i> <i>rubescens</i> <i>nutkaensis</i> <i>longifolia</i>	<i>lacustris</i> <i>longifolia</i>
<i>Calamovilfa</i>			<i>aquatica</i>	<i>aquatica</i>
<i>Catabrosa</i>			<i>longispinus</i>	<i>longispinus</i>
<i>Cenchrus</i>				
<i>Chloris</i>	<i>virgata</i>			
<i>Cinna</i>	<i>latifolia</i>	<i>latifolia</i>	<i>latifolia</i>	<i>latifolia</i> <i>arundinacea</i>
<i>Cynodon</i>	<i>dactyylon</i>	<i>dactyylon</i>	<i>dactyylon</i>	
<i>Dactylis</i>	<i>glomerata</i>	<i>glomerata</i>		
<i>Danthonia</i>			<i>intermedia</i> <i>spicata</i> <i>californica</i> <i>parryi</i> <i>unispicata</i>	<i>intermedia</i> <i>spicata</i> <i>compressa</i> <i>sericea</i>
<i>Deschampsia</i>	<i>caespitosa</i>	<i>caespitosa</i> <i>atropurpea</i> <i>flexuosa</i>	<i>caespitosa</i> <i>atropurpea</i> <i>danthonioides</i> <i>elongata</i>	<i>caespitosa</i> <i>atropurpea</i> <i>flexuosa</i>
<i>Diarrhena</i>	<i>fauriei</i> <i>mandshurica</i> <i>yabeana</i>	<i>japonica</i>		
<i>Digitaria</i>	<i>adscendens</i> <i>ischaemum</i> <i>violascens</i> <i>sanguinalis</i>	<i>adscendens</i> <i>ischaemum</i> <i>violascens</i>		
<i>Dimeria</i>	<i>ornithopoda</i>	<i>ornithopoda</i>		

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Genus	E-Asia	Japan	WN-America	EN-America
<i>Distichlis</i>			<i>spicata</i> <i>stricta</i>	
<i>Eccoilopus</i>	<i>cotulifer</i>	<i>cotulifer</i>		
<i>Echinochloa</i>	<i>crusgalli</i> <i>colinum</i>	<i>crusgalli</i>	<i>crusgalli</i> <i>colinum</i>	<i>colinum</i> <i>wiegandii</i>
<i>Elymus</i>	<i>mollis</i> <i>dahuricus</i> <i>sibiricus</i> <i>excelsus</i> <i>natans</i>	<i>mollis</i> <i>dahuricus</i> <i>sibiricus</i> <i>yubaridakensis</i>	<i>mollis</i> <i>canadensis</i> <i>virginicus</i> <i>glaucus</i> <i>hystrix</i> <i>ambiguus</i> <i>innovatus</i> <i>flavescens</i> <i>hirsutus</i> <i>triticoideus</i> <i>cinereus</i>	<i>mollis</i> <i>canadensis</i> <i>virginicus</i> <i>riparius</i> <i>hystrix</i>
<i>Eragrostis</i>	<i>pilosa</i> <i>filiformis</i> <i>cilianensis</i> <i>perennans</i> <i>poaeoides</i>	<i>multicaulis</i>	<i>hypnoides</i> <i>pectinacea</i> <i>multicaulis</i> <i>lutescens</i> <i>orcuttiana</i>	<i>hypnoides</i> <i>pectinacea</i> <i>capillaris</i> <i>frankii</i> <i>hirsuta</i>
<i>Eriochloa</i>	<i>villosa</i>			
<i>Festuca</i>	<i>ovina</i> <i>rubra</i> <i>extremiorientalis</i> <i>japonica</i> <i>pratensis</i>	<i>ovina</i> <i>rubra</i> <i>extremiorientalis</i> <i>parvigluma</i>	<i>ovina</i> <i>rubra</i> <i>occidentalis</i> <i>microstachys</i> <i>subflora</i> <i>octoflora</i> <i>subulata</i> <i>scabrella</i> <i>idahoensis</i> <i>viridula</i>	<i>ovina</i> <i>rubra</i> <i>occidentalis</i> <i>obtusata</i> <i>altaica</i> <i>octoflora</i> <i>saximontana</i>
<i>Glyceria</i>	<i>alnasteretum</i> <i>leptolepis</i> <i>lithuanica</i>	<i>alnasteretum</i> <i>leptolepis</i> <i>lithuanica</i>	<i>borealis</i> <i>grandis</i> <i>striata</i>	<i>borealis</i> <i>grandis</i> <i>striata</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>esfusa</i>	<i>depauperata</i>	<i>occidentalis</i>	<i>acutifloras</i>
	<i>triflora</i>	<i>ischyroneura</i>	<i>leptostachya</i>	<i>canadensis</i>
	<i>spiculosa</i>			<i>fluitans</i>
				<i>melicaria</i>
				<i>septrionalis</i>
<i>Helictotrichon</i>			<i>hookeri</i>	
<i>Hemarthria</i>	<i>sibirica</i>			
<i>Hesperochloa</i>			<i>kingii</i>	
<i>Hierchloe</i>	<i>odorata</i>	<i>odorata</i>	<i>odorata</i>	<i>odorata</i>
			<i>alpina</i>	<i>alpina</i>
	<i>glabra</i>		<i>geniculatum</i>	
			<i>occidentalis</i>	
<i>Hordeum</i>			<i>jubarum</i>	<i>jubarum</i>
			<i>vulgare</i>	<i>nodosum</i>
			<i>pusillum</i>	
			<i>brachyantherum</i>	
<i>Hystrix</i>				<i>patula</i>
<i>Imperata</i>	<i>cylindrica</i>	<i>cylindrica</i>		
<i>Isachne</i>	<i>globosa</i>	<i>globosa</i>		
<i>Ischaemum</i>	<i>aristatum</i>	<i>anthephoroides</i>		
<i>Leersia</i>	<i>oryzoides</i>	<i>oryzoides</i>	<i>oryzoides</i>	<i>oryzoides</i>
		<i>japonica</i>		<i>virginica</i>
<i>Leptochloa</i>			<i>fascicularis</i>	
<i>Koeleria</i>	<i>cristata</i>	<i>cristata</i>	<i>cristata</i>	<i>cristata</i>
	<i>hirsuta</i>			
	<i>komarovii</i>			
<i>Melica</i>	<i>natans</i>	<i>natans</i>	<i>smithii</i>	<i>smithii</i>
	<i>scabrosa</i>		<i>fugax</i>	
	<i>turczaninowiana</i>	<i>aristata</i>		
			<i>geyeri</i>	
			<i>harfordii</i>	
			<i>bulbosa</i>	
			<i>subulata</i>	
			<i>spectabilis</i>	
<i>Microstegium</i>	<i>japonicum</i>	<i>japonicum</i>		
	<i>vimineum</i>	<i>vimineum</i>		

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Milium</i>	<i>effusum</i>	<i>effusum</i>	<i>effusum</i>	<i>effusum</i>
<i>Miscanthus</i>	<i>sacchariflorus</i> <i>sinensis</i>	<i>sacchariflorus</i> <i>sinensis</i>		
<i>Moliniopsis</i>	<i>japonica</i>	<i>japonica</i>		
<i>Muhlenbergia</i>	<i>japonica</i> <i>hugelii</i>	<i>japonica</i> <i>curvيارistata</i> <i>longistolon</i>	<i>cuspidata</i> <i>mexicana</i> <i>racemosa</i> <i>glomerata</i> <i>richardsonis</i> <i>asperifolia</i> <i>idahoensis</i> <i>andina</i> <i>montana</i> <i>minutissima</i> <i>squarrosa</i>	<i>cuspidata</i> <i>mexicana</i> <i>racemosa</i> <i>glomerata</i> <i>richardsonis</i> <i>frondosa</i> <i>sobolifera</i> <i>schreberi</i> <i>sylvatica</i> <i>uniflora</i>
<i>Munroa</i>				
<i>Opismenus</i>	<i>undulatifolius</i>	<i>undulatifolius</i>		
<i>Orthoraphium</i>	<i>coreanum</i> <i>grandifolium</i>	<i>coreanum</i>		
<i>Oryzopsis</i>		<i>canadensis</i>	<i>asperifolia</i> <i>hendersonii</i> <i>micrantha</i> <i>hymenoides</i> <i>webberi</i> <i>exigua</i> <i>swallenii</i>	<i>asperifolia</i> <i>punyens</i> <i>racemosa</i>
<i>Panicum</i>	<i>bisculcatum</i>	<i>bisculcatum</i>	<i>capillare</i> <i>occidentale</i> <i>scribnerianum</i>	<i>capillare</i> <i>bicknellii</i> <i>boreale</i> <i>claudestinum</i> <i>columbianum</i> <i>commonsianum</i> <i>commutatum</i> <i>depauperatum</i> <i>dichotomum</i> <i>dichotomiflorum</i> <i>flexile</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
				<i>implicatum</i>
				<i>latifolium</i>
				<i>leibergii</i>
				<i>linearifolium</i>
				<i>oligosanthes</i>
				<i>perlongum</i>
				<i>philadelphicum</i>
				<i>polyanthes</i>
				<i>sphaerocarpon</i>
				<i>villosissimum</i>
				<i>virgatum</i>
				<i>xanthophyllum</i>
<i>Parapholis</i>				<i>incurva</i>
<i>Paspalum</i>			<i>distidum</i>	<i>ciliatifolium</i>
<i>Pennisetum</i>	<i>alopecuroides</i>			
	<i>flaccidum</i>			
<i>Phacelurus</i>	<i>latifolius</i>	<i>latifolius</i>		
<i>Phalaris</i>	<i>arundinacea</i>	<i>arundinacea</i>	<i>arundinacea</i>	<i>arundinacea</i>
			<i>minor</i>	
			<i>brachystachys</i>	
			<i>caroliniana</i>	
			<i>canariensis</i>	
			<i>paradoxa</i>	
<i>Phleum</i>	<i>alpinum</i>	<i>alpinum</i>	<i>alpinum</i>	<i>alpinum</i>
<i>Phragmites</i>	<i>communis</i>	<i>communis</i>	<i>communis</i>	<i>australis</i>
<i>Pleuropogon</i>			<i>oregonus</i>	
			<i>refractus</i>	
<i>Poa</i>	<i>annua</i>	<i>annua</i>	<i>annua</i>	
	<i>acroleuea</i>	<i>acroleuea</i>	<i>palustris</i>	<i>palustris</i>
	<i>eminens</i>	<i>eminens</i>		
	<i>pratensis</i>	<i>pratensis</i>		
	<i>radula</i>	<i>radula</i>		
	<i>sphondylodes</i>	<i>sphondylodes</i>		
	<i>viridula</i>	<i>viridula</i>		
	<i>nemoralis</i>		<i>nemoralis</i>	
	<i>sibirica</i>	<i>hakusanensis</i>	<i>howellii</i>	<i>alpina</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>pseudopalustris</i>	<i>nipponica</i>	<i>bolanderi</i>	<i>interior</i>
	<i>mongolica</i>	<i>fauriei</i>	<i>macrantha</i>	<i>fernaldiana</i>
	<i>subfastigiata</i>	<i>hyachinensis</i>	<i>fendleriana</i>	<i>longuida</i>
	<i>palustris</i>	<i>macrocalyx</i>	<i>nervosa</i>	<i>canloyi</i>
		<i>hisanchii</i>	<i>compressa</i>	<i>arctica</i>
		<i>sachalinensis</i>	<i>curtifolia</i>	
		<i>trivalis</i>	<i>arida</i>	<i>paludigena</i>
			<i>glaucifolia</i>	<i>saltuensis</i>
			<i>grayana</i>	<i>sylvestris</i>
			<i>acurta</i>	
			<i>nervosa</i>	
			<i>bulbosa</i>	
			<i>trivialis</i>	
			<i>cusickii</i>	
			<i>marcida</i>	
			<i>reflexa</i>	
			<i>leptocoma</i>	
			<i>grayana</i>	
			<i>interior</i>	
			<i>pattersonii</i>	
			<i>curtifolia</i>	
			<i>laxiflora</i>	
			<i>glaucifolia</i>	
			<i>pratensis</i>	
			<i>palustris</i>	
			<i>leibergii</i>	
			<i>pachypholis</i>	
			<i>pattersonii</i>	
			<i>rupicola</i>	
			<i>stenantha</i>	
			<i>lettermanii</i>	
			<i>gracillima</i>	
			<i>juncifolia</i>	
			<i>nevadensis</i>	
			<i>scabrella</i>	
			<i>sandbergii</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Polypogon</i>			<i>incarva</i> <i>interruptus</i>	
<i>Puccinellia</i>	<i>pumila</i> <i>chinampoensis</i> <i>distans</i>	<i>pumila</i>	<i>pumila</i> <i>nuttalliana</i> <i>lucida</i> <i>pauciflora</i> <i>lemmonii</i> <i>hutkaensis</i> <i>distans</i> <i>cusickii</i>	<i>pumila</i> <i>nuttalliana</i> <i>pallida</i> <i>fernaldii</i>
<i>Sasa</i>		<i>borealis</i> <i>cernua</i> <i>kurilensis</i> <i>pamata</i> <i>senanensis</i>		
<i>Schedonnardus</i>			<i>paniculatus</i>	
<i>Schizanthus</i>	<i>purpurascens</i>	<i>purpurascens</i>	<i>purpurascens</i>	<i>purpurascens</i>
<i>Scribaneria</i>			<i>bolanderi</i>	
<i>Setaria</i>	<i>glauca</i> <i>viridis</i> <i>plicata</i>	<i>glauca</i> <i>viridis</i> <i>faberi</i>		
<i>Sitanion</i>			<i>hystrix</i> <i>jubatum</i>	
<i>Sorghum</i>			<i>halepense</i>	
<i>Spartina</i>			<i>pectinata</i> <i>gracilis</i>	<i>pectinata</i> <i>alterniflora</i> <i>cynosuroides</i> <i>patens</i>
<i>Sphenopholis</i>			<i>obtusata</i> <i>pallens</i>	<i>obtusata</i> <i>intermedia</i> <i>nitida</i>
<i>Spodiopogon</i>	<i>sibiricus</i> <i>cotulifera</i>	<i>sibiricus</i>		
<i>Sporobolus</i>			<i>asper</i> <i>airoides</i> <i>neglectus</i>	<i>vaginiflorus</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Stipa</i>	<i>baicalensis</i> <i>purpurea</i>		<i>cryptandrus</i> <i>comata</i> <i>elmeri</i> <i>lemmonii</i> <i>thurberiana</i> <i>spartea</i> <i>richardsonii</i> <i>pinetorum</i> <i>viridula</i> <i>lettermanii</i> <i>occidentalis</i>	
<i>Torreyochloa</i>	<i>natans</i> <i>viridis</i>	<i>natans</i> <i>viridis</i>		
<i>Trisetum</i>	<i>spicatum</i> <i>bifidum</i> <i>sibiricum</i>	<i>spicatum</i> <i>bifidum</i>	<i>spicatum</i> <i>cernuum</i> <i>canescens</i> <i>wolfii</i> <i>orthochaetum</i>	<i>spicatum</i> <i>melicoides</i> <i>pensylvanicum</i>
<i>Zizania</i>	<i>latifolia</i> <i>caduciflora</i>	<i>latifolia</i>	<i>aquatica</i>	<i>aquatica</i>
<i>Zoysia</i>		<i>japonica</i>		
Sparganiaceae				
<i>Sparganium</i>	<i>angustifolium</i> <i>emersum</i> <i>minimum</i> <i>stoloniferum</i> <i>simplex</i> <i>stenophyllum</i>	<i>angustifolium</i> <i>emersum</i> <i>stoloniferum</i> <i>simplex</i> <i>stenophyllum</i> <i>glomeratum</i>	<i>angustifolium</i> <i>emersum</i> <i>minimum</i> <i>eurycarpum</i> <i>chlorocarpum</i>	<i>angustifolium</i> <i>emersum</i> <i>eurycarpum</i> <i>chlorocarpum</i> <i>americanum</i> <i>androcladum</i> <i>fluctuans</i>
Typhaceae				
<i>Typha</i>	<i>angustata</i>	<i>angustata</i>	<i>angustata</i>	<i>angustata</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>latifolia</i>	<i>latifolia</i>	<i>latifolia</i>	<i>latifolia</i>
	<i>davidiana</i>			
	<i>minima</i>			
	<i>orientalis</i>			

LILIIDAE

Pontederiaceae

<i>Heteranthera</i>			<i>dubia</i>	<i>reniformis</i>
<i>Monochoria</i>	<i>korsakovii</i>	<i>korsakovii</i>		
<i>Pontederia</i>				<i>cordata</i>
<i>Zosterella</i>				<i>dubia</i>

Iridaceae

<i>Iris</i>	<i>laevigata</i>	<i>laevigata</i>		
	<i>sanguinea</i>	<i>sanguinea</i>		
		<i>setosa</i>	<i>setosa</i>	<i>setosa</i>
	<i>lactea</i>	<i>eusata</i>	<i>tennis</i>	<i>lacustris</i>
	<i>maackii</i>		<i>chrysophylla</i>	<i>versicolor</i>
	<i>rosii</i>		<i>tenax</i>	<i>shrevei</i>
	<i>typhifolia</i>		<i>missouriensis</i>	
	<i>ensata</i>			
	<i>tenuifolia</i>			
	<i>tigrida</i>			
	<i>uniflora</i>			
	<i>wilsonii</i>			
<i>Sisyrinchium</i>		<i>atlantium</i>	<i>angustifolium</i>	<i>angustifolium</i>
			<i>californicum</i>	<i>albidum</i>
		<i>arenicola</i>	<i>inflatum</i>	<i>mucronatum</i>
		<i>graminoides</i>	<i>douglasii</i>	<i>montanum</i>

Liliaceae

<i>Aletris</i>				<i>farinosa</i>
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Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Allium</i>	<i>schoenoprasum</i>	<i>schoenoprasum</i>	<i>schoenoprasum</i>	<i>schoenoprasum</i>
	<i>monanthum</i>	<i>monanthum</i>	<i>cernuum</i>	<i>cernuum</i>
	<i>spendens</i>	<i>spendens</i>		
	<i>victoralis</i>	<i>victoralis</i>		
	<i>mongolicum</i>	<i>grayi</i>	<i>acuminatum</i>	<i>canadense</i>
	<i>pallasii</i>		<i>dictyon</i>	
	<i>ramosum</i>		<i>douglasii</i>	<i>triccum</i>
	<i>saxicola</i>		<i>fibrillum</i>	
	<i>senescens</i>		<i>geyeri</i>	
	<i>macrostemum</i>		<i>macrum</i>	
			<i>nevii</i>	
			<i>tolmiei</i>	
			<i>brandegei</i>	
			<i>madidum</i>	
			<i>aaseae</i>	
			<i>parvum</i>	
			<i>robinsonii</i>	
			<i>crenulatum</i>	
			<i>simillimum</i>	
			<i>amplectens</i>	
			<i>campanulatum</i>	
			<i>bisceptrum</i>	
			<i>higrum</i>	
			<i>rineale</i>	
			<i>textile</i>	
			<i>nevadense</i>	
			<i>unifolium</i>	
			<i>validum</i>	
			<i>brevistylum</i>	
			<i>lemmonii</i>	
			<i>pleianthum</i>	
			<i>scilloides</i>	
<i>Asparagus</i>	<i>cochinchinensis</i>	<i>cochinchinensis</i>		
	<i>schoberioides</i>	<i>schoberioides</i>		
	<i>gilbus</i>			
	<i>dahuricus</i>			

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
	<i>lycopodinens</i>			
	<i>oligoclonos</i>			
<i>Brodiaea</i>			<i>congesta</i>	
			<i>cornaria</i>	
			<i>elgans</i>	
			<i>hendersonii</i>	
			<i>hyacinthina</i>	
			<i>howellii</i>	
			<i>douglasii</i>	
<i>Calochortus</i>			<i>bruneaunis</i>	
			<i>macrocarpus</i>	
			<i>gunnisonii</i>	
			<i>hiitidus</i>	
			<i>eurycarpus</i>	
			<i>nuttallii</i>	
			<i>uniflorus</i>	
			<i>longebarbatus</i>	
			<i>apiculatus</i>	
			<i>tyallii</i>	
			<i>elgans</i>	
			<i>subalpinus</i>	
			<i>tolmiei</i>	
<i>Camassia</i>			<i>cusickii</i>	<i>scilloides</i>
			<i>leichtlinii</i>	
			<i>quamash</i>	
<i>Chamaelirium</i>				<i>luteum</i>
<i>Clintonia</i>	<i>undens</i>	<i>undens</i>	<i>uniflora</i>	<i>borealis</i>
				<i>umbellata</i>
<i>Convallaria</i>	<i>keiskei</i>	<i>keiskei</i>		
<i>Disporum</i>	<i>ovale</i>	<i>sessile</i>	<i>hookeri</i>	<i>lanuginosum</i>
	<i>viridescens</i>	<i>smilacinum</i>	<i>smithii</i>	<i>maculatum</i>
			<i>trachycaryum</i>	
<i>Erythronium</i>	<i>japonicum</i>	<i>japonicum</i>	<i>montanum</i>	<i>albidum</i>
			<i>oregonum</i>	<i>americanum</i>
			<i>grandiflorum</i>	
			<i>revolutum</i>	

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Fritillaria</i>	<i>maximowiczii</i> <i>ussurensis</i> <i>kamtschensis</i>		<i>camschatcensis</i> <i>pudica</i> <i>lanceolata</i> <i>atropurpurea</i>	
<i>Gagea</i>	<i>lutea</i> <i>binensis</i> <i>nakaiana</i> <i>pauciflora</i>	<i>lutea</i> <i>japonica</i>		
<i>Helonias</i>				<i>bullata</i>
<i>Heloniopsis</i>		<i>orientalis</i>		
<i>Hemerocallis</i>	<i>dumortieri</i> <i>citrina</i> <i>coreana</i> <i>minor</i>	<i>dumortieri</i> <i>fulva</i> <i>middendorffii</i> <i>yezoensis</i>		
<i>Hosta</i>	<i>ensata</i> <i>japonica</i>	<i>atropurpurea</i> <i>montana</i> <i>rectifolia</i> <i>osense</i>		
<i>Japonolirion</i>			<i>montanum</i>	
<i>Leucocrinum</i>				
<i>Lilium</i>	<i>longifolium</i> <i>maculatum</i> <i>callosum</i> <i>concolor</i> <i>cernuum</i> <i>dauricum</i> <i>tenuifolium</i> <i>disticum</i>	<i>longifolium</i> <i>maculatum</i> <i>cordatum</i> <i>medeoloides</i> <i>hansonii</i>	<i>philadelphicum</i> <i>colubinum</i> <i>washingtonianum</i>	<i>philadelphicum</i> <i>canadense</i>
<i>Liriope</i>	<i>minor</i> <i>spicata</i>	<i>minor</i>		
<i>Lloydia</i>			<i>serotina</i>	
<i>Loydea</i>	<i>triflora</i>	<i>triflora</i> <i>serotina</i>		
<i>Maianthemum</i>	<i>dilatatum</i> <i>bifolium</i>	<i>dilatatum</i> <i>bifolium</i>	<i>dilatatum</i> <i>canadense</i>	<i>canadense</i> <i>virginiana</i> <i>virginicum</i>
<i>Medeola</i>				
<i>Melanthium</i>				

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Metanartheceum</i>		<i>luteoviride</i>		
<i>Nartheceum</i>		<i>asiaticum</i>		
<i>Ophiopogon</i>	<i>japonicus</i>	<i>japonicus</i>		
<i>Paris</i>	<i>verticillata</i>	<i>verticillata</i>		
		<i>tetraphylla</i>		
<i>Polygonatum</i>	<i>desoulavyi</i>	<i>desoulavyi</i>		
	<i>humile</i>	<i>humile</i>		
	<i>involucratum</i>	<i>involucratum</i>		
	<i>odoratum</i>	<i>odoratum</i>		
	<i>inflatum</i>	<i>lasianthum</i>		<i>biflorum</i>
	<i>stenophyllum</i>	<i>macranthum</i>		<i>pubescens</i>
	<i>nakatianum</i>			
	<i>quinguefolium</i>			
	<i>sibiricum</i>			
<i>Scilla</i>	<i>scilloides</i>	<i>scilloides</i>		
<i>Scoliopus</i>			<i>hallii</i>	
<i>Smilacina</i>	<i>japonica</i>	<i>japonica</i>	<i>racemosa</i>	<i>racemosa</i>
	<i>dahurica</i>	<i>yezoensis</i>	<i>stellata</i>	<i>stellata</i>
			<i>trifolia</i>	<i>trifolia</i>
<i>Smilax</i>	<i>china</i>	<i>china</i>		
		<i>riparia</i>		<i>ecirrhata</i>
				<i>glauca</i>
				<i>hispida</i>
				<i>herbacea</i>
				<i>rotundifolia</i>
<i>Stenanthium</i>			<i>occidentale</i>	<i>gramineum</i>
<i>Streptopus</i>	<i>amplexifolius</i>	<i>amplexifolius</i>	<i>amplexifolius</i>	<i>amplexifolius</i>
		<i>streptopoides</i>	<i>streptopoides</i>	
			<i>roseus</i>	<i>roseus</i>
	<i>koreanus</i>			
	<i>obtusatus</i>			
<i>Tofieldia</i>	<i>coccinea</i>	<i>coccinea</i>	<i>coccinea</i>	
	<i>thibetica</i>	<i>okuboi</i>	<i>glutinosa</i>	<i>glutinosa</i>
			<i>borealis</i>	<i>palustris</i>
<i>Tricyrtis</i>	<i>macropoda</i>	<i>affinis</i>		
		<i>latifolia</i>		

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
<i>Trillium</i>	<i>kamtschaticum</i>	<i>kamtschaticum</i> <i>smallii</i>	<i>ovatum</i> <i>chloropetalum</i> <i>petiolatum</i>	<i>erectum</i> <i>gleasoni</i> <i>grandiflorum</i> <i>recurvatum</i> <i>undulatum</i>
<i>Uvularia</i>				<i>grandiflora</i> <i>perfoliata</i> <i>sessilifolia</i>
<i>Veratrum</i>	<i>maackii</i> <i>dahuricum</i> <i>dolichopetalum</i> <i>nigrum</i>	<i>maackii</i> <i>grandiflorum</i> <i>oxysepalum</i> <i>stamineum</i>	<i>viride</i> <i>insolitum</i> <i>californicum</i>	<i>viride</i>
<i>Xerophyllum</i>			<i>tenax</i>	
<i>Yucca</i>			<i>glauca</i>	
<i>Zigadenus</i>	<i>sibiricus</i>	<i>sibiricus</i>	<i>elgans</i> <i>paniculatus</i> <i>venenosus</i>	<i>elgans</i> <i>leimanthoides</i>
Dioscoreaceae				
<i>Dioscorea</i>	<i>nipponica</i>	<i>batatas</i> <i>nipponica</i> <i>tokoro</i>		
Orchidaceae				
<i>Amitostigma</i>		<i>kinoshitae</i>		
<i>Aplectrum</i>				<i>hyemale</i>
<i>Arethus</i>				<i>bulboisa</i>
<i>Calopogon</i>				<i>tuberosus</i>
<i>Calanthe</i>	<i>discolor</i>	<i>nipponica</i> <i>torifera</i>		
<i>Calypso</i>	<i>bulbosa</i>		<i>bulbosa</i>	<i>bulbosa</i>
<i>Cephalanthera</i>	<i>erecta</i>	<i>erecta</i> <i>longibracteata</i>	<i>austinae</i>	
<i>Coeloglossum</i>	<i>viride</i>	<i>viride</i>	<i>viride</i>	<i>viride</i>
<i>Corallorhiza</i>			<i>maculata</i>	<i>maculata</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>striata</i>	<i>striata</i>
			<i>trifida</i>	<i>trifida</i>
			<i>mertensiana</i>	<i>odontorhiza</i>
			<i>wisteriana</i>	
<i>Cremastra</i>		<i>unguiculata</i> <i>variable</i>		
<i>Cymbidium</i>	<i>erythraecum</i>	<i>goeringii</i>		
<i>Cypripedium</i>	<i>caleolus</i>		<i>caleolus</i>	<i>caleolus</i>
	<i>macranthum</i>	<i>macranthum</i>		
	<i>flavum</i>	<i>yatabeanum</i>	<i>montanum</i>	<i>acaule</i>
	<i>guttatum</i>		<i>fasciculatum</i>	<i>candidum</i>
	<i>margaritaceum</i>		<i>passerinum</i>	<i>arietinum</i> <i>reginae</i>
<i>Dactylostalix</i>		<i>ringens</i>		
<i>Diplandrorchis</i>	<i>sinica</i>			
<i>Eburophyton</i>			<i>austiniiae</i>	
<i>Epipactis</i>	<i>thunbergii</i>	<i>thunbergii</i>	<i>gigantea</i>	
	<i>handelii</i>	<i>papillosa</i>		
<i>Epipogium</i>	<i>aphyllum</i>	<i>aphyllum</i>		
<i>Galeola</i>		<i>septentrionalis</i>		
<i>Galearis</i>				<i>spectabilis</i>
<i>Gastrodia</i>	<i>elata</i>	<i>elata</i>		
<i>Goodyera</i>	<i>repens</i>	<i>repens</i>	<i>repens</i>	<i>repens</i>
	<i>maximowicziana</i>	<i>maximowicziana</i>	<i>oblongifolia</i>	<i>oblongifolia</i>
		<i>pendula</i>		<i>pubescens</i> <i>tesselata</i>
<i>Gymnadenia</i>	<i>conopsea</i> <i>cucullata</i>	<i>conopsea</i> <i>cucullata</i> <i>cantschatica</i>		
<i>Habenaria</i>	<i>viridis</i>	<i>viridis</i>	<i>viridis</i>	<i>viridis</i>
	<i>linearifolia</i>	<i>linearifolia</i>	<i>dilatata</i>	<i>dilatata</i>
	<i>sagittifera</i>	<i>sagittifera</i>	<i>orbiculata</i>	<i>orbiculata</i>
			<i>obtusata</i>	<i>obtusata</i>
		<i>yezoensis</i>	<i>greenei</i>	<i>cilliaris</i>
			<i>elegans</i>	<i>clavellata</i>
			<i>hyperborea</i>	<i>hookeri</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
			<i>chorisiana</i> <i>saccata</i> <i>unalascensis</i> <i>sparsiflora</i>	<i>lacera</i> <i>leucophaea</i> <i>psycodes</i>
<i>Herminium</i>	<i>monorchis</i> <i>longicrura</i>	<i>monorchis</i>		
<i>Isotria</i>				<i>medeoloides</i> <i>verticillata</i>
<i>Liparis</i>	<i>japonica</i> <i>loeselii</i>	<i>japonica</i> <i>kumokiri</i> <i>krameri</i> <i>makinoana</i>	<i>loeselii</i>	<i>loeselii</i> <i>lilifolia</i>
<i>Listera</i>		<i>cordata</i>	<i>cordata</i> <i>convallarioides</i> <i>borealis</i> <i>caurina</i>	<i>cordata</i> <i>convallarioides</i> <i>australis</i> <i>auriculata</i>
	<i>puberula</i>	<i>nipponica</i> <i>yatabei</i>		
<i>Malaxis</i>	<i>paludosa</i>	<i>paludosa</i>	<i>paludosa</i> <i>monophylla</i>	<i>paludosa</i> <i>monophylla</i> <i>unifolia</i>
<i>Microstylis</i>	<i>monophyllos</i>	<i>monophyllos</i>		
<i>Mymechis</i>	<i>chinensis</i>	<i>japonica</i>		
<i>Neottia</i>	<i>asiatica</i> <i>nidus-avis</i>	<i>asiatica</i> <i>nidus-avis</i>		
<i>Orchis</i>	<i>cyclochia</i> <i>chiantha</i> <i>chusua</i> <i>roborowskii</i>	<i>cyclochia</i> <i>aristata</i> <i>curtipes</i>	<i>rotundifolia</i>	<i>rotundifolia</i>
<i>Oreorchis</i>	<i>patens</i>	<i>patens</i>		
<i>Platanthera</i>	<i>hologlottis</i> <i>japonica</i> <i>mandarinorum</i> <i>tipuloides</i> <i>minor</i>	<i>hologlottis</i> <i>japonica</i> <i>mandarinorum</i> <i>tipuloides</i> <i>hyperborea</i> <i>chorisiana</i> <i>metabifolia</i>		<i>hyperborea</i> <i>dilatata</i> <i>hookeri</i>

Appendix IV

Genus	E-Asia	Japan	WN-America	EN-America
		<i>ophrydioides</i> <i>sachalinensis</i>		<i>blepharilottis</i> <i>lacera</i> <i>orbiculata</i> <i>leucophaea</i> <i>grandiflora</i> <i>clavellata</i> <i>flava</i> <i>obtusata</i> <i>psycodes</i>
<i>Pogonia</i>	<i>japonica</i> <i>minor</i>	<i>japonica</i> <i>minor</i>		
<i>Spiranthes</i>	<i>sinensis</i>	<i>sinensis</i>	<i>romanzoffiana</i>	<i>ophioglossoides</i> <i>romanzoffiana</i> <i>cernua</i> <i>casei</i> <i>lacera</i> <i>lucida</i> <i>vernalis</i> <i>discolor</i> <i>trianthophora</i>
<i>Tipularia</i>				
<i>Triphora</i>				
<i>Tulotia</i>	<i>ussuriensis</i>	<i>ussuriensis</i>		
<i>Yuania</i>		<i>japonica</i>		

Appendix V Checklist of Basic Natural Forest Communities in Eastern Asia and North America.

Forest Types	Eastern Asia	Western North America	Eastern North America
Cold-temperate			
Conifer			
Pine	scots Japanese stone	whitebark	Jack
Larch	Dahurian Changbai Prince Rupprecht's Chinese	western	Tamarack
Spruce	Korean Schrenk thickleaf Chinese Likiang Linzhi Balfour Sargent Greybark Sargent Wilson Meyer Purplecone	black white blue sitka	black white blue red
Fir	Khingan Georg Scalybark Faxon Farges Faber Forrest Canshan Himalayan Delavay Ernest	red white grand	balsam
Mixed spruce & fir	Yazo spruce- Khingan fir Taiwan fir- Taiwan spruce	Englemann spruce subalpine fir black spruce- white spruce	red spruce- balsam fir red spruce- Fraser fir

Main References: Chou & Li, 1990; Eyre, 1980.

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
Juniper		western Rocky mountain pinyon-juniper	Ashe & redberry southern red cedar eastern redcedar
Temperate Conifer			
Pine	Xingkai beauty Japanese red Chinese lacebark Armand Taiwan	bristlecone lodgepole limber ponderosa	red pitch Virginia
Cypress	Duclox Chinese Minjiang	Arizona	northern white cedar
Douglas Fir	Chinese	Rocky mountain	
Arborvitae	Chinese		
Thermophile Conifer			
Pine	Masson Yunnan Szemao Hainan	Jeffrey knobcone	loblolly longleaf shortleaf pond south Florida slash slash sand pondecypress
Redwood	dawn redwood *	redwood*	
Silver fir	silver fir *		
Chinese fir	Chinese fir		
Deciduous			
Cypress			baldecypress
Taiwania	Taiwania *		
Fokienia	fokienia *		
Terreya	Jack *		
Plumyew	Fortune *		

* rare type.

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
Keteleeria	Yunnan		
	Fortune		
	David		
Cryptomeria	Chinese		
Atlantic white-cedar			Atlantic northern
Mixed Conifers & Hardwoods			
5-needle pine & hardwoods	basswoods-birch- Korean pine oak-Korean pine spruces-firs- Korean pine fir-hornbeam- Korean pine	western white pine Pacific ponderosa pine-Douglas fir	red oak-red maple- white pine chestnut oak- white pine hemlock- white pine eastern white pine
Hemlock & hardwoods	Chinese hemlock- spruces & firs Yunnan hemlock- hardwoods longibracted hemlock & hardwood	western hemlock- sitka spruce coastal true fir- hemlock western hemlock western red cedar- western hemlock Douglas fir- western hemlock mountain hemlock	eastern hemlock hemlock- yellow birch
Deciduous Hardwoods			
Oak	Mongolian Loadong bao oriental white Daimyo	Oregon white California black bur southern scrub	northern pin post-blackjack bur bear chestnut

* rare type

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
	sawtooth oriental		white-black- northern red white black northern red Mohrs
Birch	Asian white Ermans Dahurian Kraft paper Chinapaper Chinese	paper	paper
Poplar/Aspen	David aspen sweet Korean Yunnan	aspen balsam black & willow cottonwoods	aspen
Alder	alder Taiwan	red	
Mixed hardwoods	mon maple- basswood- Manshurian walnut Japanese elm- Manshurian ash		sugar maple- basswood American elm- red maple- black ash sugar maple- beech-yellow birch
Chosenia Elm	chosenia white		American elm- silver maple
Mesquite Hickory		mesquite	mesquite overcup oak- water hickory
Willow			black willow

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
Maple			red maple sugar maple pin cherry-maple
Hawthorn			hawthorn
Black Locust			black locust
Yellow Poplar			yellow poplar
Mixed Deciduous & Evergreen Hardwoods			
Zonal	deciduous oaks-bitter chinkapin-blue Japanese oak deciduous & evergreen oaks nanmu-deciduous hardwoods	deciduous & evergreen oaks	deciduous & evergreen oaks water & swamp tupelos sweet bay-swamp tupelo-redbay yellow poplar-white oak- northern red oak
Mountain	oak-deciduous hardwoods a. blue Japanese oak -deciduous hardwoods b. schottky oak-deciduous hardwoods schima-deciduous hardwoods beeches-deciduous hardwoods		beech-sugar maple sweetgum-willow oak sweetgum-pin oak sweetgum-yellow poplar sycamore-sweetgum-American elm sassafras-perimmon

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
Limestone	oak-deciduous hardwoods butulang canthium- deciduous hardwoods		
Evergreen Hardwoods			
Evergreen Hardwoods			
Typical	Chinkapin- evergreen hardwoods a. Bitter chinkapin -oblongleaf litse-glabrous tanoak b. Farges and faber/lamont- chinkapins -hardwoods c. lamont chinkapin -hardwoods d. Ford chinkapin -hardwoods e. Carlesc chinkapin -hardwoods f. Eyer chinkapin -hardwoods g. Blackleaf chinkapin -hardwoods		

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
	h. Omei chinkapin -hardwoods		
	i. Straightspine chinkapin -hardwoods		
	j. Delavay chinkapin -hardwoods		
	Qinggang oaks- evergreen hardwoods		
	a. Blue Japanese oak-hardwoods		
	b. Thinleaf oak/ sharpdent oak -Yunshan oak -hardwoods		
	c. Yunnan oak -yellow oak -hardwoods		
	tanoak-evergreen	tanoak-Pacific	
	machilus- evergreen	madrone hardwoods	
	hardwoods	-Douglas fir	
	schima-evergreen hardwoods		
Seasonal	chinkapin -cryptocarya -evergreen hardwoods		
	chinkapin-schima -evergreen hardwoods		

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
Mountain mosses	mosses- Chinkapin -evergreen hardwoods mosses-blue Japanese oak -evergreen hardwoods		
Subalpine krummholz	rhododendron krummholz		
Sclerophyllous Hardwoods			
Mountain	alpine oak hollyleaf-like oak Yellowleafback oak Maodou oak		
Valley	coccifer-like oak mocketprivet -like oak Franchet oak sharp-leaf oak Rehder oak grey-leafback oak		
Rain & Seasonal Rain			
Typical	hair gurjun -wild artocarpus -redfruit pencilwood Yunnan gurjun -hairy hopea -paniculate crypteronia		

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
	Chinese hopea		
	-black		
	canarytree		
	-common		
	eberhardtia		
	Gagayan nutmeg		
	-autao nutmeg		
	-Taiwan		
	wingseedtree		
	stellatchair		
	vatica-Hainan		
	hopca-smallleaf		
	heritiera		
Seasonal rain	Chinese		
	parashorca		
	bayberry		
	waxmyrtlefruit		
	terminalia		
	-wingseedtree		
	common antiaris		
	-largeleaf		
	pouteria		
	-white		
	canarytree		
	Pierre dacrydium		
	-common		
	pentaphylax		
Mountain	markingnut		
rain	-spinybract		
	chinkpin		
	Javan podocarpus		
	-borneen		
	chikapin		
	-burmann		
	cinnamon		
	Yunnan madhuca		

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
	-Yunnan altingia		
Seasonal			
Deciduous	common bombax -Chinese albizzia barberry waxmyrtlefruit terminalia -strict coralbean serrate protium -spinybract chinkapin Hainan terminalia -coromandel lannea		
Semievergreen	Chinese saraca -redfruit pencilwood -common eberhardtia lofty fig -chittagong chickrassy figs-scarlet sterculia stellatchair vatica		
Limestone	parashoreas- Hainan horsfieldia hsienmu-fewnerve garcinia- Chinese cephalomappa nakedflower tetrameles -multi-flower garuga-Tonkin clm		

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
Bamboo			
Monopodial (stoloniferous)			
rhizome	galauous fishscale Makino fishpole stone greensulpur umbrella Farges cane moso giant timber Henon		
Sympodial (clumped)			
rhizome	Omei Mountain Chinese thorny rigida hedge Chung Chinese textile punting pole Chinesc sinobambusa Wenchou shibataealike indosasa		
Amphipodial (combined)			
rhizome	square bamboo bitter bamboo tonkin cane chimonobambusa		

Appendix V (continued).

Forest Types	Eastern Asia	Western North America	Eastern North America
Littoral	avicennia		
Mangrove	aegiceras		
	kandelia		
	mangrove		mangrove
	bruguiera		
	sonnertia		
	nypa		
	pisonia		
Coral island	velvetseed		

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