After the first Euro-American settlers arrived in Seattle in the 1850s, the surrounding old-growth forests were rapidly harvested for lumber, causing environmental degradation and displacing native peoples. Conflicts about the future of Pacific Northwest forests have continued since then. Only recently have academics, government agencies, industry, small private landowners, tribes, and environmental organizations come together to develop plans to protect the remaining old-growth forests, wildlife, streams, and fish, as well as providing environmentally friendly forest products.

Practicing sustainable forestry, maintaining healthy forests that are less susceptible to fire, insects and diseases; and fostering public enjoyment are now the main goals of forest management. However, conflicts still exist—and with climate change a looming threat, it is important to realize that forests give us much more than lumber.

Robert L. Edmonds, professor emeritus at the School of Environmental and Forest Sciences, University of Washington (UW), wrote this book to bring attention to the sustainability of natural resources. He describes how Washington State's forests and the practice of forestry have changed through time and how these changes relate to the long history of research and teaching at the UW. Its scope extends beyond Washington—many of the principles of sustainable forestry developed by faculty have been adopted worldwide.

Robert L. Edmonds was born in Sydney, Australia. He earned a Bachelor of Science from Sydney University, and Master of Science and Ph.D. degrees from the University of Washington (UW). He held a faculty position in the UW College of Forest Resources (now the School of Environmental and Forest Sciences) for thirty-eight years. He taught many courses, including forests in the life of man, forest ecosystems, urban and forest pathology, soil ecology, and microclimatology to hundreds of students. He retired in 2012 and is now an emeritus professor.
# CONTENTS

**DEDICATION** .............................................................................................................................................. vii

**PREFACE** .................................................................................................................................................. ix

**ACKNOWLEDGMENTS** ................................................................................................................................ xi

**FOREWORD** ............................................................................................................................................... xiii

1. **INTRODUCTION** ......................................................................................................................................... 1

   What is Forestry? ............................................................................................................................................... 1
   The Forests of Washington State ........................................................................................................................ 2
   Uses and Management of Washington's Forests .................................................................................................. 5
   Forestry at the University of Washington ......................................................................................................... 6

2. **THE EARLY YEARS: SETTING THE STAGE** ............................................................................................. 10

   Introduction ................................................................................................................................................... 10
   The Exploration and Settlement of the Pacific Northwest .................................................................................. 11
   The Pacific Northwest Lumber Trade ............................................................................................................... 12
   Labor in the Forest and Mills ........................................................................................................................... 15
   The Role of Federal, State, and Private Land Ownership in the Development of Forestry in the Pacific Northwest ................................................................................................................................. 16
   Railroads and Advances in Logging Technology .............................................................................................. 19
   The Early Actors in Forestry Education ........................................................................................................... 23
   The Beginnings of Forestry Education at the University of Washington ......................................................... 26

3. **THE 1960S ON: AN OVERVIEW** .............................................................................................................. 28

   Introduction .................................................................................................................................................. 28
   The Advent of Intensive Forestry ....................................................................................................................... 29
   Concerns about the Environment and Impacts of Forestry Practices ................................................................ 30
   Management of the Federal Forests .................................................................................................................. 31
   Management of State Forest Lands ................................................................................................................... 33
   Management of Private Forest Lands ............................................................................................................... 33
   New Visions of Forestry ................................................................................................................................... 34
   The College's Response to Change Since the 1960s ......................................................................................... 37
4. COLLEGE ADMINISTRATION: DEANS, DIRECTORS, ASSOCIATE DEANS, ASSISTANT DIRECTORS, AND DIVISION CHAIRS .................................................................40
   Introduction .........................................................................................................................40
   The Deans and Directors .......................................................................................................42
   Acting Deans ..........................................................................................................................47
   School Directors ....................................................................................................................48
   Associate Deans and Assistant Directors ................................................................................48
   Divisional Structure ...............................................................................................................49

5. THE FACULTY AND STAFF ................................................................................................51
   Introduction ...........................................................................................................................51
   Faculty Hiring .........................................................................................................................52
   International Representation ....................................................................................................54
   Faculty Contributions ...............................................................................................................54
   Adjunct and Joint Faculty .......................................................................................................67
   The Staff ..................................................................................................................................68

6. THE STUDENTS AND ALUMNI .........................................................................................69
   Introduction ...........................................................................................................................69
   Student Backgrounds .............................................................................................................69
   The Makeup of the Student Body ............................................................................................70
   What Attracted Students to the UW College of Forestry? .......................................................72
   Student Organizations ...........................................................................................................73
   Graduation ...............................................................................................................................77
   Alumni Careers .......................................................................................................................78

7. ACADEMIC PROGRAMS ..................................................................................................87
   Introduction ...........................................................................................................................87
   Undergraduate Curricula .........................................................................................................89
   Graduate Curricula ..................................................................................................................90
   Courses and Curricula ............................................................................................................90
   Field Studies ...........................................................................................................................93
   Accreditation of Curricula .......................................................................................................95
   Student Support .......................................................................................................................96
8. RESEARCH .............................................................................................................................................. 97
   Introduction.............................................................................................................................................. 97
   The Institute of Forest Resources ............................................................................................................. 99
   Long-Term Research Sites .................................................................................................................... 99
   Faculty Research ......................................................................................................................................... 106
   Integrated Research Programs, Cooperatives, and Centers ................................................................. 126
   Research Funding ....................................................................................................................................... 129
   Dissemination of Research Results ........................................................................................................... 130

9. OUTREACH AND CONTINUING EDUCATION ......................................................................... 131
   Introduction............................................................................................................................................. 131
   Media Exposure .......................................................................................................................................... 131
   Formal Outreach and Continuing Education .......................................................................................... 134
   Lecture Series ........................................................................................................................................... 138
   Other Outreach Efforts .............................................................................................................................. 140

10. FORESTRY BUILDINGS ON THE CENTRAL CAMPUS ......................................................... 141
    Introduction............................................................................................................................................ 141
    Parrington Hall .......................................................................................................................................... 142
    The Alaska-Yukon-Pacific (AYP) Exposition Buildings ......................................................................... 143
    The Forest Products Laboratory ............................................................................................................ 146
    Anderson Hall .......................................................................................................................................... 147
    Winkenwerder Hall ................................................................................................................................... 149
    Bloedel Hall ............................................................................................................................................. 150
    The Plant Laboratory and Annex ........................................................................................................... 151

11. THE UNIVERSITY OF WASHINGTON BOTANIC GARDENS .......................................................... 152
    Introduction........................................................................................................................................... 152
    The Washington Park Arboretum ............................................................................................................. 152
    The Union Bay Campus (CUH, UBNA, and Yesler Swamp) ................................................................ 158

12. FOREST PROPERTIES MANAGED BY THE COLLEGE .......................................................... 165
    Introduction........................................................................................................................................... 165
    The Charles Lathrop Pack Demonstration Forest .................................................................................. 165
This book is dedicated to the thousands of students who graduated from the Colleges of Forestry and Forest Resources and the School of Environmental and Forest Sciences at the University of Washington, and to all future students.
In 2011, on rereading The Long Road Travelled: An Account of Forestry of the University of Washington by Henry Schmitz (Schmitz 1973), I was inspired to write a second book to bring the history of the College up to date. It is not intended to be an extensive review of the history of forestry in Washington State and the nation, but I do cite many summary documents, including Barnett (1912), Fernow (1913), Schmitz (1973), Ficken (1987), Norse (1990), (Dietrich 1992), Chiang and Reese (1998), Lassoie et al. (1998), and Anderson (2007).

The book is largely written from my perspective as an Australian who came to the College of Forestry as a graduate student in 1966 and then served as a faculty member for 38 years, including time as division chair and associate dean. In 2012 I retired and continued as an emeritus professor. I was fortunate to have such a rewarding career as a researcher, teacher, and administrator of the College.

Most of my education and employment has involved forestry. I obtained a BS in Forestry from Sydney University and the Australian Forestry School in Canberra. After I graduated in 1964, I worked for the Forest Research Institute in Canberra in the Seeds and Genetics section and was responsible for maintaining several arboreta in the mountains behind Canberra. This included monitoring the performance of many northern hemisphere tree species, including the US west coast species Monterey (radiata) pine and Douglas-fir. I also had an interesting experience collecting eucalypt seeds in outback Queensland for reforestation in India and Pakistan. Indian and Pakistani foresters accompanied me and I got to witness firsthand the India-Pakistan conflict. Whoever had arranged this collection trip could not have thought this through. In 1966, I decided to attend graduate school at the University of Washington (UW). When I arrived, I unexpectedly found three students I knew from the Australian Forestry School who were already enrolled here. It was good to catch up with them, share a few beers, and learn about their experiences as graduate students. Of course, the beer was not as good as an Aussie beer. Australian students came to the College from the 1950s to the 1990s—the first graduated in 1958 and the last in 1994—and were awarded a total of 23 masters and PhDs. Australian students no longer enroll because they now can pursue graduate studies in Australia.

When I was a graduate student, I was not aware of the long history of forestry education at UW. I have to admit that I wasn’t very interested in the history of the College and I suspect this was true of many of my fellow graduate students. At least we never talked about it. My lab was in Winkenwerder Hall, which I knew was named after former Dean Hugo Winkenwerder. I also knew that Anderson Hall had been built in 1925 because there is a plaque just inside the front door of the building purveying this information. Agnes Anderson was a College benefactor, and I gratefully received an Anderson loan to help me pay tuition in one quarter. That was about it. My thoughts were focused on obtaining an MS and a PhD in forest pathology as fast as I could and moving on to a job and career elsewhere.

After completing my PhD in 1971, I took a postdoctoral position in the Botany Department at the University of Michigan in Ann Arbor. It was only a three-year position, so I knew I had to look for another job when it ended. I was fortunate to be invited back to the College in 1974 by Professor Stanley Gessel as a research faculty member and associate director of the International Biological Program (IBP) Coniferous Forest Biome program, which Gessel was directing. But even then, I must confess I still had no great interest in learning about the history of the College. Only after I started teaching a course on Forests and Society in 1985 did I discover the rich and interesting history of forestry in the US and at the UW.

As you can imagine there was a lot of history to tell and I trust I have done it justice. I enjoyed doing the research for the book and writing it and I hope you enjoy reading it.

R. L. Edmonds
Professor Emeritus
September, 2020
I would like to thank those people who contributed to the production of this book. Firstly, I want to thank my wife Vickie for putting up with me during the eight years of research and writing of this book. Without her support and tolerance, I could not have seen it through. I am particularly indebted to former Dean Bruce Bare and fellow faculty member Tom Hinckley for taking the time to read early drafts of the manuscript and providing me with input for improvement, including fact checking. I would also like to thank student services (David Cameron and Michelle Trudeau), the Center for Sustainable Forestry at Pack Forest (David Cass and Gregory Ettl), the forestry librarian (Carol Green), Washington State University extension (Donald Hanley), the School of Environmental and Forest Sciences Communications and Marketing staff (Molly Hottle and Karl Wirsing), Amanda Davis, Sally Morgan, the three students who assisted with me with my research (Allison Erskine, Rachel DeCordoba, and Huayi Jiang), and the 52 alums who provided their stories (some of which are told in Chapter 6). Many faculty assisted me by providing historical materials and photos. A number of alumni and faculty also gave interviews that I recorded as part of an oral history project. They included Bob Alverts, Bruce Bare, Gordon Bradley, Ann Forest Burns, Dale Cole, Pat Cummins, Bob Gara, Ben Harrison, Tom Hinckley, Stan Humann, and David Scott’s wife, Carolyn Scott (see Appendix A). Some initial editing of the book was provided by Patricia Roads, but the bulk of the editing was provided by Victoria Scott, daughter of Dave Scott. It was a pleasure working with her. The SEFS director, Dan Brown provided financial support for editing.
‘Saving Forest Ecosystems: A Century Plus of Research and Education at the University of Washington’ provides a thorough and fascinating trip through time over a 113-year period beginning with the 1907 formation of the School of Forestry at the University of Washington. Although this is the second book detailing the history of forestry at the University of Washington, Professor Emeritus Robert ‘Bob’ Edmonds brings his own 50 plus year history as a graduate student, faculty, and administrator to not only updating the history of this important west coast program in forestry beyond what was covered in the 1973 ‘The Long Road Travelled,’ he returns to the founding time of the School so that the reader better appreciates the evolution of teaching, research, and outreach that have occurred over the last century plus. One person, a state legislator, member of the Board of Regents, and soon to be a faculty member, Edmond Meany, championed both an arboretum and a forestry program. Meany became a faculty member and taught the first forestry course. In 1907, a School of Forestry emerged, then a College of Forestry, College of Forest Resources, School of Forest Resources, and finally a School of Environmental and Forest Sciences. These various academic program titles reflect many of the changes that have occurred over this 100 plus year history. Whether through internal or external forces these name changes reflect changes in academic and research emphasis that in many ways both followed and led changes in the broader external community. The housing of forestry in a non-land grant institution of higher learning often affected the nature and the pressures associated with the changes. Bob uses 13 chapters to trace this history with an emphasis on the last half century. Chapter 14 looks to the future.

Much of the early philosophy and direction brought to this academic unit had its origins in the 1217 Charter of the Forest and Germanic notions of forestry as brought to the United States and most forestry schools by Gifford Pinchot. This background was tempered by the conditions of the Pacific Northwest with its vast forests of old-growth and the abundance of highly-valued softwoods in these forests. These early underpinnings did not greatly change over the next six decades. What did change was the size of the unit, the diversity of its faculty and offerings, and the adjustments made as the depression, World War II, and post-war periods were weathered. Emerging in the late 1960s was a change in focus from stands, trees, and boards to forest communities and ecosystems; this shift was not entirely welcomed by both faculty in the then College of Forest Resources or the external support community. As a result over the next 40 years, the emphasis on wood products and traditional forestry declined and additional fields under the broad umbrella of ecosystem goods and services were emphasized and grew. Such units as the Centers for Streamside Studies and Urban Horticulture became part of the College. Pulp and Paper Sciences became Bioresource Science and Engineering with an emphasis on bioremediation and biofuels. When the College of Forest Resources ended, programs and faculty entered the new College of the Environment and the School of Environmental and Forest Sciences emerged. Through Bob’s detailed research and writing the elements and individuals associated with these changes are illuminated. The advantage of the wonderful mixture of detail and long-term perspective is a window into academic institutional change; an institutional often resistant to change.

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CHAPTER 1
INTRODUCTION

What is Forestry?

The sound of the chainsaw echoed through the woods. To the rural logger it represented his job and livelihood, but to the urban resident who had stopped his or her car nearby to take a rest, it evoked images of ugly clearcuts, environmental degradation, and loss of animal and bird species. These disparate views of the practice of forestry are common throughout the world. Public perceptions tend to focus on visual appearances and negative practices.

Forests have been used for timber for thousands of years, but clashes over forest ownership and uses began around the time of the Norman invasion of Britain in 1066. A procession of kings after William the Conqueror restricted access to the forest, resulting in increased hardship for the common people who were trying to farm, forage, and otherwise use the land they lived on. King Richard 1—Richard the Lionheart (r. 1189–1199)—and his brother King John (r. 1199–1216) added larger and larger areas to the royal forest until it covered about one-third of the land of southern England. It was used primarily for hunting. This social conflict was resolved in 1215 by the Magna Carta, a charter of rights first drafted by the Archbishop of Canterbury whereby the unpopular King John agreed to make peace with a group of rebel barons (not to protect the civil liberties of the common people, as commonly thought).

The term “forester” appears on the first page of the Magna Carta. In medieval England foresters were an important part of the administration of the kingdom, especially since hunting was a favorite royal pastime. Their most important task was to ensure that deer were maintained for hunting. They would hinder poachers, feed the deer in winter, care for newborn fawns, and prevent illegal grazing and logging in the woods. Thus, their normal duties included law enforcement, animal husbandry, and resource management (https://www.reddit.com/r/AskHistorians/comments/4d2jt8/questions_about_medieval_english).

Forests needed special protection, and the Charter of the Forest was issued in 1217 as a complementary charter to the Magna Carta. It was reissued in 1225 with a number of minor changes to wording, and then was joined with the Magna Carta in 1297. The statute remained in force from 1217 to 1971, when it was superseded by the Wild Creatures and Forest Laws Act. But it wasn’t until the end of the 18 th century that the practice of forestry really began (Fernow 1913). Forestry publications also began to appear in the 18 th century (Barnett 2012).

So, what is forestry? The definition has been debated since the late 19th century and continues to evolve. Merriam-Webster Dictionary narrowly defines it as “the science and caring for, or cultivating of forests, and the management of growing timber,” while Oxford English Dictionary describes it as “the science or practice of planting, managing, and caring for forests.” The emphasis is on growing timber, and even today this is probably what most people believe forestry is. But it is more than that. The Society of American Foresters (SAF) defines forestry as “the science, art, and business of creating, managing, and conserving forests and associated resources in a sustainable manner to meet desired goals, needs, and values” (Helms 1998). It is practiced in natural, plantation, and restoration forests. Today forestry is considered to be a component of natural resources management, which is an interdisciplinary field of study that includes the physical, biological, economic, and social aspects of sustainably managing natural resources.

Modern forestry embraces multiple-use management, which includes the provision of timber and other secondary forest products; fuel wood; wildlife habitat; water quality and quantity; aesthetically appealing landscapes; biodiversity; watershed management; erosion control; cultural and spiritual elements; community protection and employment; and preservation of forests as “sinks” for atmospheric carbon dioxide. It includes specialized fields such as...
as agroforestry and urban forestry. Many disciplines are involved, including biochemistry; engineering; economics; ecosystem ecology; forest management; environmental science; social science; silviculture; soils; utilization of forest products (lumber, pulp and paper, and biofuels) and secondary forest products (greens and mushrooms); and wildlife science. In the State of Washington, the practice of forestry has moved from logging of the old-growth forests, at a time when little thought was given to forest management, to modern sustainable forestry, in which environmental effects receive considerable attention. The Washington Forest Protection Association (WFPA), which was established in 1908, has attempted to present this new view of forestry to the public through short TV ads and other ways of promoting the value of working forests and their role in the production of jobs, economic growth, and renewable energy; protection of clean air and water and forest health, mitigating climate through carbon sequestration; and species conservation, especially of salmon (see WFPA in bibliography).

The Forests of Washington State

I fell in love with Washington’s forests the moment I arrived in Seattle. The eucalypt forests of Australia are impressive, but they are nowhere near as majestic as the Pacific Northwest forests. The forests of eastern and western Washington are quite different from each other due to landforms and climate. Two mountain ranges dominate—the Cascades and the Olympics. Annual rainfall can be more than 200 inches on the wild Olympic Peninsula coast, but in the rain shadow of the Olympic Mountains it is only 17 inches at Sequim and 37 inches in Seattle. Precipitation increases again to the east in the Cascade Range reaching 100 inches at Snoqualmie Pass—91 percent snow. In the rain shadow of the Cascades it drops off rapidly to 28 inches in the forests near Cle Elum, and is just 9 inches in the shrub-steppe near Vantage on the Columbia River. No wonder the vegetation is so varied.

Western Washington evokes images of coastal rainforests, lowland and subalpine forests farther inland, giant trees, snow-capped mountain ranges, iconic volcanoes like Mount Rainier (Fig. 1.1), glaciers, lakes, clear fast-flowing rivers and streams supporting salmon and other fish, rugged coastlines, and rapid urbanization. Cloudy skies and rain dominate for much of the year, but summers are sunny, warm, and dry. Many of the rivers in western and eastern Washington retain their lilting indigenous names—e.g., Cle Elum, Elwha, Entiat, Hoh, Skagit, Skokomish, Skykomish, Snoqualmie, and Spokane.

Fig 1.1. Beautiful Mount Rainier.
In contrast, the area east of the Cascade crest, with its colder winters and hotter, drier summers, paints a picture of smaller-stature forests that border shrub-steppe and agricultural lands, frequent forest fires, and the mighty Columbia River with its hydroelectric dams and infrastructure. Washington is aptly named the Evergreen State, although only half of the state is really green. Forests cover only 52 percent of its total area; many other states have a much higher proportion relative to their size.

I never cease to be amazed by the huge old trees that still stand west of the Cascade crest, particularly on the Olympic Peninsula. Of course, they are but a remnant of what was here previously—only about 10 percent of the virgin forest remains. Douglas-firs (Pseudotsuga menziesii), icons of the Pacific Northwest, are some of the tallest trees in the world—the loftiest is 327 feet and is located in coastal Oregon, but it is only the third tallest tree on the planet (Breyer 2018). The tallest is the towering coast redwood (Sequoia sempervirens) named Hyperion, after a Titan in Greek mythology. It soars to 380.3 feet and is located in Redwood National Park, California. The second tallest, at 329.7 feet, is a Eucalyptus regnans in Tasmania, Australia.

Before the Euro-Americans arrived, the coastal temperate rainforest stretched uninterrupted from Northern California to Alaska. A fine example of the original old growth is the Hoh rainforest in Washington (Kirk and Franklin 1992). The forest floor is dark, but the understory is lush. Life abounds both in the soil and above ground (Norse 1990). Many big logs—or coarse woody debris—are present and tree crowns are deep, but occasional canopy gaps are present. On sunny summer days shafts of light reach the forest floor through these gaps, resembling light coming through a stained-glass window in a Gothic cathedral. But as I experienced through my two decades of research in the Hoh rainforest in Olympic National Park dark, wet, and cold predominate for most of the year. No wonder the indigenous people did not penetrate the forest for fear of evil spirits. I can remember feeling isolated and uneasy myself in the forest at times. It is easy to get lost if you leave the trail—neither the sun nor landmarks are visible to orient you. Clambering over large logs was a challenge, and if you fell it always seemed that the only thing to grab to break your fall was a thorny devil’s club stem—very painful.

The stand structure at my site resulted from an infrequent high-intensity fire more than 600 years ago. The Douglas-fir pictured in Fig. 1.2 began its life then. It is relatively small compared to many of the old-growth trees on the Olympic Peninsula—about 6 feet in diameter. A much larger tree is shown in Fig. 2.5.
It has been suggested that at one time Douglas-fir may have been the tallest tree on the globe. According to Robert Van Pelt, one of the college’s graduate alums and author of the books Champion Trees of Washington State (1996) and Forest Giants of the Pacific Coast (2001), there are claims of Douglas-fir trees reaching 415 feet in height and 18 feet in diameter. The largest one officially recorded in Washington State was the 1,020-year-old Mineral tree near Mount Rainier, which was 15.4 feet in diameter and stood 393 feet tall. Douglas-fir has a much lower life expectancy (max. 1,300–1,400 years) than does the giant sequoia (Sequoiadendron giganteum) in the California Sierra Nevada Range (max. 3,500 years). Of course, there are Great Basin bristlecone pines (Pinus longaeva) in California, Nevada, and Utah that are much older (some 5,000 years).

A number of other species grow in consort with Douglas-fir in coastal and lowland western Washington, including the conifers western hemlock (Tsuga heterophylla), Sitka spruce (Picea sitchensis), grand fir (Abies grandis), western redcedar (Thuja plicata), and shore pine (Pinus contorta), as well the hardwoods red alder (Alnus rubra), big leaf maple (Acer macrophyllum), Pacific madrone (Arbutus menziesii), black cottonwood (Populus trichocarpa), and Garry oak (Quercus garryana) (Franklin and Dyrness 1973). Each species has its own genetic traits and range. Occasionally species common to eastern Washington are encountered west of the Cascade crest—western white pine (Pinus monticola), lodgepole pine (Pinus contorta), and even ponderosa pine (Pinus ponderosa). Perhaps they are remnants of past paleo-vegetation.

At the highest elevations in the Olympics and the Cascades are the snow-covered subalpine forests, where the dominant species are mountain hemlock (Tsuga mertensiana), Pacific silver fir (Abies amabilis), and subalpine fir (Abies lasiocarpa). These ecosystems are incredibly important for urban water supplies and crop irrigation in Washington.

East of the Cascade crest beyond the subalpine forests, many of the tree species familiar in western Washington also occur, including Douglas-fir, grand fir, western redcedar, and western hemlock, as well as western larch (Larix occidentalis), western white pine, lodgepole pine, and, in the driest areas, ponderosa pine. Quaking aspen (Populus tremuloides) is also common. These species are also widespread in the forests of northeast Washington.

Ponderosa pines are shorter in stature than the Douglas-firs, but can still attain impressive heights—typically 150–225 feet. The tallest, at 268 feet, is located in southern Oregon. Old-growth stands (Fig. 1.3) consist of widely spaced trees, a sparse understory with just a few small trees, and a thin forest floor of pine needles and few large logs. Considerable light penetrates to the forest floor. Frequent low-intensity fires—typically 10–15 years apart—are largely responsible for the stand structure.

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Fig. 1.3. Typical widely spaced old-growth ponderosa pine in Deschutes National Forest, Oregon (Source: Wikimedia Commons).
Uses and Management of Washington’s Forests

For thousands of years before the arrival of Euro-American settlers in the 1800s, native tribes had utilized the forests and associated streams of the Pacific Northwest for food, shelter, and clothing; western redcedar, for example, was used extensively. The indigenous peoples understood much about the workings of forests, and manipulated them and their associated prairies with fire so as to produce habitat advantageous for deer and elk and a variety of plants. A study of fires from 1376 to 1893 in coastal British Columbia revealed that indigenous peoples likely utilized fire as a tool for resource management, especially as their population increased. They produced high densities of specific plants by creating mosaics of vegetation in different stages of succession. Assessment of the ecological impacts of historic fire events has allowed scientists to better understand the abrupt changes to forest ecosystems that occurred in the 20th century after indigenous populations were relocated and burning was curtailed (Hoffman et al. 2017).

The new settlers viewed the forests quite differently than the native people did. They perceived them as areas to be cleared for use as pasture and farmland, and as a source of lumber for building construction in the rapidly expanding west. Douglas-fir and western redcedar were the preferred species for building material. Initially, lumber businesses were small and many hundreds of sawmills were in operation. But in the late 1800s and early 1900s, with the arrival of the Northern Pacific Railway and timber barons such as Frederick Weyerhaeuser (1834–1914), large lumber companies emerged. The early settlers established permanent towns and forced the original native inhabitants to be relocated onto reservations. Interestingly, today these native tribes—particularly those on the larger reservations, such as the Yakama tribe—are employing some of the most innovative silvicultural practices to manage their forests, maintain forest health, and increase forest resilience to climate change.

When logging of the old-growth forests began, little thought was given (with a few exceptions) to forest management and the impacts of clearcutting on the landscape, and that legacy is still with us today. Natural regeneration was the norm; no seedlings were planted. It was not until the late 1950s that new thinking about forest management emerged. This resulted in changes in forestry/natural resources education, including the concept of multiple use, in which forests were managed with five major areas of concern in mind: timber, water, range, recreation, and fish and wildlife habitat. By the 1960s forests were beginning to be recognized as ecosystems not just the trees. The term “ecosystem” was first used in 1935 by Sir Arthur Tansley, a British ecologist, but it took decades before the term was used with respect to forest management. Involvement of the social sciences, increasing ecological awareness, and greater public interest in forests—particularly federal forests—led to continuing changes. While forests continued to provide lumber and pulp and paper, forest management evolved to encompass secondary forest products such as mushrooms and floral greens, ecotourism, aesthetics, the fate of the remaining old-growth forests, wilderness designations, salmon protection, forest health, sustainable forestry, forest certification, the loss of forests to urbanization, and the role of urban forests. More recently, the concept of the “ecosystem services” that forests provide has emerged, particularly with respect to public lands managed by the USDA Forest Service (US Forest Service), the National Park Service (NPS), the Bureau of Land Management (BLM), and the US Fish and Wildlife Service (USFWS). Ecosystem services are considered to be provisioning (timber, fresh water, salmon, wildlife, etc.), supporting (soils and nutrient cycling), regulating (flood control, water purification, carbon sequestration), and cultural (aesthetic, recreational, and spiritual benefits). Added to this are concerns about loss of forest land to urbanization, loss of species biodiversity, and climate change—especially the loss of forests due to global warming, extreme weather events, increased risk of wildfires, insect epidemics, global economics, and population growth (Deal et al. 2016).

Many of these concepts have been captured in the now widely used term “ecological forestry,” in which careful forest stewardship is designed to provide a sustainable supply of timber and ecosystem services while restoring ecosystem functions and processes. The aim of ecological forestry is to improve forest structure, health, and tree growth while enhancing biodiversity and habitat for wildlife and fish. Forest practices certification is now widely used throughout the world.

Before the 1950s forest products provided the largest proportion of Washington State’s economy. However, as Washington became more and more urbanized, it became dominated by the likes of Boeing, Microsoft, Amazon
and Starbucks, and forestry declined. The proportion of the state’s economy provided by forestry is now relatively small—third largest in the manufacturing sector. Not only do few sawmills remain today but, due to technological advances, fewer people are needed to work directly in forests—even though wood products continue to be in great demand.

**Forestry at the University of Washington**

As the economic drivers in Washington State changed over time, so did forest resources education at the University of Washington (UW). When the School of Forestry was established in 1907, the UW was one of the first US universities to offer forestry as a course of study. Today, traditional forestry education—in mensuration, surveying, silviculture, protection, harvesting, logging engineering, and forest products—has given way to education in ecological and social forestry and the wildlife sciences. The number of forest management students is now very small. These changes have been reflected in name changes over time: the School of Forestry (1907–1910), College of Forestry (1910–1969), College of Forest Resources (CFR; 1969–2008), School of Forest Resources (SFR; 2008–2009), and, since 2009, the School of Environmental and Forest Sciences (SEFS) in the College of the Environment. These revisions are reflected in some of the UW Forest Club memorabilia that I have collected over the years (Fig 1.4).

![Fig. 1.4. Left: Cap with tree and axe and from the 1970s. Center: Above- and belowground-ecosystems on a glass from the 1990s. Right: A forest stream, mountains, and wildlife on a T-shirt from the 2010s.](image)

Many forestry programs throughout the world now have the word “environment” or “environmental” in their titles. In the US, for example, there are the School of Forestry and Environmental Studies at Yale, the School of Natural Resources and Environment at the University of Michigan, and the Department of Environmental Science, Policy and Management at the University of California, Berkeley. Internationally, names have also changed. For example, at the Australian National University in Canberra, forestry is now taught at the School of Environment and Society, which is an amalgamation of several departments to form a new unit. Other schools include “natural resources” in their titles, such as the School of Forestry and Natural Resources at the University of Georgia and the College of Natural Resources at Utah State University. Still others have kept their old names, such as the College of Forestry at Oregon State University (OSU) and the Faculty of Forestry at the University of British Columbia.

At the UW, the formation of the College of the Environment in 2009 combined the Colleges of Forest Resources and Ocean and Fishery Sciences and several departments from the College of Arts and Sciences. This was largely the brainchild of the upper campus administration, particularly the provost at the time, Phyllis Wise. She was concerned that the UW was not being recognized for its contribution to environmental education and research. Her idea was to create a world-class environmental college that would involve more than 100 existing faculty in forestry, fisheries, oceanography, geology, atmospheric sciences, and engineering. Faculty from these fields had been cooperating in teaching and research for years, but it was thought that this structure would encourage
more faculty interactions, foster more innovative research and teaching, and give the university more recognition.

One problem, however, was that the faculty members were scattered all over the campus and not housed in a single building, or even in adjacent buildings.

The effort to create the College of the Environment began in 2006, but it was not warmly embraced by the faculty concerned. After several years of resistance, the faculty in each unit slowly voted to join the new College, with some units voting to do so well before others. The CFR faculty engaged in three rounds of voting before agreeing to join, and some faculty members still voted against it. Provost Wise was not widely appreciated. She assured the faculty that she was dedicated to serving the University for many more years, but in 2011, two years after the formation of the College of the Environment, she left to become the Chancellor at the University of Illinois, Urbana-Champaign. Apparently, she was not popular there either and resigned in 2015.

The College of the Environment now is comprised of SEFS, the School of Aquatic and Fisheries Sciences, the School of Ocean and Marine Sciences, the School of Marine Affairs, the Applied Physics Laboratory, the Washington Sea Grant, the Program on the Environment, and the Departments of Atmospheric Sciences and Earth and Space Sciences. Also included are the Joint Institute for the study of the Atmosphere and Ocean, the Climate Impacts Group, the Washington NASA Space Grant, Friday Harbor Labs, EarthLab, and the UW Botanic Gardens in SEFS.

In 2007, CFR celebrated the centennial of the creation of the forestry school at the UW (Fig. 1.5), so you can imagine that the disbanding of colleges with long histories was somewhat traumatic and created some faculty bitterness. However, CFR was also suffering from very low enrollments, and the campus administration argued that it would be better protected from closure if it joined the new College of the Environment. Low enrollment had been a problem for CFR since the early 2000s, and it offered eight or nine different majors even though there were only 180 undergraduate students in 2005. To remedy this Dean Bruce Bare, the last dean of CFR, proposed changing the curriculum offerings from seven majors to two: Environmental Science and Resource Management (ESRM), and Bioresource Science and Engineering (BSE). Unfortunately, this streamlining was not enough to save the CFR as an independent college.

Concerns expressed about the merger were many, including: (1) the new curriculum has little to do with forestry; (2) students are not focused; (3) faculty are depleted in many subject areas; (4) there will be little capacity for faculty to continue teaching forestry since few faculty have backgrounds in forestry; (5) the quality of instruction will decline if student numbers go up and faculty numbers don’t increase; (6) loss of professional forestry focus, status, and collegiality; (7) diminished role of the forestry alumni association and loss of contact with former students, donors, and supporters, resulting in less financial support; and (8) loss of development staff.

Fig. 1.5. The College of Forest Resources centennial logo.
There have been both positive and negative effects of the CFR joining the new College of the Environment as SEFS with a director instead of a dean. Forestry has been “demoted” in the university administrative structure and no longer has direct contact with the president and provost through the board of deans. In addition, budget allocations are controlled by the dean of the College of the Environment. Perhaps the greatest impact is on faculty hiring. Vacant positions now revert to the dean and can be reallocated to other units and not to SEFS. Interestingly, the current dean of the college, Lisa Graumlich, is a CFR graduate, having obtained her PhD in 1984, and her faculty appointment is in SEFS. After the merger the faculty became smaller, especially after a spate of retirements, and course offerings became fewer. On the positive side, faculty hiring is increasing again, along with student enrollments (408 in 2018), research is being fostered, and the existence of forest resources education on campus is no longer challenged.

Names are important and reflect the philosophy of institutions. The faculty spent much time, many meetings, and a lot of arguing about the name of the school. More than twenty different names were proposed and many questions were posed, such as: How do we reflect, in a short name, the many areas we cover, especially urban horticulture and wildlife science? Should we include the word “forestry” in our name? (Note that the word “forest” but not “forestry” is in the name “School of Environmental and Forest Sciences.”) How will the name chosen for the school relate to the mission of the overall College of the Environment? What is the niche for forestry on campus, and how is it different from the niche for the Biology Department? It was deemed that forestry considers the study of whole plants or animals, up to the ecosystem and landscape levels, whereas the Biology Department tends to focus more on organisms at the cellular and molecular levels. However, some faculty in SEFS employ molecular techniques, and some biology faculty study whole organisms and ecosystems.

Forestry schools and colleges in the US have had to adjust their curricula and organizational structures to accommodate an expanded view of forestry. For many years, forestry education at the UW was focused on training students for narrow careers in traditional forestry. Now there is less emphasis on training and more on obtaining an education about the functioning of ecosystems, from both biological and human perspectives. On the forest products side, the emphasis has changed from wood products and pulp and paper science to bioresource science and engineering—i.e., fiber products, biofuels, and chemicals from biomass resources.

Forestry education at other institutions in Washington State has also changed. Historically, many community colleges offered two-year programs in forest technology as well as two-year programs preparing students to transfer to four-year institutions of higher learning. Technology programs trained forest techs for immediate employment in the forest industry. There are now fewer community colleges offering forestry education. Presently, the SAF accredits Green River College and Spokane Community College for two-year programs leading to the Associate of Applied Science degree. Green River also offers a four-year Bachelor of Applied Science degree in Natural Resources, which is not SAF accredited. Grays Harbor College offers a two-year Associate in Applied Science (Natural Resources Forestry) and a two-year Associate in Science (Environmental and Resource Sciences) for transfer students. Neither program is SAF accredited. Washington State University (WSU) in Pullman, Washington, no longer has a Department of Forestry; instead, forestry is taught in their School of the Environment, which is going through SAF candidacy until 2020 for its four-year degree in forestry. The UW has two SAF accredited undergraduate options in the ESRM curriculum in SEFS; Sustainable Forest Management, and Natural Resource and Environmental Management. A Master’s of Forest Resources (MFR) in Sustainable Forest Management is also SAF accredited.

This book chronicles the course of forestry education and research at the UW from 1895 to 2018. I focus on the period from 1907 to 2007, but material on SEFS is also included. Chapter 2 gives a brief history of the years before the 1960s, while Chapter 3 provides an overview of the period from the 1960s on. The CFR/SEFS administration and structure—the deans, associate deans, division chairs, and directors—are covered in Chapter 4, and the contributions of the faculty and staff are dealt with in Chapter 5. Chapters 6 and 7 describe the students and academic programs, respectively. Chapter 8 chronicles the research program. Continuing education and outreach have always been important priorities, and I have written about them in Chapter 9. Chapter 10 takes up the history of the forestry buildings on campus, and Chapter 11 describes the UW Botanic Gardens (UWBG)—the Arboretum, the Center for Urban Horticulture (CUH) and the Union Bay Natural Area. Pack Forest, the Olympic Natural
Resources Center (ONRC), and other CFR properties receive attention in Chapter 12. International connections through faculty and students are described in Chapter 13. Finally, I present a few thoughts on the future in Chapter 14. The appendices include: (A) a list of files available on the UW digital repository site ResearchWorks, (B) faculty books, and (C) sources of research funding.

The material in Appendix A can be viewed online at the website shown at the bottom of the appendix. It includes: faculty 1907–2018; theses and dissertations; Seattle Times articles; oral history recordings from alumni and faculty; trees in the 1960 World Forestry Conference Friendship Grove; and CFR historical records. The historical records are stored in hundreds of boxes occupying more than 300 cubic feet at the UW Libraries Archives at Sand Point in Seattle. Included are faculty meeting minutes, deans’ reports, individual dean and faculty records, curricula, student enrollment records, student organization records, continuing education records, photos, Pack Forest records, research reports, and so forth. Only the contents of the boxes can be viewed online. To actually see what is in them requires the boxes of interest to be delivered from their repository at Sand Point to the UW Library Archives located in the basement of Allen Library. A selection of CFR photos is available online from the UW Library Archives, and all the old UW course catalogs can also be seen online at: http://www.washington.edu/students/gencat/archive.
CHAPTER 2
THE EARLY YEARS:
SETTING THE STAGE

Introduction

The Territorial University of Washington—now the University of Washington—opened its doors in downtown Seattle in November 1861, just ten years after the first Euro-Americans settlers arrived. Asa Mercer (1839–1917), a publisher and politician, was the first teacher and president. Most of the students were schoolchildren. Only a few collegiate students were enrolled in classical and scientific studies, and received bachelor’s degrees and teacher’s diplomas. It wasn’t until 1895, when the university moved to its present campus on Lake Washington, that the first forestry course was offered.

The early history of Washington State and the development of the timber industry strongly influenced the history of the UW’s School (1907–1910) and later College of Forestry (1910–1969) in the pre-1960s period. In this chapter I present a brief overview of the years before 1960 to set the stage. A more detailed history of the College in this period is found in Dr. Henry Schmitz’s *The Long Road Travelled: An Account of Forestry at the University of Washington* (1973). Interestingly, this posthumous volume is organized according to the development of a forest through time, with chapters on seedlings, saplings, and the mature forest. There is no specific mention of old-growth forests. Only in the 1970s did we discover the ecological values of old-growth forests, after most of them had been logged.

Henry Schmitz (1892–1965) (Fig. 2.1) was born in Seattle and received a BS in Forestry from the College in 1915. He also obtained an MS in Botany in 1916 from the UW and went on to earn a PhD in Botany from Washington University in St. Louis in 1919, after serving as an ensign aboard a Navy submarine chaser in the Atlantic Ocean in World War I. From 1919 to 1925 he taught forestry at the University of Idaho, and from 1925 to 1952 he held administrative positions related to forestry at the University of Minnesota. He then returned to the UW where he served as President from 1952 until his retirement in 1958. Schmitz contributed greatly to forestry education in Washington State and the nation, serving both as President of the SAF and as editor of the *Journal of Forestry*. Schmitz Hall on campus is named in his honor, and Room 235 in Bloedel Hall (the Henry Schmitz Honors Room) was dedicated to him by the class of 1915—his class. Inside the room there is only a small plaque on a temporary wall listing his accomplishments, which few see. I think he deserves more recognition. Unfortunately, Schmitz drowned in an accident on the Olympic Peninsula at the age of 73.

Fig. 2.1. Dr. Henry Schmitz (1892–1965) (*Source: UW School of Environmental and Forest Sciences*).
The Exploration and Settlement of the Pacific Northwest

In 1774, the Spanish explorer Juan Perez was the first European to land on the Pacific coast of North America. Coastal areas at that time were occupied by native tribes who had lived there for at least 13,000 years. Sadly, they only lived freely for another 80 years or so before they were moved to reservations to make way for Euro-American settlers. There are now twenty-nine reservations in Washington, but most are small. I mention this because Native American tribes are currently at the forefront in the practice of sustainable forestry, including the restoration of forest health, particularly on the large Quinault, Yakama, and Colville reservations. In recent years some of our faculty members have developed strong relationships with the tribes and many tribal students have received undergraduate and graduate degrees in forestry from the College. In addition, the value of traditional knowledge is now being acknowledged.

In 1778, the British explorer Captain James Cook sighted Cape Flattery on his second exploratory world journey but missed the entrance to the Strait of Juan de Fuca and Puget Sound. Another British Captain, Charles William Barkley, named the Strait of Juan de Fuca in 1787. Juan de Fuca was born in Greece as Ioannis Phokas and was an explorer who sailed in the service of King Philip II of Spain—hence his Spanish name. He sailed in 1592 to seek the fabled Strait of Anian, which was thought to separate America and Asia and believed to be a northwest passage linking the Atlantic and Pacific Oceans. In my youth in Australia my schoolmates and I learned about Captain Cook because he “discovered” Australia, claiming it for Britain. In 1770, Cook landed at Botany Bay in present-day Sydney. Despite growing up in Sydney, it was only in 2012 that I made my first visit to the actual landing site, which is marked by a stone monument. I was not aware that Cook had explored the North Pacific Ocean as far north as the Bering Strait on another voyage. Apparently, Australian schoolchildren did not need to know that.

You may recognize the names of the next few people I mention. In 1791, the Scotchman Archibald Menzies (1754–1842) on Captain George Vancouver’s Expedition of 1791–1795 reported the occurrence of Douglas-fir on Vancouver Island. The name honored Menzies’s fellow botanist, the Scotsman David Douglas (1799–1834). Douglas collected seeds and specimens of northwest plants and sent them back to the Royal Botanical Garden in Kew, London. He was the first to report the extraordinary nature and potential of Douglas-fir. In 1825 he was based at the Hudson’s Bay Company’s Fort Vancouver on the Columbia River and collected specimens in Washington, Oregon, California, and Hawai‘i, where he died as a young man at the age of 35.

On his 1791–1795 expedition, Captain Vancouver claimed Puget Sound for Britain. He named it after Peter Puget, an officer in the Royal Navy and explorer. In 1792, Vancouver named the dominant mountain in the area Mount Rainier, in honor of British Rear Admiral Peter Rainier, Jr. Interestingly, Admiral Rainier never set foot in North America and actually fought to quell the American Revolution. Native Americans already had several names for the mountain (Tacoma, Tahoma, Tacohob, Pooskaus, and Ti‘Saaq). Debate over the name has continued for well over a century. President Barack Obama’s 2015 change of the name of the highest peak in North America—from Mount McKinley to its Alaskan Native name, Denali—gave impetus to renaming Mount Rainier, but to date, the name stands. Mount Baker, another prominent landscape feature, was named for Third Lieutenant Joseph Baker, also on the Vancouver Expedition.

In 1805, the Americans Meriwether Lewis and William Clark reached Cape Disappointment, near the mouth of the Columbia River in present-day Washington State, during their overland journey of discovery from the eastern US in 1804–1806. However, they did not establish a settlement there. In 1825, the Hudson’s Bay Company, which mostly traded in furs, established Fort Vancouver about 80 miles from the mouth of the Columbia River.

The Hudson’s Bay Company expanded into the lumber trade in 1828 and built the first sawmill in the Pacific Northwest, located 7 miles east of Fort Vancouver. The lumber mostly went to Hawai‘i. The Company also established Fort Okanogan and Fort Colville farther inland. In 1846, the Oregon Boundary Settlement established Oregon Territory, comprised of present-day Oregon, Washington, Idaho, and parts of Montana and Wyoming—the northern border was set at the 49th parallel. Washington Territory split from Oregon Territory in 1853.

When settlers first began traveling to Washington Territory, it could only be reached from the east coast of the US either by the Oregon Trail or by sailing around Cape Horn and up the west coast of South and North America. From 1811 to 1840 the Oregon Trail could only be traveled on horseback, but then became accessible to wagon trains. In 1851, settlers landed at Alki Point in Puget Sound and established a town site. They soon moved across Elliott Bay to a more
favorable location, now the historic Pioneer Square district. The new town was named Seattle to honor the Duwamish Indian leader Chief Sealth (ca. 1786–1866), who had befriended the settlers, and the name became official in 1853.

**The Pacific Northwest Lumber Trade**

The old-growth forests surrounding Seattle must have been seen as a challenge to the new settlers—hardly a good place for agriculture. But the enormous economic potential of the forests was soon recognized, leading Henry Yesler (1810–1892), to construct a steam-powered sawmill on the Elliott Bay waterfront in 1853. It was situated at the foot of Yesler Way, in what is now downtown Seattle (Lang 2003).

Yesler established a second mill on Union Bay in Lake Washington around 1888. Logs from the hinterlands were floated to it. After it burned down in 1895, several cedar shingle mills occupied the site, but were gone by 1920. The old mill area is now occupied by CUH on the eastern edge of the UW campus. Prior to the Euro-American settlement, several Native American longhouses were located in the area. Unfortunately, the local populations who camped and fished there were displaced.

**The California Gold Rush and the Pacific Rim Lumber Trade**

The California Gold Rush of 1848–1849 resulted in a surge in lumber production in the area surrounding Puget Sound (Chiang and Reese 1998). More than twenty sawmills dotted the shores of Puget Sound by the mid–1850s. Many were built by Andrew Jackson Pope, F. C. Talbot, William Renton, and Asa Mead Simpson—San Francisco investors. The Puget Mill Company was established by Pope and Talbot at Port Gamble in 1853. In the same year William Renton opened a mill at Port Blakely. In subsequent years smaller mills were added on both Puget Sound and Grays Harbor. The Pope and Talbot (now Pope Industries) mill was the oldest operating sawmill in Washington when it closed in 1995, after producing lumber for 142 years.

A typical mill town was established at Port Gamble, consisting of the sawmill on the waterfront, a company store, a manager’s house, cottages for married workers, dormitories for single employees, a hotel for visitors, a school, a church, a saloon, and a baseball field. Today the town is owned by Pope Industries and managed by the Olympic Property Group. More than thirty of the original houses and the church have been restored.

Port Gamble’s buildings are said to have been constructed in the style of those in East Machias, Maine, the hometown of Andrew Pope and William Talbot. Many of the first Port Gamble millworkers came from Maine, and the houses were apparently built to remind them of home. The attractive refurbished houses are now used by businesses (Fig. 2.2).

![Fig. 2.2. Restored houses in Port Gamble (Source: Wikimedia Commons—Joe Mabel)](image)

The Walker-Ames House, the largest in Port Gamble, was constructed in 1887 and named for Emma Walker and her husband Edwin Ames (1856–1935). Ames was employed to manage the Puget Sound operations of Pope and Talbot. Emma Walker was from a wealthy family, and the couple inherited a fortune on the death of her mother. Ames went on to be a prominent figure in the lumber and forestry business in Seattle. He was a philanthropist and donated...
his house in Seattle to the UW—it is now the home of the University President. The Walker-Ames Room in Kane Hall is named after them, as is the Walker-Ames Scholars Program, established in 1936. Dr. Maxwell Jacobs, the Director of the Commonwealth Forestry and Timber Bureau in Australia, came to campus in 1969 as a Walker-Ames Scholar.

Just before the mill closed in 1995, I did a consulting job for Pope and Talbot to determine why Douglas-fir lumber shipped to Australia was being rejected at the end of its journey. After reaching the port of arrival, it was found that the lumber was covered in fungal molds of varying colors that had developed during the long journey across the hot tropics. The lumber had been air-dried in the mill yard at Port Gamble and consisted mostly of sapwood with high moisture and nutrient contents—just perfect for molds. Airborne spores from the forest adjacent to the mill had landed on the lumber, but no molds were visible when it was loaded onto ships.

From the 1850s to the 1880s, the Pacific Northwest lumber trade was mostly with California, Hawai‘i, and the Pacific Rim nations of Australia, China, Peru, and Chile. Sailing ships carried lumber to ports in these countries. Douglas-fir shipped to Australia was sold as “Oregon,” and still is. The economy of Washington State was linked more closely to Sydney and Melbourne than to areas east of the Cascades. However, one of the problems with the Australian trade was finding return ballast. It turned out that Australian coal was an excellent and profitable ballast. Coal was sent to Hawai‘i and the ships were then loaded with sugar cane for the remainder of their journey to the west coast (Ficken 1987). Soon, however, the demand for Pacific Northwest lumber collapsed and numerous sawmills were forced to close. The Australian market faded, and by the mid-1880s it had ceased. In the early 1900s sailing ships carrying lumber were still a common sight on Puget Sound, but were eventually replaced by steamships.

But let’s return to the California Gold Rush. Prospectors poured into the gold fields from all over the world. In 1849, an estimated 2,600 Australians arrived. However, the gold rush only lasted a few years, so prospectors began looking elsewhere. In the 1850s gold was discovered in Australia, especially at Bendigo and Ballarat, near Melbourne. As they had in California, miners came from many countries, including the US. During this period an interesting Australia–US connection developed that involved growing eucalyptus trees—which are native to Australia—in California. Eucalypts are now a very common feature of the California landscape. They were introduced either by Australians or Americans who were impressed by how rapidly they grew to a large size (Rowland 2017). Ships arriving in San Francisco from Australia were built out of blue gum (Eucalyptus globulus), which provided good advertising. As the readily accessible gold in Australia became rare, entrepreneurs began to look at eucalypts as a way to “get rich quick.” They were well suited to grow in the California climate. The bare country in the San Francisco Bay Area, and other areas in the state, were ripe for tree planting. By 1900 thousands of acres had been planted to combat deforestation and to provide beauty, shade, windbreaks, firewood, railroad ties, mining timber, lumber for the construction of wagons, carriages, and farm implements, and oil for medicinal purposes. Many trees were planted to provide highway corridors.

There are about 600 species of Eucalyptus; many were tried, but blue gum was the most widely planted in California. Unfortunately, the get-rich-quick scheme for growing blue gums did not materialize. They did not have good wood properties for their intended use, as the Eastern Pacific Railroad Company discovered: railroad ties made out of blue gum checked and split if not seasoned properly, could not hold spikes securely, and rotted easily.

Eucalyptus forests have a distinctive aroma because of the volatile oils in the leaves, and the planted forests in the Bay Area smell just like Australia to expatriates like me. Californians now have a love–hate relationship with eucalypt trees (Santos 1997). They reproduce rapidly and are now considered to be weeds that spread easily. Also, they are very susceptible to fire because of their leaf oils and the ever-shedding bark that accumulates in piles at the bases of the trees. In addition, older trees are quite prone to branch breakage and windthrow. The Oakland Hills firestorm of 1991, which killed 25 people and destroyed 2,843 single-family dwellings and 437 apartment units, was fueled by eucalyptus trees, dry grasses and shrubs, and 70 mile-per-hour winds.

A number of other eucalyptus species have been planted around the world with success. Eucalypt timber species were grown in tests in Washington State, but failed due to their susceptibility to subfreezing temperatures. Some species (snow gums) that will tolerate cold, however, are grown as ornamentals in the Puget Sound area. There are 11 eucalypt trees on the UW campus, including two behind Bloedel Hall. Eucalypts can also be seen at the Washington Park Arboretum (Pacific Connections Garden), in the Woodland Park Zoo, and in residential gardens in Seattle.
In return for its “gift” of eucalypts, Australia imported Monterey or radiata pine (*Pinus radiata*) from California. This species may have been taken to Australia by gold miners after the California Gold Rush; a specimen was noted in the Sydney Botanical Garden in 1857. It occupies a small native range in California, near the coast in Santa Cruz, Monterey Peninsula, and San Luis Obispo counties and on several offshore islands, including one in Mexico. It is neither a plantation tree nor economically important in California, but is planted ornamentally; it is now threatened by disease and insects. However, because of its rapid growth and many uses, Monterey pine is now the dominant plantation tree in temperate countries in the Southern Hemisphere—Australia, New Zealand, Chile, Argentina, Uruguay, and South Africa, and also Kenya (half of which is located in the Northern Hemisphere). Douglas-fir has also been planted in a number of these countries, but not to the same extent. Unfortunately, plantations of Monterey pine have replaced native forests, and Monterey pine is now considered to be a weed in Australia because it spreads so easily. In Chile, the native forest was cleared to plant both Monterey pine and eucalypts. Attempts are now being made to revert some of the land—particularly the eucalyptus plantations—back to native forest.

**Boom and Bust Cycles and the Two World Wars**

Lumber boom and bust cycles have been common in the Pacific Northwest. Washington State’s lumber production was 160 million board feet in 1879, and by 1890, just eleven years later, it was over one billion board feet. This was largely due to the arrival of lumber companies, the building of railroads, and the use of new, more efficient logging and milling technology, such as cable logging and bandsaws. In 1905, Washington became the leading lumber-producing state in the nation, ceding this spot to Oregon only in the late 1930s. Forestry was the dominant player in Washington’s economy: in 1910, 63 percent of the state’s wageworkers depended, directly or indirectly, on forestry for employment, and in 1926, Washington’s timber harvest reached its all-time peak (7.5 billion board feet).

The stock market crash of 1929 started the Great Depression. Lumber prices plummeted, timber harvest fell to 2.3 billion board feet, and more than half of Washington’s loggers and millworkers were jobless. President Roosevelt’s establishment of the Works Progress Administration in 1935 increased employment nationwide and allowed many people to find new jobs, including graduates of the UW College of Forestry.

World War II was a shot in the arm for the timber industry (Burns 2016). Wood was needed to build hangars, barracks, ships, trucks, planes, bridges, and crates for shipping supplies and ammunition to Europe and the Pacific. War posters captured the urgency (Fig. 2.3). A once-idled timber-industry workforce suddenly had more work than it could handle. A huge amount of wood was cut to support the war effort, mostly from private land.

![Fig. 2.3. “Keep that lumber coming!” US Army World War II poster (Source: Wikimedia Commons).](image-url)
In 1944, near the end of the war, Congress passed the Sustained Yield Forest Management Act to provide a continuous supply of timber to ensure the stability of forest industries, provide employment and taxable wealth, and protect watersheds. The thinking was that a sustained yield would ensure the happiness and well-being of people in timber-dependent towns and protect water supplies. The US Forest Service was authorized to establish two types of sustained yield units: federal units to serve communities wholly dependent on federal timber, and cooperative units that involved both federal and private lands. Timber was to be sold to a single local sawmill designated by the Forest Service. Unfortunately, both types of units proved to be failures because the sustained yield unit approach failed to meet local community needs. In fact, the act was clearly designed to constrain timber production for the industry’s benefit and did not address community development, social well-being, or the political process in relation to forest management. Only one cooperative unit—the Shelton Cooperative Sustained Yield Unit—and five federal units were established.

The demand for lumber continued after World War II with the construction of new houses. But by this time lumber companies had harvested much of the private land, and became more dependent on the national forests. They lobbied hard for more access to old-growth forests. Access was granted, but this flew in face of the Sustained Yield Management Act. The Forest Service began to emphasize rapid logging and intensive management, involving site preparation and the planting of seedlings. The rapid harvesting of both private and federal forests during and after World War II left a legacy of harm to forest ecosystems that is still being felt today. In 1960 the Multiple Use–Sustained Yield Act was passed, providing a mandate for management priorities on the national forests to include all resource uses (timber harvest, protection of watersheds and their water supply, wildlife habitat, and recreation).

**Labor in the Forest and Mills**

Without a labor force of loggers and millworkers, the lumber trade could not have existed. But the early days were not very civilized—the workforce was dominated by men, who had few sources of entertainment and little contact with other segments of society. Gambling, drinking, and fighting were common in logging camps. Women were needed to establish families and create permanent towns. In the 1860s, Asa Mercer, the brother of John Mercer, one of the founders of Seattle, sought to bring marriageable-age women from the east coast of the US to foster “civilization” in Seattle. The ravages of the American Civil War had left many towns in the east short of men. Mercer thought that many of these women would be willing to come out to the west coast to marry. His efforts were not very successful, though he enticed a few so-called Mercer Girls to come west.

The ABC TV show *Here Come the Brides*, which aired from September 25, 1968 to April 3, 1970, was loosely based on the story of the Mercer Girls. In the pilot episode, lonely lumberjacks are ready to leave Seattle because of the lack of females. An effort is made to find 100 marriageable ladies in the east willing to come to the frontier town (population only 152) and stay for a full year. Three brothers travel to New Bedford, Massachusetts, to recruit the women, and they hire a ship to take them back to Seattle. The theme song of the show starts with “The bluest sky you’ll ever see is in Seattle.” My Australian mother once asked me if this was really true. I answered that it certainly is true in the summer, and during cloud breaks in the fall, winter, and spring. In recent years, however, the blue summer skies have been obscured by smoke from fires burning in eastern Washington, Oregon, and British Columbia, due in part to global warming and climate change. Of course, logging fires were common in the early days, so smoke must have been common then, too.

Early lumber workers performed demanding and dangerous work. In Washington State, 150 loggers typically died every year, and almost one in five loggers (and one in eight millworkers) suffered some sort of injury on the job. Thus, it is not surprising that unions were formed to fight for better wages and working conditions. In the late 1880s the workday was reduced from twelve to ten hours. To protect themselves from liability, industry leaders decided to support a law, passed in 1911, creating the nation’s first compulsory workers’ compensation. The law allowed injured workers to be reimbursed for most of their medical costs and lost wages, and was supported by both timber companies and the unions (Chiang and Reese 1998).
The implementation of workers’ compensation, however, did not stop the unions from continuing to fight for workers’ rights. Pay was poor in the lumber camps, but the lumbermen of the time argued they could afford to pay no more. This resulted in considerable unrest. In 1907 the radical Industrial Workers of the World (IWW), also known as the “Wobblies,” arrived in the Pacific Northwest (Rieder 1999). The IWW led many strikes in lumber camps and mills, most of which were crushed. However, after a bloody clash in Everett in 1916 and a massive statewide strike in 1917 brought the industry to halt, the lumbermen felt that IWW had to be eradicated. The US participation in World War I offered them an opportunity to defeat the Wobblies. During the latter stages of the war, airplanes began to be used. Built from Sitka spruce wood, the best wood for airplane frames, planes were produced by a number of companies around the nation. In 1916 William E. Boeing formed the Pacific Aero Products Company, which became the Boeing Airplane Company in 1917. Lumber was delivered by railroad to Boeing in Seattle, the Martin Company in Los Angeles, Curtiss Aeroplane in Buffalo, New York, and Wright Aeronautical in Dayton, Ohio. Interestingly, Boeing started his professional life as a lumberman (Schultz and Wilma 2006). Born in Detroit, Michigan in 1881 he moved as a young man to Hoquiam, Washington in 1902 and started a timber company. In 1908, he moved to Seattle and began his interest in flying and airplane manufacturing. His first airplane (Model 1, B & W Seaplane) was constructed of wood in his boathouse hanger on Lake Union, and first flew on June 15, 1916.

The Olympic Peninsula was a source for the large amounts of Sitka spruce wood needed for airplane construction. To gain access to the timber, half the acreage of Mount Olympus National Monument was returned to the Olympic National Forest in 1915 by the Woodrow Wilson administration (Chiang and Reese 1998). To increase aircraft production, spruce lumber production also needed to be increased, but strikes by the IWW were a threat to these plans. The Army Spruce Production Division, led by Colonel Brice Disque, assigned thousands of soldiers to build railroads and roads into the Olympic Peninsula spruce forests. Disque also established the Loyal Legion of Loggers and Lumbermen (the 4L). Employers and workers were induced to increase lumber production by appealing to their patriotism. Logging camp employees and millworkers were required to join the legion, but known Wobblies were not allowed to become members. Wobblies were beaten up frequently by soldiers and expelled from the logging camps. To keep the workers happy, Disque convinced the industry to give the workers an eight-hour work day with no pay reduction (Chiang and Reese 1998). Also, living conditions were improved in the logging camps. The IWW no longer had strike power and after 1919 it was not a major force in northwest lumber camps. The 4L folded in the mid-1920s (Rieder 1999) and the wartime suppression of the Wobblies was considered to be successful. But the IWW never quite died. Young IWW members surfaced in Seattle during a WTO meeting in 1999.

The Role of Federal, State, and Private Land Ownership in the Development of Forestry in the Pacific Northwest

Forest management in the Pacific Northwest has been strongly influenced by land ownership—typically, it has been a battle of philosophies among utilitarianists, conservationists, and protectionists. To encourage settlement and economic development in the west, the federal government granted lands to the states and territories. A large area of land was allocated to the State of Washington. The Land Ordinance Act of May 20, 1875 set aside section 16 of every township—which consisted of 36 sections—to be used for public education. Additional sections were given when statehood was granted in 1889, and again when land-grant or agricultural colleges and universities were established in the state. In the 1920s and 1930s further forest lands were acquired by 21 counties through tax foreclosures. Unable to manage these mostly harvested and abandoned lands, counties deeded them to the state to manage as trust lands.

In addition, railroad grants were given to corporations in lieu of cash for building right of ways. Through the 1862 Homestead Act and cash sales, federal land was transferred to private citizens. Homestead grants were given to people who cleared land for farming and agreed to stay on the land for a prescribed period of time. Despite all these allocations, however, much of the land remained in federal ownership.

Farmers had expected that heavily forested areas could be converted into prosperous agricultural land, but it soon became clear that this was not the case, except in the lower river valleys. To counter this and attract more people into forestry, boosters such as Asa Mercer and Ezra Meeker touted the region’s “infinite” timber resources.
With the expansion of the lumber industry, economic and political conditions at the time encouraged fraudulent land practices. Removal of timber from public lands was prohibited by federal regulations but they were ignored by many mills since regulatory agents were scarce (Chiang and Reese 1998). The Timber and Stone Act was passed in 1878 to combat corruption and increase settlement. Residents of Washington, Oregon, California, and Nevada could acquire 160 acres of mineral or timber land for $2.50 per acre. Timber claims could not be filed by corporations. The law was passed to help small landowners, but enforcement was ineffective and lumber companies were able to amass substantial landholdings by taking advantage of the law’s shortcomings.

Railroad grants to the Northern Pacific Railway in 1864 allowed it to acquire large tracts of forest, and it became one of the largest landowners in the west. By 1883 railroad track had been laid to Tacoma, and Northern Pacific then owned 7.7 million acres in Washington Territory. Northern Pacific received a 40-mile-long strip of land on alternate sections (which were 1 square mile each) in a checkerboard pattern for each mile of track it built in Washington Territory. The remainder was federal land. You can still see the evidence of the checkerboard pattern from the air today on Google Earth (Fig. 2.4).

Fig. 2.4. Checkerboard land ownership near Easton, Washington, on Interstate 90 in the Washington Cascades. Note the privately owned harvested square miles in comparison to the unharvested square miles owned by the US Forest Service (Source: Google Earth).

Checkerboard ownership did not lend itself well to forest management, and many decades have been spent trying to consolidate private industry and Forest Service land. Its legacy still continues. Northern Pacific’s rival, the Great Northern Railway, completed its transcontinental line to Seattle in 1893. Great Northern was awarded land grants, but much less than those given to Northern Pacific.

Many large lumber companies in the Great Lakes area looked to move west in the 1880s when the timber supply started to dwindle. In 1888, the Saint Paul and Tacoma Lumber Company was formed after the purchase of 80,000 acres from the Northern Pacific Railway (Chiang and Reese 1998). Its mill was the first to have timber delivered entirely by rail. The industry grew at a rapid pace after Washington achieved statehood in 1889 and the 1900 arrival of Frederick Weyerhaeuser, a Minnesota investor, in Washington was particularly notable. As a result of buying 900,000 acres from Northern Pacific, the Weyerhaeuser Company became the second largest private holder of timber in the nation. After additional purchases from Northern Pacific and other owners, the company owned 1.3 million acres (26 percent of Washington’s private timberland) by 1903. When he first arrived, Weyerhaeuser thought just to buy land and sell its timber to buyers. But it soon became clear that Weyerhaeuser could also make money by milling and
manufacturing its own lumber. Weyerhaeuser’s first sawmill was built in Everett in 1902 with subsequent mills in Aberdeen, Enumclaw, Longview, and Raymond. Weyerhaeuser started pulp and paper production in 1931.

The majority of the most productive forest lands were in private and state hands and were located at low elevations, though some highly productive land was retained by the federal government. High-elevation lands, which were mostly federally owned, were generally less productive, had shorter growing seasons and poorer soils, and were difficult to access due to steep terrain and snow. Because the management objectives of federal, state, and private entities varied significantly, there was considerable discussion about preserving some of the public forest areas for the maintenance of clean water and recreation, rather than for producing lumber. Some of the high-elevation lands consisted of a mix of federal land and land owned by the railroad companies, as mentioned previously. Working to consolidate these ownerships into larger single blocks has kept lawyers busy for decades.

The Forest Reserves and National Forests

To keep the remaining lands in federal ownership, the Federal Forest Reserve Act was passed in 1891, and by 1897, millions of acres had been reserved in Washington in areas we now know as national forests, including the Gifford Pinchot, Mount Baker–Snoqualmie, Olympic, and Wenatchee National Forests. Establishment of these federal reserves had the support of Presidents Harrison and Cleveland, but was strongly opposed by lumbermen, miners, ranchers, and farmers. In 1897 the Organic Administration Act was passed, specifying that forest reservations were intended for managed use, including timber and water, and not for wilderness preservation. This allowed private owners, especially the railroads and large timber companies, to exchange lands within the reservations for equivalent lands outside the reserves.

The forest reserves were managed from 1897 to 1905 by the US Department of the Interior. In February 1905 the Transfer Act moved the national forests from the Department of the Interior to the US Department of Agriculture’s Bureau of Forestry. In March 1905, the Bureau of Forestry was renamed the USDA Forest Service. In 1911 the Weeks Act allowed the Secretary of Agriculture to purchase forested, cutover, and denuded lands for the regulation of navigable streams which led to the eventual creation of national forests in the eastern US (Bramwell and Lewis 2011). It wasn’t until 1960, however, that the Multiple Use–Sustained Yield Act provided for the management of national forests to include all resource uses, including timber, water, recreation, and wildlife. Arguments about who should own or utilize federal lands or have the power to “carve up the commons,” still continue (Blaeloch 2009). The ownership of unreserved forest lands in western and eastern Washington in 2016 is shown in Table 2.1. In western Washington the dominant landowner is private industry (39 percent), while the federal government owns (28 percent). This situation is reversed in eastern Washington where private industry owns only 13.5 percent compared to 40.1 percent for federal Lands. Nonindustrial owners have a similar percentage in eastern (19.9) and western Washington (17.4). The state owns a higher percentage of land in western than eastern Washington. In contrast Native tribes own considerably more land in eastern Washington than western Washington.

Table 2.1. Percent of landownership of unreserved forest lands in Washington State, 2016

<table>
<thead>
<tr>
<th>Landowner</th>
<th>Western Washington</th>
<th>Eastern Washington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native American</td>
<td>3.2</td>
<td>16.5</td>
</tr>
<tr>
<td>State (and local)</td>
<td>16.5</td>
<td>10.1</td>
</tr>
<tr>
<td>Federal (USFS and others)</td>
<td>23.8</td>
<td>40.1</td>
</tr>
<tr>
<td>Forest Industry</td>
<td>39.0</td>
<td>13.5</td>
</tr>
<tr>
<td>Nonindustrial</td>
<td>17.4</td>
<td>19.9</td>
</tr>
</tbody>
</table>

The National Parks

In the mid to late 1800s a number of citizens argued that some federal lands that had natural or cultural value should be set aside to be enjoyed by all citizens in perpetuity. The first national park was Yellowstone, established in 1872, followed by Yosemite and Sequoia in 1890. Mount Rainier National Park was established in 1899. The NPS, however, was not established until 1916 (National Park Service 2016). The movement to establish Mount Rainier National Park was started in 1893, and in 1897 President Cleveland proclaimed that 21 million acres be set aside in the Pacific Forest Reserves, including a 2.5-million-acre Mount Rainier Forest Reserve.

About half of the Mount Rainier Forest Reserve was owned by the Northern Pacific Railway in a checkerboard pattern, and the company was reluctant to give up the land without compensation. Mount Rainier was considered to be valueless land of rock and ice. However, legend has it that Northern Pacific originally thought there could be economic value in providing ice to Seattle for refrigeration purposes. This idea was abandoned, and Northern Pacific decided to form a “pragmatic alliance” with the Mount Rainier movement and advocate the establishment of national parks and hotels to promote rail tourism. It was hoped that this would improve the company’s image.

Behind the scenes, however, Northern Pacific was lobbying to exchange its Mount Rainier lands for valuable forest lands in forest reserves through amendments to the Mount Rainier Act of 1899. With the help of congressmen from Washington State, it was successful in its lobbying efforts: in exchange for about 450,000 acres that the company relinquished in the national park and forests, it acquired some 444,000 acres in Oregon, Washington, Idaho, Montana, and Minnesota. Much of this land was then sold to timber companies like Weyerhaeuser (Ficken 1987).

There is a similar intriguing story about the establishment of Olympic National Park. The Olympic Peninsula’s forests were designated by President Cleveland as the Olympic Forest Reserve in 1897. With the establishment of Mount Rainier National Park, a movement to create Olympic National Park in the Olympic Forest Reserve soon arose. In 1909 President Teddy Roosevelt designated 615,000 acres as Mount Olympus National Monument. This set up decades of battle between timber and mining interests versus those interested in park establishment. The lowland forests on the Olympic Peninsula were extremely valuable for timber, and the upland areas had potential for mining. Unfortunately for supporters of park establishment, it appeared initially that there was no single feature that would justify preservation, such as the scenic beauty of Mount Rainier, the geysers in Yellowstone, or the unique geology of the Yosemite Valley. However, large populations of Roosevelt elk caught the eyes of supporters. Perhaps the park could be named Elk National Park. Eventually it was realized that it was the trees that needed to be preserved—especially the huge Sitka spruce, western redcedar, and Douglas-fir. After years of battles, President Franklin Roosevelt signed the act establishing Olympic National Park in 1938.

Railroads and Advances in Logging Technology

Initially, logging technology was not very sophisticated (Chiang and Reese 1998); just cut the trees by hand with axes and crosscut saws (Fig. 2.5). But felling large trees was a real challenge. Fallers had to be sure to make the trees fall in areas that would avoid stem breakage. They also needed to place logs in the best place to be hauled from the woods. After the trees were felled, buckers sawed logs into suitable lengths. Sometimes they were debarked. Following this a third set of workers placed the logs onto oiled skids—small planks or logs—and then teams of oxen or horses would skid the logs (Fig. 2.6) to Puget Sound or a river landing to be floated to mills.
Early forest harvesting was confined to land close to Puget Sound, but to move logs from upper slopes, log flumes had to be used. The remains of a 5-mile-long historic flume can still be seen at the Log Flume Heritage Site at Sherman Pass on Highway 20 in eastern Washington (Washington Trails Association). Another example is the Broughton Lumber Company flume, which transported rough-hewn lumber (cants) in a 9-mile-long flume from an upper mill near the town of Millard, Washington (elevation 1,200 feet) to a finishing mill at 200 feet elevation (Library of Congress) located on Highway 14, just across the Columbia River from Hood River, Oregon. The flume was constructed in 1921–1923, and it took 55 minutes for a cant to cover the nine miles. It was the last operating flume in the US and was closed in 1986.
Splash dams and log drives on rivers were commonly used in North America and Europe to transport logs downstream from logging sites to sawmills and pulp mills. Most of the rivers in Washington were used for this purpose. This practice had mostly ceased by the 1950s, and the last log drive in Washington was in 1966. In 1973, I was lucky to see one of the last log drives in the eastern US, on the Kennebec River in Maine, on Highway 201. It was quite spectacular and also aromatic, due to the presence of eastern redcedar logs.

When logs arrived at a water landing, boom men sorted the logs and formed them into rafts, which were towed to mills. Many rafts on the Columbia River were extremely large, and some were even towed on the Pacific Ocean as far away as San Diego. Log rafts pulled by tugs on Puget Sound used to be a common sight, but less so today. When logs reached mills, millworkers removed them from the water, sawed them at the steam-powered mills, and loaded the lumber aboard vessels.

New technologies in the 1880s facilitated the rapid harvest of the forests. In 1881 the donkey engine (Fig. 2.7), a small steam engine that could power a winch that pulled logs from the woods with cables, allowed harvesting to reach stands that had previously been inaccessible.

The introduction of high-lead yarding about 1910 increased efficiency, but made logging more dangerous, particularly for choker setters. When World War II started, chainsaws still weren’t common. But to meet the wartime need, more and more crews turned to two-man chainsaws to speed up the cut (Fig. 2.8). But the two-man chainsaw wasn’t long for the woods, and within a few years of V-J Day, one-man chainsaws started to appear (http://battle-ready.kcts9.org/chainsaws.html). In 1948 McCullough introduced a new chainsaw in North America. One faller with a chainsaw could do the work of 15 fallers with axes and crosscut saws.

![Image of donkey engine](source: UW Libraries, Special Collections, Negative Number C. Kinsey 3893)

![Image of two-man chainsaw](source: US Forest Service)
Loggers could haul logs significant distances using donkey engines. However, there was no easy way to move logs out of the forest (Chiang and Reese 1998). The appearance of narrow-gauge logging railroads in the 1880s solved this problem. Stands of trees that were previously inaccessible because of the difficult terrain and long distances from water were now reachable. But the high cost of railroads favored large logging companies; small operations were at a disadvantage. Hundreds of miles of narrow-gauge railroad were constructed (Robertson 1995). Logs were loaded on train cars pulled by steam engines and then transported to mills. Sometimes a single log would occupy a whole car. Railroad trestles were common sights in steep terrain (Fig. 2.9).

The use of steam donkey engines and logging trains commonly resulted in forest fires. In many cases, the area burned equaled the area that was cut. A hike on Rattlesnake Mountain, Tiger Mountain, Squak Mountain, or Cougar Mountain near Seattle reveals the legacies of both the railroad grades and the fires.

When I was a graduate student in the College, I used to admire the logging locomotive located behind Winkenwerder Hall, adjacent to the railroad tracks that eventually became the popular Burke-Gilman Trail. The locomotive (a Mallet 2–6–2 built in 1926) was given to the UW in 1962 by the US Plywood Corporation and sported the number 11 (Fig. 2.10). It had a number of owners before it came to the UW, including the Weyerhaeuser Corporation in Oregon. When I left the UW for the University of Michigan in 1971 it was still there, but when I returned in 1974 it was gone, and I often wondered about its fate. It turns out it had been donated in 1972 to the Washington State Parks and Recreation Association and then transferred to the Puget Sound Railway Historical Association Museum in Snoqualmie on long-term loan. It moved under its own steam along the old tracks to Kenmore and then was towed to Snoqualmie, where it was overhauled and pulled tourist trains until 1990. It no longer runs but can be seen in all its glory at the museum (Grindeland 2005; Northwest Railway Museum).

Fig. 2.9. Crew with Weyerhaeuser Timber Company’s Baldwin Mallet locomotive No. 6 hauling a log train over a trestle, Melbourne, Washington, ca. 1941 (Source: UW Libraries, Special Collections, Negative Number C. Kinsey 4880).

Fig. 2.10. US Plywood Corporation locomotive No. 11 behind Winkenwerder Hall, in 1962. Dean Gordon Marckworth is waving from the cab (Source: Museum of History and Industry, Seattle Post-Intelligencer Collection).
Logging railroads were common not only in the western US but also in Canada and other countries, including Australia and New Zealand (Stamford 2001). Logging trucks began to be used in the late 1910s (Fig. 2.11). Eventually railroads were completely replaced by roads and logging trucks. Many of the old railroad grades are still used as roads.

Fig. 2.11. Logging truck, Washington, ca. 1918 (Source: UW Libraries, Special Collections, Negative Number UW2170).

The Early Actors in Forestry Education

A handful of men (Fig. 2.12) had a huge influence on the development of forestry education in the US: Gifford Pinchot, Dietrich Brandis, Wilhelm Schlich, Carl Schenck, Bernhard Fernow, and John Muir (Lassoie et al. 1998; Green 2006; Anderson 2007).

Fig. 2.12. Six men who strongly influenced forestry education in the US: Gifford Pinchot (Source: Wikimedia Commons), Dietrich Brandis (Source: Wikipedia), Wilhelm (William) Schlich (Source: Wikimedia Commons), Bernhard Fernow (Source: Wikivisually), Carl Schenck (Source: Wikimedia Commons), and John Muir (Source: Wikimedia Commons).
Gifford Pinchot (1865–1946)

Gifford Pinchot is considered to be the “Father of American Forestry.” He was born in Simsbury, Connecticut, and died in New York City. His fostering of scientific forestry and forestry education played a key role in shaping the management of natural resources in the US. His father, James Pinchot, had made his fortune from investments in land speculation and lumbering. Pinchot graduated with a BA from Yale University in 1889 and began to pursue a career in forestry and conservation. In 1890, he spent a year at the French National Forestry School at Nancy and was the first American to receive formal instruction in forestry there. Pinchot and his father endowed the School of Forestry at Yale in 1900, and in the same year started the SAF.

In 1892, Pinchot became the private forester for George Vanderbilt’s Biltmore Estate in Asheville, North Carolina—the cradle of American forestry—and initiated the first large-scale systematic forest management scheme in the US. He then moved into private consulting. In 1896, Pinchot served as a member of the Forest Commission appointed by the National Academy of Sciences, which recommended the creation of forest reserves from the public domain. In 1898, Pinchot was appointed Chief of the US Department of Agriculture’s Division of Forestry, which eventually became the USDA Forest Service in 1905. Pinchot was the first chief of the Forest Service and served from 1905–1910. He was a close friend and collaborator of President Theodore Roosevelt, who had appointed him. With Roosevelt’s help he put into practice the guiding principle that forests could produce timber and yet still be maintained for the enjoyment of future generations. The forest reserves were transferred from the Department of the Interior to the Department of Agriculture and renamed “national forests” in 1907. In 1910, at the end of Pinchot’s time as chief, the national forests had increased to 175 million acres, including almost 11 million acres in Washington State (25 percent of its total land area). Forestry in Washington has been greatly influenced by the presence of the national forests.

Pinchot was a utilitarian conservationist who recognized that the wise use of the earth and its resources would be of lasting value to people in the US (Chiang and Reese 1998). If proper logging methods and harvest levels were used by the Forest Service, the national forests could provide a continuous source of lumber. But western logging and ranching companies believed that the Forest Service’s conservation policies would restrict their ability to obtain lumber and grazing rights. Although Pinchot assured them that logging and grazing would be expanded on national forests, congressional representatives in western states passed an amendment declaring that without Congress’ approval the President could not add lands to the National Forest System in Washington and five other western states. In opposition, President Roosevelt used an executive order to add millions of acres to the national forests, including the Colville National Forest in Washington.

Despite this, lumber companies eventually came to support Pinchot because some of his policies matched their needs (Chiang and Rees 1998). Because of tax laws, companies hesitated to implement conservation measures, such as tree replanting. On their unlogged lands owners had to pay high annual property taxes, so Pinchot called for tax reform. Fire was a constant threat to forests so lumbermen had an incentive to quickly harvest the trees on their lands to avoid economic losses. Pinchot promoted cooperation among federal, state, and local government landholders and private companies to reduce fire losses.

He was also supported by Weyerhaeuser and other lumber companies because his ideas about forestry were not totally different from theirs (Chiang and Reese 1998). Like Pinchot, they aimed to maximize the long-term output of lumber. Also, he considered “virgin forests”—currently called ancient or old-growth forests—as “inherently wasteful.” In these old forests wood volume only increased gradually or not at all. They also contained many tree species that had no economic value for lumber. Pinchot wanted to establish fast-growing-managed forests to replace the old virgin forests. Forests composed only of high-value species, such as Douglas-fir, would be the ideal. Once these trees reached the point when their growth slowed, they would be harvested and replaced by a new managed forest. Sustained yields of lumber could be produced in managed forests ad infinitum as long as harvest levels did not exceed growth. The conversion of slow-growing old-growth forests to new managed forests would be appreciably delayed if they were retained.
When William Howard Taft replaced Roosevelt as President in 1909, Pinchot continued as chief of the Forest Service. The Taft administration, however, was not deeply devoted to conservation programs, believing instead that public lands should be controlled by the states or by private individuals. Pinchot’s philosophy was different from Taft’s, and he was dismissed in the following year. However, his idea of sustained-yield forestry remained enshrined as the agency’s guiding principle.

After leaving the Forest Service, Pinchot founded the National Conservation Association, an organization he personally funded to be a watchdog over the development of public lands and to oppose the transfer of public lands to the states. He served as its president from 1910 to 1925. His interests then turned to politics. Pinchot ran unsuccessfully for the Senate in 1914 from the State of Pennsylvania, on the Progressive Party ticket, and then tried twice more. He served two terms as governor of Pennsylvania (1923–1927 and 1931–1935). In his remaining years, he gave advice to President Franklin D. Roosevelt. Pinchot died of leukemia in 1946, at the age of 81. In 1963, President John F. Kennedy accepted the family’s summer retreat house as a donation to the Forest Service by the Pinchot family. It is located in Milford, Pennsylvania and is now a National Historic Site. The Gifford Pinchot National Forest in Washington, Gifford Pinchot State Park in Pennsylvania, and Pinchot Hall at Pennsylvania State University are named after him.

**Dietrich Brandis (1824–1907) and Wilhelm Schlich (1840–1925)**

The men who had the most influence on Pinchot’s development as a forester were Sir Dietrich Brandis, who brought forestry to the British Empire, particularly in India (Underwood 2013), and his successor Sir Wilhelm (William) Philipp Daniel Schlich (1840–1925). Both were born and educated in Germany and considered to be German-British. Brandis guided Pinchot in his studies at Nancy and gave him advice on how to develop professional forest management in the US and structure the Forest Service after he became its chief. Schlich spent 19 years in India developing forest management and education programs for the British. In 1885 he moved to England, where he established the Oxford University School of Forestry in 1905. He was knighted in 1909 and became Sir William Schlich. One of his most notable achievements was the publication of a five-volume *Manual of Forestry* beginning in 1889. Schlich was also a colleague and mentor of Gifford Pinchot and first met him when Pinchot was on his way to France. Pinchot would subsequently visit Schlich whenever he passed through England. Schlich strongly urged Pinchot to “strike for the reservation of national forests.”

After Schlich’s death, the Oxford Forestry School sponsored a campaign to memorialize him. The SAF contributed $100, and additional contributions came from countries in the British Empire. The first award was presented to Australia in 1928, the second to New Zealand, the third to India, and the fourth to the US (Steen 2000). Each country selected an individual who contributed to the advancement of forestry.

In the US, the SAF established the Sir William Schlich Memorial Award. The first to receive the award was President Franklin Roosevelt in 1935, and the second was Gifford Pinchot in 1940. In Australia, the Schlich medal was awarded annually to the top forestry graduate at the Australian Forestry School in Canberra. I attended the Australian Forestry School in the early 1960s, but unfortunately did not win the Schlich medal; not even close. However, one of Dean Bare’s graduate students from Australia, Tony O’Hara (UW PhD ’87), did win one when he was an undergraduate student at the Australian National University.

**Carl Schenck (1868–1955)**

Carl Schenck succeeded Gifford Pinchot at the Vanderbilt Biltmore Estate, where in 1898 he founded the Biltmore Forest School, the nation’s first forestry school. Schenck was born in Darmstadt, Germany, and received a PhD from the University of Giessen in 1895. He developed the Biltmore stick, a simple device for measuring tree diameter and height, and therefore tree volume. I used the Biltmore stick in classes at the Australian Forestry School, but I was not aware of its origin until I came to the US. You can still buy one at Forestry Suppliers, Ben Meadows, or Amazon.
Schenck and Pinchot’s philosophies about forest management differed considerably. Pinchot advocated a national approach, while Schenck favored private enterprise. They also differed in their educational objectives. Pinchot thought foresters should be well educated at the university level, whereas Schenck believed a more technical field-oriented education was best (Schenck 2011). This disagreement still continues in forestry circles.

Bernhard Fernow (1851–1930)

The other leading forestry expert at the time was Bernhard Fernow, who espoused a regional approach. Fernow was born in Poland and educated at the University of Königsberg (now Kaliningrad, Russia) and the Royal Prussian Academy of Forestry at Münden, Germany. In 1886 he was appointed Chief of the Division of Forestry in the US Department of Agriculture, and in 1898 he became the first Dean of Forestry at the New York State College of Forestry at Cornell—the first four-year forestry school in the US. He died in Toronto, Canada.

John Muir (1838–1914)

John Muir was a famous Scottish-American naturalist, mountaineer, and author. He was born in Dunbar, Scotland, and died in Los Angeles. Muir was an early champion of wilderness preservation in the US, the founder of the Sierra Club, and is considered to be the “Father of National Parks.” Like Schenck and Fernow, Muir had strong philosophical differences with Gifford Pinchot.

Muir was considerably older than Pinchot, but they formed a friendship in 1893 and often traveled together. In August 1897, Pinchot was in Seattle as a special agent in the Department of the Interior, examining the impact of creating forest reserves. Muir was returning from a trip to Alaska and read Pinchot’s newspaper statement that sheep did no harm in the mountains where they were taken to graze. When they ran into each other in the lobby of the Rainier Hotel in downtown Seattle, Muir pointed to the offending article and asked, “Have they quoted you correctly here?” “Yes,” said Pinchot. Muir responded, “Then I don’t want to have any more to do with you. Last summer when we were in the Cascades you agreed that sheep do a great deal of harm!” Some have argued that this encounter never happened, particularly the Sierra Club (https://vault.sierraclub.org/john_muir_exhibit/people/pinchot.aspx), but it makes for a good story. Pinchot and Muir clashed again over the establishment of a dam in the Hetch Hetchy Valley, adjacent to Yosemite National Park in California, which Muir wanted as a part of Yosemite. Muir lost and the valley eventually became a reservoir. Ironically, it is now included in Yosemite National Park. Despite Muir’s battles with Pinchot, a large coast redwood in Muir Woods, near San Francisco, is named in Pinchot’s honor, as is Pinchot Pass on the John Muir Trail in the Kings Canyon National Park, also in California.

The Beginnings of Forestry Education at the University of Washington

A brief overview of the history of the College from 1907–1960 relative to the development of the field of forestry is presented here; more details are given in later chapters. In the early days of the University, the focus was on the sciences and the arts. But in 1894 more practical curricula began to be offered when the School of Mining was added. Since forestry was the preeminent industry in Washington in the 1890s, it seemed logical that the UW would eventually include a forestry program. Thus, a course in forestry was offered in 1895, and in 1905 the Forest Service established a Timber Testing laboratory on campus. This gave impetus to the formal establishment of a forestry education program in 1907, which was supported by many lumber companies, including Weyerhaeuser.

The development of forestry education in the US was influenced by six main factors (Green 2006): (1) the Morrill Act of 1863, which established state and federal land-grant colleges to promote the development of applied agricultural education—trees were considered to be a crop, which explains the inclusion of forestry programs within agricultural colleges, especially in forested regions; (2) concern among early conservationists about a growing timber famine due to the destruction of primary forests across the country; (3) the need for trained employees for the forest industry and government agencies, such as the US Forest Service, to counteract this destruction; (4) regional politics
and issues concerning the use of the forests; (5) changes in individual college and university administrative structures in keeping with local needs; and (6) the development of professional standards for foresters, especially by the SAF.

Only a few forestry schools existed in 1907. They included the Biltmore Forest School in Asheville, North Carolina, and the New York State College of Forestry at Cornell University (established in 1898); Yale (1900); Michigan State University and the University of Maine (1902); University of Minnesota (1903); Pennsylvania State University and Purdue University (1905); University of Georgia (1906); and the UW and Texas A&M University (1907) (Green 2006; Wikipedia List of Historic Schools of Forestry). In the 1930s the UW's College of Forestry was rated highly by Chapman's professional forestry school report, and by 1960 it was known nationally and internationally as an outstanding institution at which to obtain both undergraduate and graduate degrees.

Three UW deans were appointed in the period from 1907 to 1960: Francis G. Miller (1907–1912), Hugo Winkenwerder (1912–1945), and Gordon D. Marckworth (1945–1963). All contributed greatly to the future of the College. From a small start faculty numbers increased to 18, specialty areas were included, research was fostered, library resources were enlarged, and student aid programs were put in place.

Property taxes on forest land were of great interest during this period. Several faculty members, including Dean Winkenwerder, played a role in trying to relieve the property tax burden on private forest lands. There was little incentive for companies to continue to pay property tax on harvested land, so they let their lands become delinquent. The situation was remedied by the passage of the 1931 state Reforestation Act, whereby annual property tax was based on land values. Timber was exempted from annual taxation, but was taxed on the stumpage value of the harvested trees (http://leg.wa.gov/CodeReviser/documents/sessionlaw/1963c214.pdf).

Annual undergraduate enrollment fluctuated widely from 1907 to 1960, from 10 to 454. It was influenced by the development of the field of forestry, the two world wars, the fortunes of the timber industry, economic depressions, and federal government politics. Only a handful of women were represented. Graduate enrollment was much less, ranging from 1 to 33. In 1934 the first master's degree was awarded and the PhD program was established. From 1909 to 1959, the College graduated 1,432 undergraduates and 204 graduate students (182 master’s and 22 PhD degrees). In 1908, UW students also established the Forest Club and the Alpha Chapter of Xi Sigma Pi, the national honorary forestry fraternity.

Until 1960, the undergraduate curriculum was frequently reviewed but changed little. It focused on the same subjects it had started with—silviculture, silvics, logging engineering, forest products, and mensuration. After receiving their degrees, most BS graduates in forestry were employed to manage the forests of federal agencies (such as the US Forest Service), state governments, or the timber industry. The need for forests for research, teaching, and demonstration was recognized early in the College’s history. Several College forests were established: the Charles Lathrop Pack Experimental Forest in 1926; the Lee Memorial Forest in 1934; and the Winnifred Denney Moore Forest in 1958. The Washington Park Arboretum near the UW campus was established in 1934, which involved the College, the City of Seattle, and the Arboretum Foundation. Until the first permanent forestry buildings were constructed on campus—the Forest Products Laboratory (1921) and Anderson Hall (1925)—buildings from the 1909 Alaska-Yukon-Pacific Exposition in Seattle were used, including the Forestry Building, the Hoo-Hoo House, and the Good Roads Building.
CHAPTER 3
THE 1960s ON: AN OVERVIEW

Introduction

From my perspective as an Australian, I remember the late 1940s, 1950s, and early 1960s as being simple times. World War II was over, things changed slowly, and politics were not nearly as polarized or volatile as they are today. Although the Korean War was conducted from June 1950 to July 1953, it was barely acknowledged by most Americans—media coverage was censored. Society was more egalitarian for white people, though not for people of color. When TV arrived in Australia in 1956, there was no cable. We spent hours adjusting the rabbit ears to improve the black and white image, without a lot of success, I might say; snow on the screen was common.

Forestry concepts in this period also were not very complicated: construct roads; log the remaining old-growth or second-growth forests; plant seedlings, or use aerial seeding; get logs to the mill; and create lumber and other forest products, such as pulp and paper. Silviculture and silvics guided forest management. But turbulent times were ahead: life began to speed up, and technology advanced rapidly. Today, modern societies cannot function without laptop computers, tablets, smart phones, the internet, social media, and HDTV.

The social fabric of life changed dramatically after the 1960s. Concerns were raised about race relations, human rights, social inequality, immigration, and the Vietnam War. Many of my fellow graduate students and some of my American family members served in Vietnam, and most families knew someone involved in the war. I even had a draft card myself in the early 1970s, but had little chance of being called up. (After the war was over, I symbolically burned it.) Concerns about environmental issues were emerging, particularly in relation to air and water pollution, loss of tropical and temperate forests and biodiversity, and even then, climate change and global warming. In the past, the US had taken a leadership role in attempting to solve these problems, but today it has taken a backseat. As of this writing, the Trump administration is removing environmental protection regulations, denying the existence of climate change and its impacts, and allowing exploitation of federal lands—witness the plan for increased logging and mining in the Tongass National Forest in Southeast Alaska.

By the late 1960s, forestry was rapidly changing, and the academic forestry programs of today reflect the evolution of ideas developed over the past six decades. New terms began to be used, such as environmentalism, environmental protection, biodiversity, habitat, forests and fish, riparian zones, forest health, landscape management, urban forestry and horticulture, sustainable forestry, conflict management, ecosystem restoration, disturbance ecology, climate change, bioenergy, timber investment management organizations (TIMOs), and more.

Conflicts among the timber industry, conservationists, and preservationists continued, but disparate groups began working together. The timber industry has forged relationships with government, environmental groups, and Native American tribes to come up with forest management plans that not only protect the environment but also provide for the economic interests of the timber industry. A wonderful example is the Northeast Washington Forest Coalition. This is made up of lumber and other private companies, consulting foresters, the Lands Council, nonprofit and conservation groups such as the Nature Conservancy, the Washington State Department of Natural Resources (WADNR), and the Forest Service. Hopefully, these relationships will continue.

Forest management on both private and public lands has evolved substantially since the 1980s and now embraces ecosystem management and the urban to wildland continuum. This represents a transition from a timber emphasis to sustainable forest ecosystem management and mitigation of human activities (Bell 2017).
The Advent of Intensive Forestry

During the 1890s, there was concern about the timber supply in the nation; the notion of a timber famine was widely accepted. However, in the west the forests were seemingly endless, so this idea was soon dispelled. Because the landscape was still covered with old-growth trees, there was little need to consider intensive forestry, which involves clearcutting, site preparation (soil scarification and slash burning), planting of seedlings, tree breeding, fertilization, tree thinning, vegetation management, and rotations every 40 to 60 years. Forests were simplified and designed by forest managers. In areas where clearcutting was not appropriate, shelterwood cutting and individual tree selection were practiced.

Although tree planting had been started by Weyerhaeuser in 1938, it wasn't until after World War II that it became obvious that seedlings would need to be planted and the forest nurtured if timber yields in Washington's forests were to be maintained; natural regeneration would not suffice. Old-growth stocks on private land were rapidly being drawn down to feed the building boom of the 1950s, and concerns arose again about the sustainability of the timber supply—so tree planting began to be practiced in earnest (Fig. 3.1).

Fig. 3.1. Students planting Douglas-fir seedlings at the UW's Pack Forest in the 1950s (Source: UW Center for Sustainable Forestry at Pack Forest).

Pressure grew on the national forests to supply the timber industry, resulting in new federal laws to promote sustainability, including the Multiple Use–Sustained Yield Act (1960), Wilderness Act (1964), and National Environmental and Policy Act (1970). The Multiple Use–Sustained Yield act, which I mentioned in the previous chapter, mandated that national forests be “administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes.” Multiple use on BLM lands was not legislatively required until the passage of the Federal Land Policy and Management Act of 1976.

Although implementation of these acts meant that the allowable cut from Forest Service lands in the 1960s and 1970s would be reduced, it would still be sustainable. However, environmentalists upset the apple cart. The passage of the Endangered Species Act in 1973, and subsequently the protection of the northern spotted owls (Strix occidentalis; Fig. 3.2 left), marbled murrelets (Brachyramphus marmoratus; Fig. 3.2 right), and salmon further reduced the cut. These same factors affected the harvest level from Washington State trust lands as well. The concepts of multiple use, sustained yield, and intensive forest management have now been broadened to encompass the ecosystem approach, which has led to the sustainable forestry and certification programs that we see today. Many forest managers, whether private or government, small or large, now practice these principles.
Concerns about the Environment and Impacts of Forestry Practices

Changes to forest management and the public use of forests, not only in the Pacific Northwest but worldwide, have largely been driven by environmental concerns. By the 1950s and 1960s, human-caused environmental degradation, particularly water and air pollution, became obvious. Industrial chemicals and raw sewage disposal in rivers and oceans were polluting the water and degrading the quality of drinking water. The first Federal Clean Water Act in 1948 was strengthened by the Clean Water Acts of 1956 and 1962. Heavy use of pesticides, particularly DDT, in agriculture and horticulture was reducing reproduction in birds at the top of the food chain, such as eagles, because of the thinning of eggshells. Rachel Carson (1907–1964), a marine biologist and conservationist, brought this to the attention of the public in her 1962 book *Silent Spring* (Carson 1962). Air quality and visibility were also being impaired, resulting in the first Federal Air Pollution Control Law (Clean Air Act), which was passed in 1955 and then modified in 1970.

The environmental impacts of forestry practices in the Pacific Northwest were also being questioned, particularly those related to clearcutting, the treatment of slash following clearcutting, and the management of unwanted competition following planting. It was widely accepted that use of clearcutting was the only way to establish Douglas-fir plantations because Douglas-fir needs a lot of light to grow, particularly in its early stages of development. Concerns about the impacts of clearcutting and the construction of forest roads on erosion, forest streams and salmon, and the visual appearance of the landscape began in the 1960s and 1970s. There has been much argument among the timber industry, public forest-management agencies, scientists, and environmentalists about this issue.

Restrictions have now been placed on the timber industry and government organizations so as to protect forest and stream ecosystems. Conflicts between environmentalists and forest managers were not restricted to the US alone. While visiting family in Australia in the early 1980s, I was asked by the ex-commissioner of the Forestry Commission of New South Wales, a family friend, whether the environmental movement was a thing of the past in America. I guess he thought environmentalism would be short-lived and that the commission could soon go back to the old ways of doing things.

Before World War II, only a small percentage of Americans were recreationalists. But after the war, as incomes increased and people had more leisure time, the popularity of hiking, camping, fishing, and other types of outdoor recreation skyrocketed. As a result, there was increased interest in preserving forests for recreational purposes. Many of the people who moved to the Pacific Northwest after the war had been attracted by its scenic mountains, streams, and forests. (I myself have taken more than a hundred photos of Mount Rainier.) Thousands of new members joined the Sierra Club, the Audubon Society, and other national and local groups. They were devoted...
to securing places and practices that would sustain environmental values and human well-being within the lands along the wildland-to-urban continuum. Recognition by the environmental community of the benefits of leaving large tracts of the original forest on the landscape resulted in Congress passing the Wilderness Act in 1964, which allowed the Forest Service and other federal agencies to create wilderness areas where all forms of development, including logging and road building, were forbidden. The Wilderness Act was not welcomed by the timber industry or even by the WADNR. The WADNR commissioner, Bert Cole, argued in 1959 that the Wilderness Bill “was unnecessary and undesirable” (Cole 1959). The creation in 1968 of the North Cascades National Park Complex, which includes the Lake Chelan and Ross Lake National Recreation Areas, was a result of the passage of the Wilderness Act. It was carved out of the Mount Baker–Snoqualmie and Wenatchee National Forests, much to the chagrin of those who wanted it kept for logging.

To further the protection of species lost due to human activities, the Endangered Species Act (ESA) was passed by Congress in 1973. The same year, Federal Air and Water Pollution Acts were passed and the Environmental Protection Agency (EPA) was established. The first Earth Day was also held in 1973, and since then anniversaries have been celebrated continuously both nationally and internationally.

Logging of the old-growth in the national forests of Washington and Oregon continued at a rapid pace through the 1970s and 1980s, reaching an all-time high in 1987. Miles of logging roads were constructed resulting in the national forests as a whole having more miles of road than the national freeway system. Many of these roads are now being put to rest and allowed to revert to a forest condition.

During the 1980s, as I drove west along the shores of Lake Crescent on the Olympic Peninsula to my research sites in Olympic National Park, I remember being met by an almost unending procession of logging trucks headed east to the mills in Port Angeles. Occasionally, I would see logs in the water of the lake, where an errant truck had crashed on the dangerous windy road or had simply lost its load. On return trips for another load, the empty trucks barreled along as fast as they could, their drivers clearly frustrated by my sticking to the speed limit. I could see truck radiators getting closer and closer in my rearview mirror as they jockeyed to get around me. Such was the urgency to get the logs out of the forest.

The allowable annual cut on national forests was often exceeded. The Forest Service had become overly optimistic about the amount of timber that the national forests could produce sustainably and was relying on science and technology to increase productivity. Furthermore, forest harvesting was very visible from major highways and an eyesore to motorists. The public began to be very concerned about the fate of federal forests, especially the impact of clearcut logging.

Management of the Federal Forests

The heated battle over the federal forests in the Pacific Northwest eventually led to a large shift in the management of Forest Service lands. Emphasis was shifted from sustained yield of timber to conservation of biodiversity, particularly endangered species. Threatened plants and animals were listed by the USFWS, and Federal agencies were required to promote the recovery of these species. The northern spotted owl, which lives in the old-growth forests of Washington, Oregon, and northern California, was declared a threatened species in 1990. In March 1991, US District Court Judge William Dwyer issued an injunction to halt state and federal timber sales until further studies on the owl’s habitat were completed. He also restricted logging on many private timberlands in the region, as well as on most national forests.

Large areas of old-growth are needed for spotted owls to survive (Chiang and Reese 1998). As a result, 11.6 million acres outside national parks were designated as critical habitat by the USFWS. But the main issue was not just about saving spotted owls, but saving the remaining old-growth forests. Endangered ecosystems were not protected by laws, so the endangered status of the owl was used by concerned scientists and environmentalists to protect the last major stands of old growth in the national forests. William Dietrich, a reporter for the Seattle Times, noted that the spotted owl thus acted as a “surrogate for old growth protection” (Dietrich 1992). But spotted owl protection also threatened the livelihoods of rural logging communities.
In 1990, the Forest Service announced that it was selling virtually no timber from the Olympic National Forest (ONF)—about 65 percent of ONF had been set aside for owl habitat (Chiang and Reese 1998). Many mill closures occurred due to the recession of the 1990s, lack of federal timber, and rising log exports to Japan. In 1978, there were 180 sawmills in Washington, but only 37 remained in 2016 (Table 3.1). Veneer/plywood and pulp/plants similarly declined. Thousands of people were laid off.

<table>
<thead>
<tr>
<th>Years</th>
<th>Sawmills</th>
<th>Veneer/Plywood plants</th>
<th>Pulp/paper plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>180</td>
<td>40</td>
<td>0.25</td>
</tr>
<tr>
<td>1990</td>
<td>104</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td>2005</td>
<td>73</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>2016</td>
<td>37</td>
<td>7</td>
<td>12</td>
</tr>
</tbody>
</table>

*Source: Washington State Department of Natural Resources (2019).*

Residents of timber-dependent communities were understandably outraged and expressed their opposition to owl protection through rallies in Seattle and Olympia. Some inhabitants decided to investigate other employment opportunities through tourism and retraining. However, throughout the 1990s unemployment rates remained very high and many families had to move to find work.

As the spotted owl and old-growth controversy intensified, a permanent solution to the problem was sought. Two congressional committees charged four prominent forest scientists with developing approaches to protect ecologically significant late-successional ecosystems and species, including the spotted owl and other old-growth-dependent species. Known as the “Gang of Four,” they were Drs. Jack Ward Thomas, Jerry Franklin (a faculty member in CFR), John Gordon, and Norman Johnson (Thomas et al. 2006). An intensive data-gathering effort was undertaken to determine the status of old-growth forests and owls. In April 1993, President Clinton called for a “Northwest Forest Summit” to be held in Portland, Oregon, which he hoped would resolve the issue. Vice President Al Gore, four Cabinet members, scientists, and representatives from environmental organizations, timber communities, and lumber mills met to discuss the future of the old-growth forests of the Pacific Northwest.

Clinton established FEMAT (Forest Ecosystem Management Assessment Team) after the meeting to develop management strategies for federal forests. He was presented with ten options, one of which became the Northwest Forest Plan (NWFP). It involved: late-successional reserves to protect endangered species; riparian reserves; adaptive management areas; and the matrix in which timber harvest could be conducted. Funds for lumber workers and timber-dependent towns were provided to assist economic development (Chiang and Reese 1998).

A harvest of 1.2 billion board feet of timber per year was included in the plan for the national forests of northern California, western Oregon, and western Washington (Chiang and Reese 1998). Environmentalists claimed that it was too much and that thinning and salvage logging were ecologically unsound. Loggers felt it was too little. The White House responded by reducing annual timber harvests to 1.1 billion board feet. Also, more land was set aside to protect owl habitat, and stream no-logging buffer zones were increased from 50 feet to 100 feet. Economic aid for timber-dependent communities was increased slightly. The ban on most logging in the national forests was lifted by Judge Dwyer in June 1994, and in December 1994 he upheld Clinton’s NWFP.

Although the NWFP represented a significant policy shift, the struggles over the region’s forests continued. Clearcutting continued to threaten fish in forest streams. In 1998, several Pacific Northwest runs of salmon—coho, sockeye, chinook, and also cutthroat trout (recently added to the salmon classification)—were listed as endangered. Penalties were to be imposed if salmon streams were damaged by logging. Riparian area protection soon became customary practice.
Further reductions in logging levels occurred in 1999, prompting the timber industry to claim that the NWFP had failed to provide a steady, reliable supply of wood for the region's mills. New jobs created by tourism and other economic development efforts paid much less than jobs in logging or millwork. The number of jobs lost was far greater than the number of new jobs created.

Another round of debate and conflict resulted from President George W. Bush’s efforts in the 2000s to increase commercial thinning and salvage logging as a means of improving forest health and reducing forest fires. Road culvert removal to allow fish passage created even more conflict. Culvert removal affected both government and private entities. Washington State tribes alleged that state-owned culverts were infringing upon the tribes’ treaty-protected fishing rights and should be removed from land managed by four state departments. Despite objections by the state, the US District Court ruled in 2013 in favor of the tribes: all culverts that blocked habitat for salmon and steelhead must be removed by 2030. This was upheld by the US Supreme Court in 2018, and could cost Washington State taxpayers as much as $2.4 billion. Progress has been slow, however, and the state legislature in 2019 allocated only a small fraction of what is required. It is highly likely that the 2030 deadline will be missed.

Management of State Forest Lands

The WADNR was created in 1957 to manage state trust lands for the people of Washington. It now administers over 3 million acres of forest, range, and agricultural lands, along with 2.6 million acres of aquatic areas. Most of the department’s funding is derived from forest and geoduck harvesting, rather than taxes. Some of the revenue is used to fund the construction of public schools, colleges, universities, and other state and county government functions. Oversight is provided by the Board of Natural Resources, which is composed of six members: the governor or the governor’s designee; the superintendent of public instruction; the commissioner of public lands; the director of SEFS at the UW (previously the dean of CFR); the dean of the College of Agriculture, Human, and Natural Resource Sciences at WSU; and a representative of the counties containing State Forest Board purchase or transfer lands. The WADNR manages 87,000 acres of the UW’s trust land (Sonoran Institute 2007). Harvesting old-growth trees on this land has caused considerable angst for the College and University. Even logging of stagnant, western-hemlock-dominated second-growth forests on the Olympic Peninsula has met strong resistance, specifically related to the recovery of the marbled murrelet.

Management of Private Forest Lands

The first forestry operations in Washington were carried out by private individuals. But starting in the early 1900s large corporations such as Weyerhaeuser, Crown Zellerbach, Simpson, Rayonier, Boise Cascade, and others began to dominate the industry. Many were vertically integrated companies (producing timber and processing it in mills). But in the 1970s a new class of private ownership of Washington’s forests appeared that were not industry or small woodlot owners—Timber Investment Management Organizations (TIMOs). TIMOs are management groups that aid investors in managing timberland portfolios (Mendell 2016). They act as brokers for clients to find, analyze, and acquire investment properties that would best suit them. Timberlands were good targets because they were highly undervalued.

In the late 1970s and early 1980s the industry was experiencing financial losses associated with the loss of timber contracts with the US Forest Service. TIMOs took advantage of this by leveraging buyouts and using hostile takeovers of timber companies. Their component parts (forest lands and mills) were then sold off to the highest bidder for short-term profits. Many companies merged and few of the vertically integrated companies exist today. The primary objective of TIMOs was maximizing returns for investors. They had no intention of being conservationists and keeping forest land from developers. Land would be sold to developers if the best returns could be gained that way. However, if growing timber on longer rotations maximized returns, they would do that. Insurance companies were heavily involved. An example is Hancock Timber Resources Group, an offshoot of
Hancock Insurance. One of the reasons that TIMOs became popular was the low taxes on revenue gained from timberlands.

In the late 1990s another type of owner emerged—Real Estate Investment Trusts (REITs). They are companies that own, operate, or finance income-generating real estate, like timberlands (Mendell 2016). Modeled after mutual funds, REITs pool the capital of numerous investors. This makes it possible for individual investors to earn dividends from real estate investments without having to buy, manage, or finance properties themselves. Weyerhaeuser is now a public REIT, as are Rayonier and Potlatch.

In addition to TIMOs and REITs, conservation groups like the Nature Conservancy and Forterra also procure forest lands. Small woodlot owners are also important private forest land owners in Washington.

There have been consequences to all these changes. Research and development have been much reduced and forest land ownership has been fragmented making landscapes hard to manage. However, conservation easements have been established and the value of providing ecosystem services has been recognized. Carbon credits for the carbon sequestration abilities trees have also been collected.

**New Visions of Forestry**

**Forest, Stream, and Urban Ecosystems**

By the late 1960s and early 1970s, there was continuing realization that forests were not just trees in a stand, but part of a greater ecosystem. Much of the initial knowledge about the functioning of Pacific Northwest ecosystems came from the western Coniferous Forest Biome research program, which was established at the College in 1969, and described in detail in Chapter 8. The biome program, however, did not specifically include humans as components of forest ecosystems, except for their involvement in forest management. There was no attempt to study recreational use and the interactions of forests and society. Urban forest ecosystems also were not included.

One of the major contributions of the biome program was the study of pristine old-growth ecosystems. Scientists discovered that these forests were dynamic, complex ecosystems that served as habitat for thousands of species of microbes, insects, plants, and animals—in other words, they were biological treasures (Norse 1990). Old-growth advocates argued that managed forests composed primarily of recent clearcuts and even-aged, single-species stands lacked diversity. The old-growth forest in Olympic National Park clearly illustrates this ecological web (Kirk and Franklin 1992). I conducted research on this web in the Hoh River Valley, studying the growth and mortality of old-growth trees, regeneration after windthrow disturbance, nutrient cycling and decomposition, soil ecology, the impact of diseases, and stream ecology.

Streams are integral components of forest ecosystems, and aquatic and terrestrial ecosystems interact extensively within the riparian zone. Riparian zone protection is critical for healthy forest and aquatic ecosystems. The stream ecosystem can be greatly influenced by forest management, especially clearcutting, road construction, and associated erosion.

Urban/human ecosystems are spreading rapidly, resulting in loss of green spaces and trees, creation of impermeable surfaces, as well as stream, lake, and salt water pollution. The challenge is how to protect all these ecosystems while still allowing for social and economic well-being. Humans have changed the landscape dramatically in the Pacific Northwest, as illustrated in Fig. 3.3, which shows the continuum along the Interstate-90 (I-90) corridor from the dense metropolitan area of Seattle to Snoqualmie Pass through suburban areas, rural farmlands, and working forests to wildlands—the urban/wildland gradient. The landscape becomes progressively greener to the east (on the right) as the forested area increases; note the white areas to the west (on the left) representing impermeable surfaces in the city. Clearcuts on managed forest lands are visible in the top right. Because of its excellent representation of the urban/wildland gradient, the I-90 corridor from Seattle to Ellensburg was used for field trips in a number of classes offered by CFR.
Protection of this section of the I-90 corridor was first envisaged in 1990 because of the sprawling development across the landscape. In 1991, the Mountains to Sound Greenway Trust was founded to keep some of the natural forest lands within a connected, multipurpose corridor with multiple landowners. It is a 1.5-million-acre area shaped by watershed boundaries—the Yakima River to the east, the Cedar River to the south, the Snoqualmie River and Lake Washington to the north, and Puget Sound to the west. Because of the Conservation, Management, and Recreation Act of 2019, the corridor was designated a National Heritage Area.

**Sustainable Forestry and Forest Stewardship**

Knowledge about old-growth forests has now been integrated into modern forest management, where attempts are made to restore biodiversity and old-growth forest structure to the landscape as well to produce timber. The terms “ecological forestry” and “new forestry” are now being used in connection with sustainable forest management. Ecological forestry does not have a precise definition, but it involves the following themes: that (1) forests have intrinsic value; (2) humans need to extract goods and services from the forest; (3) silviculture should follow natural processes as much as possible; (4) foresters should plan for the long term; (5) implementation of forestry is at the stand scale, but must be in balance with the larger landscape; (6) the social and economic context matters; and (7) science and place-based experience should guide forestry. This concept has now been adopted worldwide (Evans 2006). The WFPA has been at the forefront in promoting this concept.

The concept of sustainable forestry has been around since the 1800s, but it was not formalized until the late 1980s (https://link.springer.com/article/10.1007/BF02471975). It has three main pillars—ecological, economic, and socio-cultural—and provides timber; protection of riparian areas, streams, fish, and soils; and prevention of erosion resulting from harvesting and roads. Furthermore, it supplies habitat diversity for wildlife and structure through snag, log and green tree retention—either as patches (Fig. 3.4 left) or individual trees (Fig. 3.4 right). Fig. 3.5 illustrates green tree retention at the watershed level where streams and riparian zones are protected. Guidelines for Washington’s forest land are given by the WADNR (https://www.dnr.wa.gov/publications/fp_fpi_timberharvest.pdf).
In the early 1990s there were several attempts to define sustainable forest management and identify criteria and indicators. For example, Canada developed a plan at the national and forest-management-unit levels. International initiatives were developed for: humid forests under the auspices of the International Tropical Timber Organization (ITTO); European countries (the Helsinki process); and non-European temperate and boreal countries (the Montreal process). Environmental protection organizations have also attempted to define sustainable forest management.

An overview of these initiatives provided by the Food and Agriculture Organization (FAO) in 1994 showed consensus on the use of six criteria: the extent of forest resources; conservation of biological diversity—at the ecosystem, species and intraspecific level; forest health and vitality; productive functions of the forest; protective functions of the forest; and forest-related economic and social needs. A seventh criterion from the Montreal process concerned the policy and legal frameworks and the capacity to implement sustained management. This criterion differs from the other six, in that it only indirectly characterizes sustainable forest management as one of its “tools.” Relationships to global carbon cycles and climate change are also considered.
Forest Certification

Sustainable forestry has now been adopted by many owners of private and government forest lands. It is implemented through a certification process. A number of certification schemes have been developed, but the two most widely used are the Sustainable Forestry Initiative (SFI) and the Forest Stewardship Council (FSC).

The SFI is a North American forest certification standard and the world’s largest certification by land area. It was established in 1994. The forest industry in North America tends to use SFI because the emphasis is on forest products, a chain of custody, and adaptive management. SEFS’s Pack Forest has SFI certification. FSC is the most widely used certification and was established in 1993 to promote responsible management of the world’s forests. It is the only certification standard recognized by the LEED™ (Leadership in Energy and Environmental Design) building standard. Merrill Hall, SEFS’s most recent building, achieved the LEED Silver Standard. FSC is a voluntary procedure and sets standards on forests and forest products and certifies them as eco-friendly based on ten principles and criteria. Once FSC certification is attained, accredited audits are carried out at least once a year; if not in compliance, changes must be made to keep certification.

The College’s Response to Change Since the 1960s

Although a scientific approach to forestry education had been followed before the 1960s, it was markedly accelerated from then on. Suddenly there was a need for university forestry programs to hire faculty representing many different areas of expertise. Under Dean Bethel’s administration (1963–1981), faculty numbers dramatically increased. From 1960 to 1980 the College hired 63 faculty representing at least 30 disciplinary areas. Research was greatly expanded, and outreach programs provided scientific input to forest managers and environmental regulatory agencies. Much of the research was devoted to providing a greater understanding of how forest ecosystems function and the ecological and social impacts of forest management practices.

The change in name from the College of Forestry to the College of Forest Resources in 1969 reflected the broadening of College programs, but the direction that the College (now SEFS) should take still continues to be strongly debated. Many different opinions have been offered that have led to conflicts, particularly in the 1980s, when the College moved farther away from its traditional beginnings by adding urban horticulture and environmental science. Other forestry schools, such as Duke, Yale, UC Berkeley, and Michigan, had incorporated the words “environment” and “natural resources” into their names to reflect the changing nature of forestry. But all attempts at renaming the College were unsuccessful until it became SFR in 2009 and then SEFS in 2011. Many older alumni were unhappy about these changes.

During Dean David Thorud’s administration, from 1981 to 2000, the College was strongly influenced by major changes in federal forest management that occurred in the early 1990s. Adoption by the Forest Service of the NWFP in the early 1990s was fraught with conflict. The Clinton administration had tapped UW Forestry Professor Jerry Franklin to help develop the plan, while the other side of the aisle turned to Franklin’s colleague at the College, Professor Chadwick Oliver, who presented a different philosophical viewpoint on the management of federal forests. A particularly scathing piece about the College in the Seattle Times in 2002 recalled those divisions (Welch 2002). The reporter wrote that the clash of high-profile professors over national policy on managing federal forest lands epitomized the longtime turmoil within the College. Faculty and students were polarized into the ecosystem-based “greens” and the timber-oriented forest management “browns.” The College was characterized as being one of the most polarized academic-forestry units in North America. Faculty and staff members described their work environment as dysfunctional, unhealthy, traditional, divisive, leaderless, and splintered—not particularly positive words. My memory of this time was not quite as harsh. To remedy this, faculty, staff and students were brought together through a series of moderated retreats, which eased tensions and allowed the College to move forward. Strategic planning was also implemented at this time.

On top of the internal conflicts, the University administration questioned the College’s low undergraduate enrollments, high number of different majors, low student to faculty ratios, high cost of educating forestry students,
low level of research funding, and even the relevance of having a forestry college on campus at all. Constructing a graph of the dropping enrollment from 2000–2005 and extending it as a straight line, the administration determined that there would be no forestry students at all in just a few years. Questions were asked, specifically, why changes hadn’t already been made in the curriculum to reflect sweeping changes in forestry in the Pacific Northwest and abroad, and why people still regarded the College’s faculty and students as lumberjacks with suspenders and chainsaws who produced wood. Ideas were floated suggesting that the best approach might be to close the College and parcel out relevant programs to other departments in the university. Further criticism was that the College had too large a proportion of senior faculty. Some faculty were highly productive, but others were not active in research and scholarly endeavors. Expertise in some areas was no longer in high demand.

With the 2000 retirement of Dean Thorud, Kristiina Vogt was hired to replace him. But she had little time to develop a plan for the College before she resigned as dean in 2001, staying on as a tenured faculty member. This rapid change in leadership placed attention on the College’s future existence and its role within the University. Professor Bruce Bare was installed in 2001 as an interim dean and then became dean in 2002, with a mandate to determine the future of the College.

Dean Bare presented a new vision for the College focused on integration of the environmental, economic, and social dimensions of natural resource management. “Sustainability” was the operational word. He also was able to present a greatly revised undergraduate curricular focus and structure that was accepted by Acting President John Huntsman and Acting Provost David Thorud. The number of majors was reduced from seven to two: Environmental Science and Resources Management (ESRM), which merges basic forestry education and environment education; and Bioresource Science and Engineering (BSE), which includes pulp and paper science. But criticism of the College continued, and Dean Bare acknowledged the depth of the problem. In an all-College memo in October 2002, he wrote, “We must not underestimate the current perception of our lagging performance and contribution. We may not have another chance to demonstrate the value of the College’s contributions to the University.” Bare also warned professors to expect deep budget cuts and demanded that faculty members increase grant funding by 25 percent in two years.

Dean Bare worked hard to maintain the support of the University administration during his tenure, and was able to hire new faculty to further the transition to an environmentally focused program. However, total faculty numbers fell, mostly due to a large number of retirements. Bare continued as dean until 2009, when the College became SFR within the College of the Environment with Tom Hinckley as interim director. In 2011, SFR was renamed SEFS. There have been Two directors (Tom DeLuca and Dan Brown) who continued and added to Bare’s philosophy.

All the past conflict, however, cannot detract from the College’s achievements. It has always been highly ranked nationally and internationally. In 2006 the College’s research impact was highly ranked in a survey of 53 North American forestry programs (Laband and Zhang 2006). A National Research Council report in 2010 rated it among the top three forest science graduate programs in the US.

Altogether, 199 faculty have been hired since 1907, including tenure-track, research, and WOT (without tenure), and joint appointments. In addition, 19 instructors were appointed. Most of this hiring took place after 1960. Tenure-track faculty numbers steadily increased to a maximum of 47 in 1985.

At the same time, research areas have been broadened, and currently include environmental horticulture and urban forestry, forest ecology, forest soils, bioresource science and engineering, restoration ecology, social sciences, sustainable resource management, and wildlife science. Research funding has been strong from federal and state agencies and also from many private sources. From 1907 through 2018, 5,750 undergraduate degrees were awarded, with 75 percent being granted from 1960 on. This trend is even more exaggerated for graduate degrees—2,691 were awarded, with 92 percent of these being earned after 1960. Graduate degrees offered included MS, MSF (Master of Science in Forestry), MF (Master of Forestry), MFR (Master of Forest Resources), MEH (Master of Environmental Horticulture), and PhD. In 2018, 57.3 percent of the students were women. Before 1960 few women enrolled. Research and teaching centers have been added, including the Center for Quantitative Science in Forestry, Fisheries, and Wildlife in 1969, which was a joint effort between CFR and the College of Fisheries.
College faculty recognized the importance of research collaboration and developed ties with UW faculty across campus, other academic institutions, federal, state, and local governments, industry, and Native American tribes.

Many of our graduates have become leaders in natural resources and public and private land management throughout the state, region, nation, and around the world—of note are the current Chief of the US Forest Service (Vickie Christianson) and Deputy Chief of Research and Development (Alex Friend). Two of our undergraduates were vice presidents in the Weyerhaeuser Company. Many are employed as faculty members in universities throughout the country and the world, and are educating the next generation of leaders in natural resources and environmental issues.

Finally, one of the College’s major achievements of the past 60 years has been the addition of new buildings, including Winkenwerder and Bloedel Halls and CUH with its new research labs, offices, and teaching spaces. The College’s major sites for teaching, research, and outreach outside the main campus now include the ONRC at Forks, Washington, as well as Pack Forest near Mount Rainier.
CHAPTER 4
COLLEGE ADMINISTRATION:
DEANS, DIRECTORS, ASSOCIATE DEANS, ASSISTANT DIRECTORS,
AND DIVISION CHAIRS

Introduction

I had not fully appreciated the myriad tasks carried out by deans until I became a division chair under the leadership of Dean David Thorud. He was the face of CFR from 1981 to 2000, and was an effective champion both within the University and externally. Thorud was a strong advocate for the College to the UW president, particularly with respect to budgets. The dean’s responsibilities included hiring faculty; providing faculty tenure recommendations to the provost (with faculty input); setting academic policies; raising private funds for scholarships, professorships, programs, facilities, and other college needs (a task on which many deans spent up to half their time); overseeing the budget; acquiring accreditation; managing nonacademic appointments; being an advocate for federal and state funding with Congress and the state legislature; representing the College on the National Association of University Forest Resources Program; and serving on the UW Board of Deans and the Washington State Board of Natural Resources. Although all deans held faculty appointments in the College, they typically conducted little research or teaching during their tenures. Who would have the time?

Some of the College deans also served temporarily in higher University positions—notably Hugo Winkenwerder (acting president) and David Thorud (acting provost, acting vice provost, vice president for academic affairs, and liaison to the Washington State legislature).

The administrative structure of the College has changed many times over its history. These changes were in response to a variety of factors, including adaptation to new educational needs; a wish for different mixes of faculty; graduate school and university presidential reviews; employer’s requirements for jobs; environmental issues; greater public appreciation of the value of forests; and changes in forest management practices designed to benefit all forest users.

The change from CFR to SEFS in 2011, greatly influenced the administrative structure because the dean’s position became that of a director. I should point out here that use of the terms “college,” “school,” and “center” is not consistent across campus. Some schools act as colleges, while others reside within colleges and act as departments. Centers may be virtual or physical entities. Before 1972, the College functioned as a single unit and was not departmentalized. But after this, as faculty numbers increased, divisions were put in place, and although not officially recognized within the university, these divisions behaved as departments. Divisions ceased to exist in the early 2000s, while Bruce Bare was dean, and a faculty chair was appointed to work directly with him.

The organization of the College in 1995, with a dean, associate deans, and four academic divisions, is shown in Fig. 4.1. In 2018, the SEFS organization involved a director, assistant director, and no divisions (Fig. 4.2). Until these changes, the dean of forestry had direct access to the UW president and provost through the Board of Deans. There is now an extra level of administration, since the SEFS director reports not to the UW president but to the dean of the College of the Environment.
Fig. 4.1. Organization chart for the College of Forest Resources in 1995.

Fig. 4.2. Organization chart for the School of Environmental and Forest Sciences in 2018.
In addition to deans and associate deans of CFR, faculty and staff served on standing or ad hoc committees that provided information to the dean’s office. Standing committees, including the elected faculty council, covered matters such as faculty promotion, merit, and tenure; curricula; computing and information technology (IT); external relations and communications; research groups; planning; scholarships and financial aid; space; school lands; and educational outreach.

The Deans and Directors

Seven CFR deans and two SEFS directors (Fig. 4.3) were appointed from 1907–2018. Table 4.1 shows their tenures. There have also been three acting deans, and interim and acting directors. The accomplishments of each dean and director are described here. However, I must start by acknowledging the contributions of Mr. Edmond Stephen Meany (1862–1935). Although he was never a dean, he had a huge influence on the formation of the School of Forestry in 1907.

Fig. 4.3. CFR deans and SEFS directors, 1907–2018 (Source: UW School of Environmental and Forest Sciences).
Table 4.1. Tenures of CFR deans and SEFS directors, 1907–2018

<table>
<thead>
<tr>
<th>Surname</th>
<th>Given name(s)</th>
<th>Tenure</th>
</tr>
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<tbody>
<tr>
<td>Deans</td>
<td></td>
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</tr>
<tr>
<td>Miller</td>
<td>Francis Gamber</td>
<td>1907–1912</td>
</tr>
<tr>
<td>Winkenwerder</td>
<td>Hugo</td>
<td>1912–1945</td>
</tr>
<tr>
<td>Jeffers (Acting Dean)</td>
<td>Dwight</td>
<td>1933–1935</td>
</tr>
<tr>
<td>Marekworth</td>
<td>Gordon Dotter</td>
<td>1945–1963</td>
</tr>
<tr>
<td>Bethel</td>
<td>James Samuel</td>
<td>1963–1981</td>
</tr>
<tr>
<td>Thorud</td>
<td>David B.</td>
<td>1981–2000</td>
</tr>
<tr>
<td>Hinckley (Acting Dean)</td>
<td>Thomas A.</td>
<td>1984–1985</td>
</tr>
<tr>
<td>Bare</td>
<td>B. Bruce</td>
<td>2001–2009</td>
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<th>Directors</th>
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<tbody>
<tr>
<td>Hinckley (Interim)</td>
<td>Thomas, A.</td>
<td>2009–2012</td>
</tr>
<tr>
<td>DeLuca</td>
<td>Thomas, H.</td>
<td>2012–2016</td>
</tr>
<tr>
<td>Van Volkenburgh (Acting)</td>
<td>Elizabeth</td>
<td>2016–2018</td>
</tr>
<tr>
<td>Brown</td>
<td>Daniel G.</td>
<td>2018–</td>
</tr>
</tbody>
</table>

**Edmond Stephen Meany**

Edmond Meany (Fig. 4.4) was a UW botany and history professor, politician, writer, and civic leader, who is considered to be the “father of forestry education” at the UW (Stein 2006). He served the UW from 1895 to 1925. Meany graduated from the UW in 1885, when it was still a territorial university, and was the class valedictorian. He earned an MS from the UW in 1899, and then a Master’s of Letters in 1901 from the University of Wisconsin.

![Edmond S. Meany (1862–1935) (Source: UW Libraries, Special Collections, Negative Number UW3369).](image)

In 1894, as a member of the Board of Regents and the Washington State legislature, Meany helped to secure new land for the current UW campus, which was planned to house the University as well as a scientific arboretum. He taught the first course in forestry in 1895, “Washington Forestry,” in the Department of Terrestrial Physics and Geography. By 1897 this department no longer existed and Professor Meany taught courses in the Department of Botany emphasizing forestry as a science. He was appointed professor of
Francis Garner Miller (1907–1912)

The first dean of the newly established UW School of Forestry was Francis Miller, who was appointed in 1907. He obtained a MDI (in didactics) in 1893 at Iowa State Normal School (now the University of Northern Iowa), a PhB (Bachelor of Philosophy) in 1900 from the University of Iowa, a BAS (Bachelor of Applied Science) in 1901 from Iowa State College, and a MF (Master of Forestry) from Yale University in 1903. His expertise was in forest management.

During Miller’s tenure the School initiated a four-year program of study leading to a BS in forestry as well as two MS programs. The honorary society Xi Sigma Pi and the Forest Club were formed. He also tightened the School’s admission requirements to be sure to produce knowledgeable forestry professionals. The School’s goal was to offer instruction in forestry and foster interest in forestry in Washington State by encouraging the appropriate use of forest resources. Dean Miller had little financial support to work with, but he helped produce a reputable education program which “stood second to no other forestry school in the nation” (Schmitz 1973). He recognized the need to work with agencies outside the UW and established a strong relationship with the US Forest Service that continues to this day. The director of the Forest Service Timber Testing Station on campus was added to the forestry faculty, and Forest Service professionals became special lecturers in subjects such as forest administration, forest law, and log scaling. During Miller’s tenure, in 1910, the School of Forestry was renamed the College of Forestry to reflect the comprehensive nature of the degree programs offered.

Hugo Winkenwerder (1912–1945)

Hugo Winkenwerder (1878-1947) was the second dean of the College of Forestry. He was appointed in 1912 and served for 33 years. He was born in Watertown, Wisconsin, and received his BS from the University of Wisconsin in 1902 and his MF from Yale University in 1907. His academic expertise was in forest mensuration.

After graduation from Yale, Winkenwerder served as an assistant professor of forestry at Colorado College in Colorado Springs. In 1909, he was appointed associate professor in the UW College of Forestry, and just three years later he was named dean of the College. Winkenwerder thought that the forests of Washington would always be economically important and that professionally trained foresters would be needed to properly manage them. Although his friends in the lumber industry did not always see eye to eye with him, they eventually accepted and respected the programs he advocated.

When Winkenwerder arrived on campus in 1909, the facilities of the College were not adequate to achieve its goal of becoming a truly world-class forestry school. However, it wasn’t until 1921 that a new Forest Products Research Laboratory was constructed. One of Winkenwerder’s major accomplishments was establishment of the Charles Lathrop Pack Forest in 1926 as a field laboratory/demonstration forest. In addition, it was largely through his efforts that the Washington Park Arboretum, which he first promoted in the early 1920s, was established off-campus in 1936, in partnership with the City of Seattle. In recognition of his administrative skills, he was named acting UW president in 1933, serving in that role until 1935.

In 1945, at the age of 67, Winkenwerder retired from the deanship, but continued as dean emeritus. Two years after his retirement, he died. His wife, Mrs. Adeline Winkenwerder, survived him by some five years. On her death, their entire estate was bequeathed to the University to establish the Hugo Winkenwerder Memorial Fund. The Hugo Winkenwerder Forest Science building was named in his honor in 1962.
**Gordon Dotter Marckworth (1945–1963)**

Gordon Marckworth (1895–1980) was appointed in 1945 and served as the third dean of the College until 1963. He received a BS from Ohio State University in 1916, and a MF from Yale in 1917. When he arrived at the UW, the College was suffering from the effects of World War II, but he immediately took on the challenge of rebuilding it. Under his leadership the growth of the College was truly remarkable. The faculty grew from six to eighteen, and more importantly, the breadth and depth of their interests and special training were greatly expanded. Fields such as forest soils, forest pathology, forest entomology, forest economics, and forest genetics were added to complement the traditional fields of forest management, forest products, logging engineering, silvics, and silviculture. The graduate program was also strengthened to complement the undergraduate program. There was essentially no student aid program in 1945 when Dean Marckworth was appointed, but through his leadership student aid (such as scholarships, fellowships, and loans) increased to become one of the strongest in the University.

Dean Marckworth was responsible for the establishment of a number of new associations, institutes, and initiatives, including: (1) the UW Forestry Alumni Association (1946); (2) Keep Washington Green (1946), an organization dedicated to the prevention of wildfires, and housed in Anderson Hall; (3) the Institute of Forest Products (1946), which was an entity of the State Department of Conservation and Development created by the Washington State legislature to compile and publicize research on the utilization of wood products. It was originally a non-University program housed in Anderson Hall but later legislatively incorporated into the College of Forestry; (4) a Forestry Branch Library within the College, which eventually became one of the finest forestry libraries in the nation; (5) improved physical facilities, including an experimental dry kiln, the Hugo Winkenwerder Forest Sciences Building, and a semi-portable sawmill at Pack Forest to cut the annual sustained yield of the forest and give students practical experience in milling (the first load of lumber was used in the construction of Medical School student housing, at a considerable savings to the University); and (7) sponsorship of the Fifth World Forestry Conference (1960), which was a major international event on campus, attended by 1,857 delegates representing 66 nations (more on the conference is presented in Chapter 13).

Through Dean Marckworth’s leadership, the College grew in stature both academically and professionally. Upon retirement, a grateful university awarded him the title of emeritus dean and professor. The 6,900-acre Marckworth Experimental Forest was named after him.


The fourth dean of the College was James “Jim” Bethel (1916–1999). He was born in Tacoma, Washington, and received his BS in 1937 from the UW College of Forestry, and his MS in 1939 and DF (Doctor of Forestry) in 1947, both from Duke University. His expertise was in wood products. Bethel served in World War II as a captain in the Army Air Force. After completing his doctorate, he took a faculty appointment at North Carolina State University, where he taught forestry, conducted wood-products research, and was acting dean of the Graduate School. He then worked for three years for the National Science Foundation in Washington, DC. In 1962 he was appointed the dean of the Graduate School at the UW and then dean of the College of Forestry in 1964. He was the first alum of the College to be appointed dean and was responsible for increasing the stature of the College to world-class rank. It regularly placed among the nation’s top forestry institutions during his tenure. “Before him, the College was average,” said forestry professor Gerard Schreuder. “In five years, it was in the top five. He was the spark.”

Despite university budget cuts and forest industry slumps during his tenure, Dean Bethel accomplished much, including: (1) rapid faculty expansion; (2) broadening the curriculum to include additional programs in wood and fiber science, forest science, outdoor recreation, and wildlife science; (3) establishing the Washington Pulp and Paper Foundation; (4) adding Bloedel Hall and new buildings at Pack Forest; (5) fostering faculty participation in international forestry programs; (6) extending opportunities for funding faculty and graduate research; (7) transferring the Institute of Forest Products from the Graduate School to the College of Forestry; (8) changing the College name to the College of Forest Resources to reflect the growing concern for instruction and research.
related to the use of all natural resources associated with forested lands; (9) entering into a cooperative agreement with the NPS to establish the first NPS Research Cooperative Unit emphasizing forest recreation research; (10) increasing library facilities by setting up PACFORNET (Pacific Forestry Network Information Center) to serve forestry professionals throughout the Pacific Northwest; (11) setting the foundation and funding support for the development of CUH; (12) initiating, with OSU, a joint mid-career professional training program in silviculture (the Silviculture Institute), (13) forming the Regional Forest Nutrition Research Project (RFNRP); and (14) establishing a cooperative education program with the Washington State Parks and Recreation Commission to give students the opportunity to serve as interns in state parks.

In the 1970s, although having little time for research, Bethel was able to conduct research on tropical-forestry management and played a major role in investigating the effects of herbicide use during the Vietnam War. He was one of the leaders involved with the establishment in 1963 of the Organization for Tropical Studies (covered in Chapter 13). Management of UW-owned timberlands fell under the purview of the College. He was besieged with criticism for allowing the clearcutting of old-growth forests owned by the UW. After his retirement in 1981, he became an emeritus professor and resumed teaching and consulting.


David Thorud was appointed the fifth dean of the College in 1981. He received his BS in Forestry in 1958, his MS in 1960, and his PhD in forest hydrology in 1964, all from the University of Minnesota. Before coming to the UW, he was employed by the US Forest Service. Thorud believed strongly in the power of entrepreneurship and was particularly skillful in raising funds from donors. For example, in 1992, during the five-year campaign for Washington, the College raised $9.7 million, the fifth highest among UW units. The College’s endowment had reached $16 million by 2000, at the time of his retirement. Dean Thorud’s leadership was valued at the University level as well, leading to his appointment to three separate university-level posts serving the larger UW community. From 1984–1985 he served in the UW Office of Government Relations. He was acting vice provost and vice president for academic affairs from 1984–1986, and from 1999–2000 he was acting vice president for University relations. In 2002, after retirement, he was called upon to serve as acting provost.

During his deanship, Thorud helped establish: (1) a joint continuing education calendar among the College, WSU, and OSU to enhance cooperation among regional continuing education programs; (2) the Stand Management Cooperative (SMC) to provide a continuing source of information from integrated studies of silviculture, wood quality, and product value; (3) the Center for International Trade in Forest Products (CINTRAFORE) to address problems and opportunities in the import and export of forest products; (4) the Center for Streamside Studies (CSS) to study critical issues associated with riparian habitats in the Pacific Northwest; (5) the Washington Pulp and Paper Scholarship program; (6) the ONRC in Forks, Washington, to foster and support research and outreach applicable to the Olympic Peninsula; (6) the Cooperative Forest Systems Engineering program (FORSYS)—a joint effort of the US Forest Service’s Pacific Northwest Research Station and the College to solve forest management problems through the use of new technologies and engineering design and analysis; (7) a formal strategic planning effort for the College; (8) the Wind River Canopy Crane research facility; (9) the Poplar Molecular Genetics Cooperative; (10) the Arbor Day fair—a combined effort by the College and alumni which attracted 2,000 kindergarten through third-grade children annually; and (11) the new Washington Park Arboretum Master Plan. In addition, programs and initiatives were begun in urban ecology, precision forestry, and rural technology. Research funding increased during Dean Thorud’s tenure, and the College’s graduate program continued to be highly ranked.


Dean Vogt was born in Turku, Finland, and was the sixth dean, and the first woman dean, of the College. She earned a BA in biology from the University of Texas (1971) and MS (1974) and PhD (1976) degrees from New Mexico State University. She first came to the College as a postdoctoral research associate working in forest soil
microbiology with a focus on mycorrhizas. She later became a research assistant professor. In 1985 she moved to the School of Forestry and Environmental Studies at Yale University, reaching the rank of professor, and was appointed as the Margaret K. Musso Professor of Forest Ecology. In 2000 she rejoined the College as dean and professor. While dean, she fostered an interdisciplinary approach to forest resources with a focus on applying the concept of “sustainability” to the College's teaching, research, and outreach programs, including the Denman Forestry Issues series (see Chapter 9). After leaving the deanship in 2001, she continued as professor of ecosystem management, linking social and biological sciences. Her research accomplishments are described in Chapter 8.

B. Bruce Bare (2001–2009)

Bruce Bare was the seventh and final dean of the College. He was born in Indiana in 1942 and received his BSF (Bachelor of Science in Forestry) in 1964 from Purdue University and his MS in 1965 from the University of Minnesota, in statistics, biometry, and mensuration. He then returned to Purdue, where he obtained a PhD in 1969 with a focus on operations research, forest management, and computerized teaching tools. That same year he was hired as an assistant professor at the UW as a faculty member in the Center for Quantitative Science (CQS) with a joint appointment in the Colleges of Forestry and Fisheries. In 1973, he was appointed solely in CFR and taught many courses encompassing quantitative methods, computer programming and modeling, forest management and policy, statistics, and financial management. As dean he maintained an active research program, which is described in Chapter 8.

After Dean Vogt stepped down, Bare was appointed as acting dean in 2001 and dean in 2002. He was dean during a particularly turbulent period in the College's history, inheriting a host of challenges: budget cuts; declining student enrollments; pressure from upper campus to justify the existence of the College on campus; the impact of protection of the northern spotted owl on management of the University’s forest trust lands; the curricula; justification for the support of remote sites such as Pack Forest, the ONRC, and the Canopy Crane site; movement of the main emphasis of the College away from traditional forestry; the planned demotion of the College to a school within the new College of the Environment; loss of relevance of the Institute of Forest Resources; a failing outreach program; and loss of faculty expertise.

Despite these challenges, Dean Bare managed to accomplish much. He: (1) established sustainability and sustainable forestry as a major theme for the College; (2) created the Center for Sustainable Forestry at Pack Forest; (3) had Pack Forest certified under the SFI; (4) reformed and refocused the undergraduate curriculum; (5) established strategic goals and objectives for the College through a planning process, particularly for faculty hiring; (6) revised the continuing education program, including the involvement of the environmental community; (7) realigned the SAF accreditation process; (8) worked closely with the WADNR, particularly Land Commissioner Douglas Sutherland, to introduce ecological and sustainable forestry; (9) shepherded the completion and funding of the effort to rebuild Merrill Hall following the May 21, 2001 fire-bombing of the original building; (10) reorganized the research program; (11) increased development and external support by raising over $17 million during the UW Campaign in the first decade of the 21st century; (12) improved undergraduate enrollment; (13) developed new plans for the use of the ONRC; (14) established the Working Together Agreement among the City, UW, and Arboretum Foundation for the Washington Park Arboretum; (15) created the Northwest Environmental Forum; and (16) created two new faculty chairs and six faculty professorships. However, he was unable to prevent the inevitable movement of the College to a school in the College of the Environment.

Acting Deans

Occasionally, deans of the College were called to other duties on campus and an acting dean was appointed. The first of these was Dwight Jeffers (1933–1935), who filled in for Dean Winkenwerder when he was acting University president. From 1984–1986, Thomas A. Hinckley relieved Dean Thorud, and Dale Cole acted for Dean Thorud from 1994–1996.
School Directors

When the CFR became a school in 2009 it was first named SFR. Tom Hinckley was appointed interim director and served until 2014. During his tenure, SFR was renamed SEFS. Since 2014 there have been two directors (Thomas DeLuca and Daniel Brown). After DeLuca left SEFS in 2016 to become dean at the College of Forestry and Conservation at the University of Montana, and now dean at the College of Forestry at OSU. Elizabeth (Liz) Van Volkenburgh (2016–2018), a professor of plant physiology in the UW Biology Department, was appointed acting director and served until Daniel Brown was appointed.


Thomas DeLuca served as the first permanent director of SEFS from 2014–2016. He received his BS in soil science from the University of Wisconsin–Madison in 1984, his MS in soils from Montana State University in 1987, and his PhD in soil microbiology and biochemistry from Iowa State University in 1993. DeLuca served as an assistant professor of agroecology and sustainable systems from 1993–1994 at Slippery Rock University, Pennsylvania; assistant professor and professor of forest soils in the School of Forestry, University of Montana, from 1994–2006; senior scientist/forest ecologist at the Wilderness Society (2006–2009); and from 2009–2014 as professor of environmental sciences at Bangor University in the United Kingdom, as well as a senior research scientist at the Institute for Subarctic Alpine Research, Silver Museet, Sweden. He conducted research in temperate, boreal, maritime, and polar settings (including Antarctica).

Daniel G. Brown (2018–)

Daniel Brown received his BA in geo-environmental studies from Shippensburg University in Pennsylvania in 1987, and his MA (1989) and PhD (1992) in geography at the University of North Carolina, Chapel Hill. He has conducted research on understanding human-environment interactions in North America, Asia, and Africa, and in 2009 he was elected fellow of the American Association for the Advancement of Science.

Associate Deans and Assistant Directors

It is the responsibility of the dean to appoint associate deans, who are members of the faculty. The College had eleven associate deans from 1965 to 2009 (Table 4.2). As the College expanded in the 1960s, a need arose for associate deans to assist with administrative duties in the dean’s office. In 1965, two associate deans were appointed: one assigned to teaching, and the other to research as well as other assignments, as needed by the dean. During some periods there was only one associate dean. Many served for long periods—notably Stan Gessel (18 years, from 1965–1983) and Dale Cole (12 years, from 1984–1996). Assistant directors are now appointed to aid the SEFS director; three have served to date (see Table 4.2).
Table 4.2. Tenures of UW forestry associate deans and assistant directors

<table>
<thead>
<tr>
<th>Years</th>
<th>Associate Deans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1907–1965</td>
<td>No associate deans</td>
</tr>
<tr>
<td>1965–1970</td>
<td>David R. M. Scott; Stanley P. Gessel</td>
</tr>
<tr>
<td>1970–1974</td>
<td>Stanley P. Gessel; Benjamin A. Jayne</td>
</tr>
<tr>
<td>1974–1976</td>
<td>Stanley P. Gessel; David P. Thomas</td>
</tr>
<tr>
<td>1976–1980</td>
<td>Stanley P. Gessel</td>
</tr>
<tr>
<td>1980–1984</td>
<td>Stanley P. Gessel (Research)</td>
</tr>
<tr>
<td></td>
<td>Thomas Waggener (Instruction)</td>
</tr>
<tr>
<td></td>
<td>Bruce Lippke (External Initiatives)</td>
</tr>
<tr>
<td>2000–2002</td>
<td>Robert Edmonds (Infrastructure)</td>
</tr>
<tr>
<td>2002–2009</td>
<td>Robert L. Edmonds (Research)</td>
</tr>
<tr>
<td></td>
<td>Stephen West (Academic Affairs)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assistant Directors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009–2012</td>
</tr>
<tr>
<td>2012–2015</td>
</tr>
<tr>
<td>2015–</td>
</tr>
</tbody>
</table>

Duties of the associate deans were to assist the dean with management of: (1) academic programs and curricula; (2) student affairs; (3) faculty affairs; (4) research programs; and (5) strategic planning.

Divisional Structure

The informal divisional structure of the College that was established in 1972 allowed the dean to add or remove divisions or combine them in response to changing education and research needs. Establishment of official departments was strongly recommended in a Graduate School review in 2004, but a decision was made to not do this.

The divisional structure as it changed with time is shown in Table 4.3, along with surnames of the division chairs in parentheses. The number of divisions has ranged from two to four, and sixteen faculty have served as chairs. After 2004, all the divisions were dissolved and the structure turned full circle, back to a single unit.
<table>
<thead>
<tr>
<th>Year Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre 1972</td>
<td>A single unit—no divisions</td>
</tr>
</tbody>
</table>
| 1972–1978   | Management and Social Sciences (Waggener, Thomas, Driver)  
|             | Biological Sciences (Fritschen)  
|             | Wood and Paper Sciences (Sarkanen, Hrutfiord) |
| 1978–1984   | Management and Social Sciences (Thomas, Driver) |
| 1972–1978   | Biological Sciences (Fritschen, Scott)  
|             | Physical Sciences (Hrutfiord) |
| 1984–1990   | Forest Resources Management (Lee, Agee)  
|             | Forest Products and Engineering (Schreuder) |
| 1990–1994   | Forest Resources Management (Lee, Agee)  
|             | Forest Products and Engineering (Schreuder)  
|             | Center for Urban Horticulture (Tukey) |
| 1994–1998   | Ecosystem Sciences and Conservation (Edmonds)  
|             | Forest Management and Engineering (Schreuder)  
|             | Paper Science and Engineering (Hrutfiord)  
|             | Urban Horticulture (Hamilton) |
| 1998–2000   | Ecosystems, Conservation, and Horticulture (Hinckley)  
|             | Forest Management and Engineering (Gustafson) |
| 2000–2004   | Ecosystem Sciences (Manuwal)  
|             | Management and Engineering (Gustafson) |
| 2004–2009   | A single unit—no divisions (faculty chair, Bradley) |
| 2009–present| SEFS—no divisions |
CHAPTER 5
THE FACULTY AND STAFF

Introduction

In the sloping classroom filled with more than a hundred students, the paper airplane soared in the air. The chemistry professor who was teaching the class at Sydney University in the early 1960s was writing on the huge blackboard at the front of the room, his back to the class. When he turned around, he saw the airplane and demanded that the student who threw it (not me) confess or he would stop teaching the class for a week. Nobody owned up, so he did indeed not teach for a week, though we were all still responsible for the material on the final exam. Faculty still have challenges teaching large classes, although we wouldn’t stop teaching because of a paper airplane.

The largest class I taught for many years at CFR was “Forests in the Life of Man” for non-majors, with 120 students. It was always hard to get the students to pay attention. Many arrived late, talked in class, left early, played computer games on their laptops, looked at their cell phones, and cheated on exams. There was even a fight in class between two members of the UW Huskies football team. But it wasn’t all bad. The students in front paid attention and often thanked me for an interesting and enjoyable class. Teaching classes of 15–30 forestry majors, or fewer, was particularly pleasurable, especially classes with field trips. You got to know the students and a little about them. Mentoring of graduate students was especially enjoyable, as I am sure all faculty would agree.

Faculty put their hearts and souls into teaching, and try to use relevant and up-to-date teaching material and present it to students in as interesting and entertaining a way as possible. Some teach courses jointly with other professors. Guest lecturers are often invited to speak, adding relevance to the course. Student ratings of CFR teachers have always been good, and two faculty members have received UW distinguished teacher of the year awards—Reini Stettler (tree genetics) in 1990, and Jerry Franklin (forest ecosystem ecology) in 2015.

Teaching is only one of the activities of the College faculty; they also engage in research, outreach, and serve on College and University committees. Their national reputation is based on research rather than teaching, however. Faculty have been very successful in obtaining grant money and publishing data in peer-reviewed journals. Many graduate students have been supported by fellowships and grants. Faculty have been actively involved in outreach and continuing education, imparting their knowledge both to professionals and to the public. In addition, their expertise is used to solve client problems—the University allows faculty to spend one day a week as paid consultants during the academic year. Furthermore, many serve on graduate committees outside the College and as Graduate School representatives. Others have acted as PhD dissertation readers for students in universities in other countries.

The College faculty are well known both nationally and internationally. At the national level, they review research proposals and journal submissions, present papers at meetings, serve on federal agency research panels and national research council committees, and chair national societies. Many have testified in front of congressional committees. Internationally, faculty have conducted research in many foreign countries and participate in international societies such as IUFRO (International Union of Forest Research Organizations). Several have been stars on the international stage. For example, Jerry Franklin is known globally for his ideas on ecological forestry, many of which have been adopted in other countries. Another example is David L. Peterson, a US Forest Service senior scientist and a former faculty member, who shared a Nobel Peace Prize in 2007 with other scientists for his contribution to the 1995 report of the IPCC (International Program on Climate Change).

A list of all faculty, including lecturers and joint and adjunct appointments, is presented in the UW ResearchWorks (see Appendix A). It shows the year of initial appointment, years of employment, the universities where they obtained their degrees, their area of expertise, and whether they were tenure-track, WOT (without tenure), and research faculty or instructors. I had the privilege of knowing, or least meeting, nearly all of them.
Most of the faculty began as assistant professors and moved up the ranks to become associate and full professors. Some were hired as associate or full professors when more senior experience was needed. Only a few have not received tenure. Many spent decades at the College—the average time spent as a tenure-track faculty member hired before 1990 is 21 years. Six faculty members spent 40 or more years on the faculty: Graham Allan (52 and counting), Bruce Bare (45), Bror Grondal (42), Gordon Bradley (42), and Bob Gara (40). Another twenty-six spent 30–39 years. I served a happy 38 years myself. Of course, some moved on to other employment, including academic institutions. After retirement many continued their association with the College as emeritus or emerita professors, and some were employed as part-time professors to teach courses.

Many of the older faculty I knew were “characters,” but now we seem to have fewer of them. They were hired before the “Publish or perish” era, and so perhaps had more time to become armchair philosophers. Today, faculty not only teach, mentor, serve on committees, and conduct research, but must also publish regularly, prepare PowerPoint lectures, write grants, perform outreach activities, and in many cases commute long distances to campus.

**Faculty Hiring**

When the School of Forestry was established in 1907, Dean Francis G. Miller (1907–1912) was the only faculty member. Professors from other departments taught required courses and were listed as members of the faculty of forestry. Most were excellent teachers, and many of their names are well known to UW students today because some of the campus buildings are named after them. They included Trevor Kincaid (Zoology), John Condon (Law), Henry Landes (Geology and Mineralogy), J. Allen Smith (Political Economy and Social Science), Frederick Osborne (Physics), Theodore Frye (Botany), and others.

In the first fifty years of the history of the College, faculty were hired with expertise in forest management, logging engineering, silviculture, mensuration, wood science, forest economics, outdoor recreation, soils, forest ecology, genetics, forest products, fire management, paper science, arboretum management, and statistics. From the 1960s on, faculty hiring continued in these areas, but broadened to include sustainable forestry, entomology, pathology, fire science, ecophysiology, hydrology, micrometeorology, wildlife science, urban horticulture, social science, trade and marketing, remote sensing, new areas in ecology and soils, pulp and paper science, fiber science, bioenergy, and biomaterials. The changes in faculty expertise through time reflected the changing nature of forest and natural resources education, employer needs, new areas of research and teaching, new technological innovations, changing university priorities, budget considerations, and public views about natural resources.

The approach to faculty hiring has changed over time, from being very discipline-oriented to a more integrated approach. Cluster hires, where new SEFS faculty work together with faculty from other departments on a specific area of research (e.g., freshwater sciences), are not uncommon.

Table 5.1 shows the faculty and instructors hired from 1907 to 2018 by type of appointment and gender. A total of 218 personnel have been responsible for teaching and research in the College (150 tenure track, 25 non-tenure-track (research faculty and WOT), 24 joint and adjunct professors and 19 instructors). A few of the faculty have been employees of government agencies, such as the US Forest Service, NPS, and the US Geological Survey (USGS), or of other universities (such as WSU), and have held joint appointments. In addition, there are adjunct and jointly appointed faculty (from other departments within the UW). Not listed are the many affiliate faculty from outside the University and postdoctoral fellows (research associates). Graduate students also teach classes and serve as teaching assistants.
Table 5.1. Male and female UW Forestry Faculty hiring, 1907–2018

<table>
<thead>
<tr>
<th>Tenure track</th>
<th>Men</th>
<th>Women</th>
<th>Total</th>
<th>Percent women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1907–09</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1910s</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>1920s</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1930s</td>
<td>7</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>1940s</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>1950s</td>
<td>7</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>1960s</td>
<td>22</td>
<td>0</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>1970s</td>
<td>21</td>
<td>2</td>
<td>23</td>
<td>9</td>
</tr>
<tr>
<td>1980s</td>
<td>22</td>
<td>2</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td>1990s</td>
<td>11</td>
<td>8</td>
<td>19</td>
<td>42</td>
</tr>
<tr>
<td>2000s</td>
<td>10</td>
<td>4</td>
<td>14</td>
<td>29</td>
</tr>
<tr>
<td>2010–18</td>
<td>11</td>
<td>6</td>
<td>17</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>128</td>
<td>22</td>
<td>150</td>
<td>10</td>
</tr>
<tr>
<td>Research and WOT</td>
<td>22</td>
<td>3</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>Joint</td>
<td>7</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Adjunct</td>
<td>13</td>
<td>4</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>Instructors</td>
<td>18</td>
<td>1</td>
<td>19</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: WOT = without tenure.

Only two faculty were hired before 1910. From the 1910s through the 1920s, five faculty joined the College, though from 1913 to 1927 no new faculty were added. Seven more were appointed in the early 1930s, but only one faculty member was hired from 1936–1944 due to the Great Depression and World War II. Right after the war, ten faculty were hired. The 1950s saw a period of low hiring—only seven. Dean Bethel was intent on hiring new faculty, and 69 were appointed from the 1960s through the 1980s. During this time enrollments were high (a maximum of 648 in 1975) and research funds were easily available. Since the 1990s the rate of hiring has declined. This was largely due the changing nature of forestry, declining enrollments, less state support, and, most recently, to reallocation of retirements to other schools and departments in the College of the Environment, a downside of the loss of College status. With the exception of Graham Allan, all the faculty members hired prior to 1980 are deceased or retired.

Research and WOT faculty, who are supported from research grants (soft money) and not by state funds, have contributed greatly to the research program although they represent only 13 percent of total hires. Hiring of research faculty commenced in the 1970s and peaked in the 1980s. The first research faculty member was hired in 1967. I was originally hired in 1974 as a Research Assistant Professor. Times were different then. There was no formal interview process, and I was simply invited to return to the College by Professor Gessel after undertaking a postdoctoral position at the University of Michigan. I became a tenure-track faculty member in 1976, when Dean
Bethel changed the source from which I was being paid, a research budget, to the state budget. This could never happen today. All new faculty members undergo a rigorous application, screening, and then a multi-day interview process.

The faculty was entirely male before the 1970s, as were almost all the students. The first female faculty member, Linda Brubaker, was employed in 1973. Over the hiring life of the College and SEFS (1907–2018), 150 tenure-track faculty were hired, 22 of which were female (15 percent). In the period from 1990 to 2018, however, 36 percent of the tenure-track faculty hires have been women. The percentage of women on the faculty in 2018 was 33 percent. In contrast, the student population was 63 percent female.

The number of active faculty has risen and fallen over the years, reflecting the changing nature of the forest industry, World War II, economic conditions (the Great Depression, periods of austerity and periods of relative wealth), the need for foresters, and University priorities. Figure 5.1 shows faculty numbers (tenure track, research/WOT, federal government, and other) from 1910 to 2018 at five-year intervals. Tenure-track faculty reached a peak in 1985 at 47, but fell to 31 by 2015. It then began to increase again, and in 2018 was 35. Total faculty numbers peaked in 1990 at 56, decreased to 39 in 2015, but by 2018 had climbed back to 42. The recent retirement of the large number of faculty who were hired in the 1970s and 1980s contributed to the large downward trend.

![Fig. 5.1. Total numbers of UW forestry faculty and their different appointments from 1910–2018 at five-year intervals.](image)

**International Representation**

Starting in the 1950s, professors with connections to 15 countries have served on the faculty: Australia—William Stoate, Ian Morison, and myself; Brazil—Fernando Resende; Cameroon—Stanley Asah; Canada—David Scott and Jon Bakker; Chile—Robert Gara; Finland—Kyosti Sarkanen and Kristiina Vogt; France—Anthony Dichiara; Hungary—Sándor Toth; India—Indroneil Ganguly and Krishna Rustagi; Italy—Fiorenzo Ugolini; Mexico—Ernesto Alvarado; Poland—Renata Bura and Monika Moskal; the Netherlands—Gerard Schreuder and Hans Riekerk; Russia—Sergey Rabotyagov; Switzerland—Reinhard Stettler and Peter Schiess; and the United Kingdom—David Ford and David Mabberley from England, and Graham Allan, James Robertson, and Kenneth Turnbull from Scotland.

**Faculty Contributions**

Faculty contributions are typically assessed in terms of numbers of publications, graduate students advised, committees served on, courses taught, course enrollments, grant funding obtained, student evaluations, guest
lectures, membership and leadership in scientific societies, outreach activities, and more. Thirty faculty have authored or coauthored 80 books, including new editions (Appendix B). Grant Sharpe and John Marzluff lead the list with 15 and 10, respectively. Some of them are targeted at the general public, some are written for other scientists, some are textbooks, and still others are history books. Many faculty have written book chapters.

These are rather cold, quantitative evaluations and don’t tell the human stories behind their contributions. Unfortunately, in the limited space here I cannot recount the personal stories of all the faculty, though they all deserve mention. The research accomplishments of all the faculty are touched on in Chapter 8.

Below I convey the personal stories of twenty faculty (Fig. 5.2) who represent the breadth of the College’s programs and who contributed immensely to research, teaching, and outreach. They were hired from the 1940s to the 1980s, and I knew most of them. They include a forest management specialist (James Robertson); ecologists and silviculturists (David Scott, Chad Oliver, and Jerry Franklin); a paleoecologist (Linda Brubaker); wood scientists and chemists (Benjamin Bryant, David Thomas, and Bjorn Hrutfiord); recreationalists (Frank Brockman and Grant Sharpe); soil scientists (Stanley Gessel and Dale Cole); a wildlife scientist (Richard Taber); an entomologist (Robert Gara); an economist (Barney Dowdle); a geneticist (Reinhard Stettler); an ecophysiologist (Thomas Hinckley); a mensurationist (Kenneth Turnbull); and social scientists (Gordon Bradley and Robert Lee). Like all faculty, most of their research was conducted by graduate students. Bare, Bradley Cole, Dowdle, Gara, Hinckley, and Scott’s wife, Carolyn all participated in my oral history project. You can hear their interviews on ResearchGate (see Appendix A.)

Fig. 5.2. Representative CFR forestry faculty members (Source: UW School of Environmental and Forest Sciences).
The Forest Management Specialist

James C. H. Robertson (1896–1995) was professor of forest management, economics, administration, and finance from 1945 to 1969 (24 years). He was born at Lochgilphead, Scotland, and served in the British army in World War I, seeing action in Belgium as a sapper in the Royal Engineers and then in the field artillery. Although he was wounded several times, he survived. In 1921 he explored different parts of Canada and the US and made a decision to attend the University of British Columbia (UBC). After a brief period at UBC he headed to the UW to study forestry, where he received a BS in 1927.

After graduation he worked for a year in a pulp mill at Shelton, Washington, and then headed back to British Columbia to a position in the newly established research division of the Canadian Forestry Service (CFS) re-measuring growth and yield plots. Following that he accepted a job with the Queensland Forest Service in Australia. Two years later he moved back to Canada and rejoined the CFS research division. In 1932 he again left British Columbia, this time to pursue graduate studies at University of California, Berkeley. After receiving his MS in 1933, he worked for the US Forest Service for a year and once again went back to Canada to join the CFS again—the third time in six years. Robertson spent much of his time there studying growth and yield plots and vegetation succession in coastal cutblocks. He left Canada in 1936 for the last time, to accept a teaching position at Colorado State University. In 1945 he moved to the UW, and became a professor. He earned his PhD in forestry at Duke University in 1947. Robertson spent the rest of his career at the UW and retired in 1969. While at the College he taught many courses, including forest economics and finance, forest management, and photo interpretation. Many of his courses involved field studies. His research covered release of residual trees in thinned ponderosa pine stands; aerial surveys of forest reproduction; plant and soil indicators for Douglas-fir productivity; economics (liquidation of second-growth Douglas-fir stands and production and marketing of English holly); and forest measurements. He advised 14 master's students and one PhD student.

The Soil Scientists

Stanley “Stan” P. Gessel (1917–1995), professor of forest soils and tree nutrition, grew up on a Utah farm during the Great Depression. He earned a BS in forestry and range management in 1939 at Utah State Agricultural College, and a PhD in soil science from the University of California at Berkeley in 1950. Like many in his generation, he served in World War II (US Army Air Corps). He joined the College as an assistant professor in 1948 and retired in 1983, after 35 years.

Professor Gessel was a stimulating teacher and taught many courses, including general forest soils; soil morphology and classification; methods for soil surveys and mapping; forest influences/watershed management; range management; and forests in the life of man (for non-majors). Gessel's research, which involved 35 master's and 20 PhD students, covered forest management, tree nutrition, forest fertilization, and nutrient cycling, and was acclaimed worldwide. When he arrived at the College, Gessel soon realized that many Douglas-fir trees were nitrogen (N) deficient and that application of urea-N fertilizer could greatly increase forest productivity. We used to joke that Stan's life plan was to fertilize all the Douglas-firs in Washington State. Of course, he did not achieve this, but his research did help to increase the productivity of Pacific Northwest forests—thousands of acres were fertilized with urea. Stan established the RFNRP and directed the US/IBP (International Biological Program) Coniferous Forest Biome Program. Both are described in Chapter 8.

One of his most interesting research projects involved the influence of atomic bomb tests on soils and plants on Bikini, Enewetak, and Rongelap atolls in the Marshall Islands, which are located near the equator in the Pacific Ocean, 2,392 miles southwest of Hawai`i. Nuclear war was very possible after World War II, but very little was known about the effects of nuclear fallout on terrestrial and aquatic ecosystems. Twenty-three nuclear devices were detonated on Bikini atoll between 1946 and 1958, and an additional 43 atmospheric nuclear tests were conducted on Enewetak atoll. Graduate students Dale Cole, Wally Gentle, and Reid Kenady were involved, along with Stan's collaborator Richard Walker, a plant physiologist in the UW Botany Department. Fallout contamination forced the evacuation of Marshallese people living on Rongelap atoll, where Stan and his colleagues worked. The research revealed that the deposited radioactive
element cesium 137 (Cs 137) was taken up by food crops. Coral atoll soils were so low in potassium (K) that Cs 137 was taken up in its place. Gessel returned to Rongelap atoll in 1986 to sample soils and vegetation.

Stan was a consultant and adviser in forest soils and forestry on every continent except Antarctica. He spent long periods in Central America (Costa Rica and Honduras), Australia, and New Zealand. Besides visiting virtually every European country, he had assignments in Chile, India, South Africa, Thailand, Indonesia, Turkey, Malaysia, Nepal, and the Philippines. Many of his graduate students were international. On one trip to Australia he brought back eucalyptus seeds, thinking that fast-growing eucalypts would make good plantation trees in the Pacific Northwest. To demonstrate this idea, he planted seedlings adjacent to Bloedel and Anderson Halls. In a very short time, they had grown to the height of the roof of Anderson Hall and became a problem. Stan, of course, was not happy with the thought of removing them. The problem was solved when the trees died after a spell of subfreezing temperatures and were taken down. He concluded that growing eucalypts for timber in Washington probably wouldn't work.

Professor Gessel was very active on the national stage in the Soil Science Society of America, and on the international stage with IUFRO. He was very much involved in the World Forestry Congress, which was held on the UW campus in 1960 (described in Chapter 13). In recognition of his many years of international involvement and administrative service to IUFRO, he received the IUFRO Distinguished Service Award in 1989.

Stan contributed enormously to the College administration and was the first associate dean for research, serving for 18 years, from 1965 to 1983. He worked extensively with campus colleagues, and he and Dick Walker from Botany were founding members of the UW Campus Landscape committee.

Dale Cole, professor of forest soils, served as a faculty member from 1964 to 1997 (33 years). He was born in 1934 in Everett, Washington. After high school he enrolled in the College, graduated in 1955 with a BSF, and then obtained an MS from the University of Wisconsin in 1957 in forest soils. He returned to the UW for his PhD, which he received in 1963 working under the tutelage of Stan Gessel.

Dale taught many courses, including introductory soils; forest soils; soils in the forest ecosystem; forest soil properties; and crisis in the forest environment. He was active in research and advised 5 master's and 14 PhD students, six of whom went on to academic positions in the US. Nutrient cycling, soil solution chemistry, and the influence of acid rain and biosolids application on forest soils were the main subjects of his research. Along with Gessel, Dale was instrumental in initiating the College's research effort in the City of Seattle's Cedar River Watershed with the help of Joe Monahan, the watershed director, who was one of the College’s graduates. He also served as director of research for the Organization for Tropical Studies (OTS) in Costa Rica.

For much of his career at the College, Dale served as an administrator in a variety of positions, including associate dean, acting dean, director of the Institute of Forest Products and Pack Forest, and the chair of both the University Lands and the Campus Landscape committees. He was the director of the Washington Park Arboretum for 11 years and was heavily involved in the establishment of CUH. In the early 1970s, when Pack Forest was suffering financially and facilities were deteriorating, Dale worked tirelessly on its rejuvenation. (Pack Forest is described in detail in Chapter 12.)

Dale and his wife, Lyn, hosted many gatherings of students and faculty at their farm property on Cougar Mountain. He entertained many guests on his large historic sailboat the Mary Hillyer, a 57-foot auxiliary sail keel schooner, which was then docked at Shilshole Bay. It is now over 100 years old and docked at his home in Keyport, Washington. He sailed to British Columbia and Alaska in the summers with friends and family and still continues to sail. Dale was also an avid mountain climber and climbed many peaks in Washington and New Zealand, where he worked for many years as a forestry consultant.

**The Wood Scientists and Chemists**

Benjamin “Ben” Bryant (1923–2011), professor of forest products, was also a Washington native—born in Seattle. In his youth Ben was quite a mountain climber and scaled all the major peaks in Washington, even surviving a fall down McClellan Butte in 1939. In World War II, Ben served in the Army Signal Corps in Okinawa.
Ben received a BSF and an MSF (1948) from the UW and a PhD from Yale in 1951, and spent 33 years on the faculty, from 1949 to 1982. His research and teaching focused on timber properties, and he worked in summers in the forest products industry. He taught a large number of courses, including timber physics, plywood lamination and glues, wood technology, wood utilization, wood machining, timber design, and wood and fiber structure.

One of Ben’s major life goals was to create products to help meet the global need for low-cost housing in developing countries. For example, he designed and promoted a low-technology press for making fuel briquettes out of agricultural waste, to help stop deforestation and improve the lives of women in developing countries. He also had a strong interest in using fast-growing tree species to provide low-cost lumber for housing in Nigeria.

He advised the research of 38 master’s and 8 PhD students. One of the students provided this anecdote about Ben’s research. The US Forest Service asked him to develop a spray-on product that would allegedly speed wood decomposition, thereby reducing the need to burn logging slash. Professor Bryant and the student used popsicle sticks as substitutes for branches and measured tensile (or breaking) strength as the treatment effect. Water was used as a placebo, and Coca-Cola as an alternative treatment to the “No-Fire Acid” product they hoped to develop. The results were clear! Coca-Cola accelerated decomposition faster than No-Fire Acid. Not surprisingly, no large-scale production resulted.

David “Dave” Phillip Thomas (1918–2012), was born in Wasco, Oregon, and served as a professor of wood science and technology from 1950 to 1983 (33 years). Professor Thomas received his BSF from the UW in 1941, but his forestry career was interrupted by World War II. He joined the US Navy in 1941, served in both the Pacific and in France, and survived the sinking of the USS Lexington in the Battle of the Coral Sea in 1942. After receiving his master’s degree from the UW in 1947, he served three years on the faculty of the New York State College of Forestry at Syracuse University before returning to the UW in 1950 as an assistant professor of forestry. His classes included lumber grading; milling and kiln drying; introduction to forest resources management; and forest surveying.

Thomas served in a number of administrative positions (director of the Institute of Forest Resources, associate dean, and chair of the division of forest management). He was very effective as an undergraduate student advisor, and for many years directed the University’s secondary science training program and the junior science and humanities program for high school students. As special assistant to the vice president and provost, he had responsibilities as an academic adviser to the Reserve Officers Training Corps (ROTC) program and was technical adviser to the Peace Corps program in Chile. Dave also served on the state forest practices board’s technical advisory committee and held a three-year term on the forest practices appeals board. He was active in the SAF throughout his career and served as chairman of the Washington State SAF. For his service he was awarded the status of SAF Fellow.

Bjorn Hrutfiord (1932–2010) was a professor of wood chemistry from 1965 to 1998 (33 years). He was born in Bellingham, Washington. In 1954, he received a BS from WSU, and in 1959 a PhD in chemistry from the University of North Carolina at Chapel Hill, North Carolina. He is remembered as an outstanding chemist and an excellent teacher. Bjorn taught pulp and paper technology, wood chemistry, and wood extractives chemistry, and was dedicated to mentoring students and young faculty members. He taught special courses to graduate students outside his field, including Tom Hinckley and me, who benefited from his knowledge of the biochemistry of photosynthesis and respiration and wood extractives (compounds used by plants to protect themselves from insects and diseases).

Bjorn’s research was focused on pulping, delignification, and the chemistry of wood extractives that negatively influence pulp properties in Douglas-fir and other species. He also studied the production of unpleasant odors from pulp mills and the acoustic basis for wood species differentiation. During his career he advised 30 master’s and 13 PhD students.

He was also a small forest landowner in Whatcom County. Donald Hanley, a College faculty member with a joint appointment with WSU extension, regularly gave him advice about the management of his forest.

The Ecologists and Silviculturists

Possibly the most colorful faculty member was David “Dave” Robert Main Scott (1921–2002), professor of forest ecology and silviculture, who served 33 years on the faculty, from 1955 to 1988. Dave was born in Toronto, Ontario,
Robert L. Edmonds

Canada, but spent the majority of his life in the US. During the later years of World War II, he served as an army artillery and infantry officer in the Canadian Army. He received his BS from the University of Virginia in 1942 and his MF (1947) and PhD (1950) from Yale University. From 1950 to 1955 Dave conducted forestry research for the Canadian government in Alberta and Ontario, and then accepted a faculty position at the UW. At the time he was hired there were only 12 faculty members.

In his youth Dave lived in Lynchburg, Virginia, where his father was head of the Department of Religion at Randolph-Macon Woman’s College. His summers were spent in Canada. He first met his wife, Carolyn Beardsworth, in kindergarten in Lynchburg, and many years later, in 1944, they married. Carolyn and Dave were a team to his graduate students as well as to the undergrads at Pack Forest, where Dave lived with his family in the summers from 1956 to 1987 while teaching. Social interactions with his students were important and he hosted scores of parties at his home in Laurelhurst, near campus, where he lived for 45 years. Dave died at age 81, but Carolyn, who is now in her late 90s, is still active and volunteers at CUH and the UW Retirement Association.

Dave was considered to be a real character by all who knew him, mostly for his teaching style. He was an excellent instructor and loved teaching silvics, silviculture, and forest ecology. His teaching style was informal, particularly for his graduate students, who affectionately shortened “Doctor Scott” to “Doc.” He was a great spinner of tales, much to the students’ delight. Jim Lassoie, one of his doctoral students, provided the following description of his famous cigarette-smoking technique. Before non-smoking rules were implemented, it was permissible to smoke in class—ashtrays were prevalent. Standing without notes in front of 60 plus students with his flip-up eyeglasses in the up position, Doc would begin developing a point. At the same time, he would take out his tobacco pouch and rolling paper and assemble a roll-your-own cigarette. He could roll one-handed, write on the chalkboard with the other hand, and lecture at the same time. After striking a match, he would continue to lecture. Students would watch, mesmerized, as the flame came closer and closer to his fingers, giving an audible sigh of relief when, at the last possible moment, he lit his roll-up. He never burned his fingers, at least to my knowledge.

Dave had an incredibly active research program, chaired an amazing 102 graduate student committees (71 master’s and 31 PhDs), and easily takes first prize for the number of students advised. (The next highest is Professor Gara, who advised 81 students.) Foreign students were attracted to work under his guidance. Many of his PhD students went on to academic careers. Dave pioneered temperate forest canopy research and established ecosystem ecology as an interdisciplinary applied science. His research was focused on the ecology and silviculture of Pacific Northwest and Alaskan tree species, especially their regeneration, succession, and autecology. Subjects of his investigation included the effects of the environment (temperature and plant water stress) on photosynthesis, transpiration, and tree growth; crown, stem, and root development; the influence of pruning and fertilization on tree diameter growth; and even Douglas-fir response to heron nesting. He supervised the research of graduate students on the establishment of eucalypts in the Philippines and canopy structure in the dry dipterocarp forests in Thailand. Dave also served in administrative positions in the College, including associate dean for academic affairs.

He strongly believed that an important part of the education of a scientist was learning how to do research independent of top-down command and control. The Scott lab in Winkenwerder served as an intellectual and social center for his students. Jim Lassoie told me that, “Free-association and unbounded creativity ruled and discussions meandered back-and-forth covering such topics as our research (once in a while); general politics; Vietnam; the environment; and great places to hike, eat, and drink beer.”

Chadwick “Chad” Oliver, professor of forest ecology and silviculture, and now a professor at Yale University, was a faculty member from 1975 to 2001 (26 years). Professor Oliver was born in Camden, South Carolina, where his father—who was a forestry graduate of the University of Georgia—owned a forestry business. Chad received his BS from the University of the South in Sewanee, Tennessee, in 1968, and an MS (1968) and PhD (1975) from Yale. He taught silviculture; forest stand dynamics; forest ecosystem management; and intermediate operations. He is well known for his ecological research on stand development in stratified mixed species stands in the Pacific Northwest. In his book Forest Stand Dynamics, co-written with Bruce Larson, he proposed that the best way to
understand stand development was through various chronological stages (stand initiation, stem exclusion, understory initiation, and multilayered canopy).

His research led him to develop a “landscape approach” to forest management to provide biodiversity, fire protection, wildlife, and other values. One of his most interesting projects was the development of the Landscape Management System (LMS), a computerized tool enabling foresters to manage landscapes for multiple values, not just timber production. (LMS is described in more detail in Chapter 9.)

More than a dozen times he testified at congressional hearings in Washington, DC, on fire and spotted owl issues in the Pacific Northwest. Chad was one of a group of thirteen scientists, which also included the College's Professor Jerry Franklin, present at President Clinton's nationally televised forest summit in 1993. Although Oliver and Franklin's views contrasted, they both believed that there should be no further clearcutting of old-growth forests.

Professor Oliver contributed greatly to the College’s outreach and continuing education program and taught in the Silviculture Institute and the Forest Land Management Program (FLMP) which was designed for professional staff in the WADNR. He was also involved in international work in Ecuador, the Mexico/Guatemala border, Brazil, Thailand, and Chile. Chad advised 35 master's and 16 PhD students.

Jerry Forrest Franklin is a world-renowned expert on sustainable forest management and the integration of ecological and economic values into forest harvesting practices. He served on the faculty from 1986 to 2017 (31 years) as a professor of forest ecology and ecosystem management. Jerry was born in Waldport, Oregon, in 1936, but in 1940 his family moved to Camas, Washington, where his father had taken a job in the Crown Zellerbach paper mill. Family camping trips in the nearby Gifford Pinchot National Forest sparked his interest in studying forestry. I once visited the cozy cabin he owns there. He earned a BS (1959) and an MS (1961) in forest management from OSU and obtained his PhD in botany and soils from WSU. In addition, he holds honorary degrees from Simon Fraser University in British Columbia (2001) and Lakehead University in Ontario, Canada (2006).

From 1959 to 1986, before coming to CFR, Jerry served as a research forester and chief forest ecologist with the US Forest Service in Corvallis, Oregon, with an appointment in the Departments of Forest Sciences and Botany and Plant Pathology at OSU. At CFR he taught many popular courses, including structure and function of forest ecosystems; landscape ecology; natural resources issues; ecosystem management; social functions of forest ecosystems (with social sciences faculty); and theory and case studies of ecosystem management. All classes included field trips, some as long as 10–12-days. In 2015, he received the UW Distinguished Teaching Award.

Jerry is especially known for his research on the structure and function of natural forest ecosystems, especially old-growth forests; disturbance ecology; landscape ecology; the influence of global change on ecosystem processes; and integration of ecological and economic factors into natural resources management. As a result, he was dubbed “the old-growth guru” and “the father of new forestry.” In Bill Dietrich’s 1992 book The Final Forest, a whole chapter, entitled “The Guru,” is devoted to him. While at the UW, Jerry advised 15 master's and 21 PhD students (in addition to those he had advised earlier, at OSU). Many of his PhD students now occupy faculty positions at other universities. He published hundreds of articles in scientific journals and coauthored eight books. One of his major contributions is the 1973 Vegetation of Oregon and Washington, co-written with Ted Dyrness, which is considered the bible of Pacific Northwest forest ecology. He also conducted research in several other countries, including Canada, Chile and Costa Rica.

Jerry spearheaded many regional and national projects in ecosystem science. In 1970, he was able to secure a congressional mandate to establish the US Forest Service’s H. J. Andrews Forest in the Oregon Cascades as the primary site for old-growth forest research in the Coniferous Forest Biome Program. From 1973 to 1976, he was the first director of the Ecosystem Science Division at the National Science Foundation in Washington, DC. In 1976, he helped establish the Andrews Forest as a pilot site for a network of Long-Term Ecological Research (LTER) sites. Following this, he secured NSF funding in 2008 to establish the National Ecological Observatory Network (NEON), a continental-scale observation system for examining ecological change over time.

He was heavily involved in the old-growth controversy in the 1990s and was one of four scientists appointed to the late successional forest ecosystems panel that advised President Clinton and Congress on ecosystem principles.
for science-based management of national forest lands. In 1993, he joined the Forest Ecosystem Management Assessment Team (FEMAT) to develop the Northwest Forest Plan. To gather data on the canopies of old-growth trees in the Pacific Northwest, Jerry installed a construction crane at the Wind River Experimental Forest in the Gifford Pinchot National Forest in southwest Washington, which operated from 1995 to 2011. Much invaluable data on canopy ecology and processes, particularly carbon fluxes and cycling, were collected. (The canopy crane project is discussed in Chapter 8.)

Professor Franklin has recounted the results of his research in forest ecology and management to a wide audience and has expressed his ideas to scores of forest managers. He published many articles for public consumption, was interviewed by newspaper and TV reporters, and has been featured in many documentaries. Jerry is a member of several scientific societies, including the Ecological Society of America (ESA) and the British Ecological Society, and is a fellow of the American Association for the Advancement of Science. In 1993–1994 he was president of ESA and served on the board of directors of Ecotrust and the Wilderness Society.

For his outstanding contributions to the understanding of forest ecology and natural resources management, he has received numerous awards, including the LaRoe Award for lifetime contributions to conservation biology (2004) and an award from the Heinz Family Foundation (2005). He was recently elected to the American Academy of Arts and Sciences, where he was recognized as a leading visionary in forest ecology and conservation. In 2016, he received the Eminent Ecologist Award from the ESA and the Pinchot Medallion from the Pinchot Institute for Conservation.

The Paleoecologist

*Linda B. Brubaker* was the College’s first female faculty member and served on the faculty from 1973 to 2006 (33 years) as professor of paleoecology and dendrology. She also held an adjunct professorship in the UW’s Quaternary Research Center. Professor Brubaker earned a BS in biology from the University of Redlands, California, in 1966, and an MS in biology (1967) and PhD in zoology (1973) from the University of Michigan. Before arriving at the College, she was an assistant professor of biology at Kent State University. Her appointment was a considerable departure from the typical forestry faculty member hired before that time, and represented the changing nature of forest research.

Linda was a wonderful teacher, and in 1992 she received the College's Burlington Northern teaching award. She taught dendrology, dendroecology, forest community ecology, forest biology, and forest autecology. Students remarked on her enthusiasm and energy in both the field and the classroom, especially the grad students in her forest community ecology class. One student wrote, “In the field, Linda was able to march up steep inclines while answering student questions without a pause. She always seemed genuinely interested in what students had to say and treated us as her colleagues rather than as students.”

Her research, involving 16 master's and 12 PhD students, concentrated on the dendroecology of the Quaternary Period (<18,000 years BP, or Before Present), especially pollen analyses from lake sediment cores to reconstruct past postglacial forest vegetation, and climate and other disturbance records hidden in tree rings. She extensively studied pollen in Washington State lakes and in tundra lakes in central Alaska and Beringia (the Bering Strait and adjacent parts of Siberia and Alaska). Her research involved documenting changes in the postglacial forest vegetation in western Washington. The combinations of tree species we see on the landscape today are very different from the past. After the ice sheet retreated, the climate was much drier, with pines dominating—there was no evidence of Douglas-fir. Such knowledge aids in the prediction of the influence of future climate change on forest vegetation. She also used tree-ring analysis to determine the influence of western spruce budworm and Douglas-fir tussock moth defoliation on tree growth.

Linda served on many NSF panels and committees, including the division of polar programs, undergraduate training in geosciences, doctoral dissertation improvement grants, as well as on the science advisory board for the BLM. She was an active member of the ESA.
The Forest Mensurationist

Kenneth “Ken” J. Turnbull (1927–1980), professor of forest mensuration, was born in Fordoun, Scotland, and received his BSc from the University of Edinburgh in 1951 and his MS (1958) and PhD (1963) from the UW in forestry. Turnbull served on the faculty from 1958 to 1980 (22 years) and taught forest mensuration; forest measurements; forest economics and finance; research methods in forest ecology (with others); industrial forest analysis (with Dean Bethel); current issues in forestry and forest research; field studies in forest mensuration (at Pack Forest); and forest biometry.

His research focused on forest inventory and growth and yield of Douglas-fir and other species, e.g., *Pinus taeda* and *Pinus patula* in Brazil. In the early 1960s he introduced the tariff system to the WADNR. The tariff system, which was developed in Europe, is a set of tree volume tables for determining the gross wood volume of individual trees and stands in even-aged plantations. He was also involved in a chemical defoliation project with Dean Bethel—agent orange in the Vietnam War. Ken’s research also contributed to combating cancer. In 1965, a group of twelve scientists on campus, including Turnbull, was awarded a grant from the American Cancer Society to study cell growth that could potentially lead to a cure for cancer. Turnbull studied tree burls; abnormal growths somewhat akin to cancer. He used growth data extracted from trees and fish to mathematically model growth in competing cells. Ken advised 13 master’s and 9 PhD students.

In the 1960s, he and other College faculty were involved in the formative years of the Organization for Tropical Studies (OTS). Ken served as executive secretary to its director, Dean Bethel. Along with Stan Gessel, he helped develop the RFNRP in 1970. In the 1970s, he was the primary consultant to most major timber companies in the Pacific Northwest (and British Columbia), which included Weyerhaeuser; Crown Zellerbach; MacMillan Bloedel; Simpson Timber; Boise Cascade; Georgia Pacific Corp.; Pope and Talbot; the British Columbia Ministry of Forests; Pilchuck Farms; and native American tribes. His expertise was in constant demand internationally (in Canada, the UK, Europe, Scandinavia, Africa, South America, the Pacific Islands, Southeast Asia, Indonesia, Thailand, and Malaysia).

The Economist

Barney Dowdle (1928–2000), professor of forest economics, was born in Burlington, Washington. After spending time in the military during the Korean War, he completed his AA degree at Skagit Valley Junior College and then attended the UW, where he obtained his BS in forestry (logging engineering) in 1957. He received his MF (1958) and PhD (1962) from Yale University and then joined the College faculty in 1962, retiring in 1999 after serving for 37 years.

Professor Dowdle was a “character” and was well known for his strong ideas and forceful personality. He loved teaching, and his many courses included forest resources economics; economics in forest land use; outdoor recreation economics; forest products economics; forest finance and accounting; economics of timber production; and even logging engineering. Barney “challenged students to think critically and to form sound arguments in support of their beliefs,” according to Dean Emeritus Bruce Bare. He would constantly challenge their answers to his questions—always playing the devil’s advocate. One of his interesting teaching techniques was to ask the students at the beginning of the quarter what grade they would like and then test them at that level. You could take the A, B, C, or D test. If you took the A test but fell short, you got an F—it was “all or nothing.” He also allocated a certain number of minutes to students for office visits. They could take them all at once or eke them out through the quarter—in either case, he kept track of the time.

The focus of his research was the economic development of the softwood industry in the Pacific Northwest. He explored public policy, forest taxation methods, and optimal allocation of forestland to timber production, especially related to federal land-grant endowments. The role of federal versus private forests was a favorite topic. He also conducted research on the optimal level of manpower for forest fire suppression, the economics of Douglas-fir tussock moth control, and the economic burdens of forest harvest regulation. Internationally he conducted studies in Mexico, Canada, and India. He advised 11 master’s and 10 PhD students.
Barney was a strong believer in market demand economics. His views on privatizing the national forests were controversial, and he had his supporters and detractors. He believed that the US Forest Service should privatize intensive management on 20 percent of its lands to pay for all of the “multiple uses” on the national forests, as well to contribute profit back to the federal government. I remember listening to his congressional testimony on this subject on the radio in Anderson Hall, with faculty and staff gathered around. Once I asked him why he hadn’t invited researchers to present their views on sustained yield management, and not just market economics, at a meeting he was organizing on campus. He answered by asking, “Would you invite a person from the Flat Earth Society to a geological sciences meeting?”

The Geneticist

Reinhard “Reini” F. Stettler, professor of forest genetics, was a faculty member from 1963 to 1996 (37 years). He was born in Steckborn, Switzerland in 1929 and received a Diploma Forsting from ETH Zurich (Swiss Federal Institute of Technology) in 1955. Immediately after graduation he briefly attended the University of British Columbia. He was employed for a short while with the Canadian Forestry Service and then returned to Switzerland to work as a forester in Schaffhausen. I visited Schaffhausen in 2015—a delightful town and municipality in northern Switzerland—but only recently learned of Reini’s connection. Following his interest in plant genetics, he returned to North America and obtained his PhD in genetics in 1963 from the University of California, Berkeley, and joined the College faculty in the same year.

Professor Stettler was a remarkable teacher and was awarded the UW Distinguished Teaching Award in 1990. He taught many courses, including trees in our environment (with Linda Brubaker); dendrology/autecology (with Brubaker and Tom Hinckley); forest genetics; and a graduate seminar on current issues in forestry and forest research. Reini also contributed to the continuing professional education program and for 17 years ran the Silviculture Institute with Tom Hinckley. He described his teaching philosophy in the following words: “I have always been of the persuasion that teaching and research go hand in hand. Now there is an obsession with teaching, but it can’t come at the expense of research. If you are not in a research mode, you may accept too much information and not question it. Also, if you are a researcher, you can approach your course as an experiment. That keeps it exciting.” Reini strongly believed in the value of field trips. His one-week summer class included field trips into the Cascades, where the students camped out.

His initial research involved genetic variation of Douglas-fir; the genetics of response to N fertilization; the potential for haploid induction (a common strategy to create high-yielding plants by crossing two different inbred lines to obtain characteristics superior to each parent); and the possibility of using parthenogenesis (reproduction without fertilization).

He also studied the genetics of red alder, but his first love was poplar genetics. He had studied leaf variation in tomatoes, model plants for plant genetic research, for his PhD. At that time there was no model tree species. His research led to poplars being accepted as a model tree, and they were the first trees to have their genome mapped. Professor Stettler is world-renowned for his research on the native black cottonwood (Populus trichocarpa) and hybrids of black and eastern cottonwood (Populus trichocarpa x Populus deltoides). His hybrid poplar research was conducted in cooperation with scientists from WSU, Puyallup, particularly soil scientist Dr. Paul Heilman, and College faculty Tom Hinckley, Barbara Smit-Spinks, and Toby Bradshaw.

Trees resulting from these crosses were amazing, with huge leaves and incredibly fast growth. I remember the hybrid poplar plantations at Pack Forest, with their huge leaves almost 12 inches wide and long (see Fig. 8.16 left in Chapter 8). They could reach rotation age in 7 to 15 years and were particularly suitable for pulp and paper production, solid wood boards, and biofuels, particularly jet fuel. Many thousands of acres of hybrid poplars were planted in Washington, Oregon, and British Columbia, but their economic promise was not fulfilled, and unfortunately, susceptibility to rust disease was high. Although many of these plantations no longer exist, some are still in operation (e.g., Greenwood Resources in Oregon). Poplars continue to be used worldwide for windbreaks, lumber, and fuel. Reini also studied the establishment of black cottonwood in riparian zones and river gravels.
As well as working in Washington and other western states, Reini traveled globally in “poplar land” and conducted international projects in Armenia and China. Besides advising 14 master’s and 5 PhD students, he published several books, including *Cottonwood and the River of Time: On Trees, Evolution, and Society*. In the early 1970s, he voiced his growing concern about the possible effects of anthropogenic climate change.

**The Ecophysiologist**

_Thomas “Tom” Hinckley_, professor of forest physiology and ecology (ecophysiology), was born in 1944 in Washington, DC. He received his BA in biology from Carleton College in Minnesota in 1966 and his PhD in 1971 from the UW under Dave Scott. After graduation he spent nine years on the faculty at the University of Missouri and returned to the College as an associate professor in 1980. He was a member of the faculty until 2012 (32 years) and has continued to teach in retirement as an emeritus professor.

Tom has a very impressive record in teaching, research, outreach, and administration. He taught tree physiology, silvics (with Dave Scott), global change and forest biology (with Dave Peterson), and autecology (with Linda Brubaker and Reini Stettler). Field experience was integral to his teaching, as illustrated by his Spring Comes to the Cascades course. He was also very active in continuing education, and managed and taught courses in autecology for the Silviculture Institute program at Pack Forest with Reini Stettler (see Chapter 9). He also lectured in FLMP.

His research focused on the water and carbon physiology of trees and woody shrubs, and he advised 21 master’s and 27 PhD students (plus students at the University of Missouri). Many of his students occupy academic positions at other universities. Following the fire-bombing of Merrill Hall in 2000 (see Chapter 11), he shifted the focus of his teaching and research efforts. His new research with other faculty members involved studies of indigenous populations and their surrounding forest ecosystems, the impacts of historical and present policies on their use of these ecosystems, and whether their current practices are sustainable or not. From 2004 to 2011 he was the principal investigator on an NSF-funded IGERT (Integrative Graduate Education and Research Traineeship) grant to study “multinational collaborations on challenges to the environment.” This research was conducted both in China and in Washington State. Tom exposed his students to the forest management practices of the Yakama Indian Nation, and led classes to the Yakama Reservation. He has published widely, including chapters in the book *Biology of Populus*, coauthored with Reinhard Stettler, Paul Heilman, and Toby Bradshaw (Stettler et al. 1996). Tom also was a USDA competitive grants program manager, an associate editor and editorial advisory board member of several major scientific journals, and served on research panels for NSF, three USDA departments, the Environmental Protection Agency (EPA), and the Department of Energy (DOE). He holds an honorary degree from the Agricultural University of Vienna (1997).

Tom played a major role in the administration of the College. He was an acting dean from 1984–1985, while Dean Thorud was on leave; chair of the Ecosystems Division from 1997–2000; director of CUH (1999–2004); and interim director of SFR (2009–2012). In addition, he served as acting director for the UW Botanical Gardens after the passing of Sarah Reichard.

**The Recreationalists**

_C. Frank Brockman_ (1902–1985) served on the faculty from 1946 to 1967 (21 years) as professor of dendrology and recreational management of wildlands. He was born in Cincinnati, Ohio, and received a BS from Colorado State University in 1924 and an MS from the UW in forestry in 1931. Before joining the College faculty, he was a naturalist for the NPS in Mount Rainier and Yosemite National Parks—establishing information stations at historical locations throughout the parks. He also planned several museums for heavily visited areas. Brockman retired from the NPS in 1946 and became an associate professor in the College. McIntire (2001) provided a detailed history of his contributions to the NPS.
He taught a wide array of courses, including dendrology, survey of forestry, forest insect control, international concepts of nature conservation, wildlife management, and recreational use of forests. During his time at the College he advised four master's and two PhD students, including Grant Sharpe, who later joined the College faculty.

Brockman had a deep love of trees, and in 1968 he published a book entitled *Trees of North America: A Guide to Field Identification*. His “Tree of the Week” display still graces the hallway in Anderson Hall near the director's office. Perhaps his most lasting legacy is the Brockman Memorial Tree Tour, which was established on campus in 1980 and commemorates his contributions to the College and his passion for passing on knowledge of trees to the public. Some 480 different kinds of trees beautify the UW campus. Most are exotics—only 28 are native to Washington. The original tour included 81 of these trees but only 61 now. Their locations are available on line and can be enjoyed on your cell phone as you walk through campus. Clicking on a tree that appears on the map or on the tree list sends you to a brief description of the tree. (The tour is described in more detail in Chapter 9.)

Grant W. Sharpe (1925–2011), professor of outdoor recreation, served on the faculty from 1967 to 1990 (23 years). Professor Sharpe was born in Kentfield, California, but was raised in Washington State. In World War II he served in the US Navy in the South Pacific. Taking advantage of the GI Bill, he enrolled as an undergraduate in the College, choosing outdoor recreation as his major. He received all his degrees from the UW (BSF 1951, MS 1951, and PhD 1956). After receiving his PhD, he taught dendrology and fire management at the University of Michigan before moving back to the College in 1967 to assume a faculty position. He had great love for national parks and conducted his MS and PhD research in Glacier and Olympic National Parks. Grant also worked as a seasonal ranger-naturalist, initiating and upgrading interpretative programs in Glacier, Olympic, Shenandoah, Crater Lake, Acadia, and Mount Rainier National Parks. During his career he was involved in the construction of many interpretive trails and was particularly proud of the Hall of Mosses Trail in the Hoh Rain Forest of Olympic National Park. He also designed the Foster Island Trail in the Washington Park Arboretum.

Grant taught a wide array of courses, including recreational use of wildlands; principles of interpretation; regulation of recreational areas; field studies in outdoor recreation; introductory courses in outdoor recreation; environmentalism; management of recreational areas; and public relations and communication for resource managers.

He was a wonderful mentor to his graduate students and advised 61 master’s and 10 PhD students. Many of them worked in interpretive or managerial positions in parks and forests in North America and beyond. His research covered determination of recreational feasibility for sites in national parks, forests, and wildlife areas; use of interpretive tools (signs, listening posts, and slide presentations); recreational opportunities for the handicapped in wilderness areas; international tourism (forest recreation in Nigeria, visitors to Marina National Park in Argentina, and the role of parks in developing countries such as Lesotho); human contact with animals in urban parks; and pumice removal at Mount St. Helens.

Grant was a Golden Member of the SAF and a founding member of the National Association for Interpretation. He published 15 books (listed in Appendix B). Most were coauthored with his wife Wenonah (Nonie). They created flower guides for six national parks and collaborated on three college texts: *Introduction to Forestry, Environmental Interpretation*, and *Park Management* in various editions.

The Entomologist

Robert “Bob” I. Gara, professor of forest entomology, served on the faculty for 40 years (1968–2008). He was born in Santiago, Chile, in 1931 and came to Florida in 1941 with his family. Bob became interested in forestry in high school and decided to enroll in the forestry program at Utah State University, where he obtained his BS in 1953. While he was at Utah State, he spent the summers as a smokejumper for the US Forest Service at McCall, Idaho. From 1953–1957 he served as a navigator and electronics instructor in the US Air Force, and from 1958–1960 he was employed as a forester with Kirby Lumber Company in Texas. While there, he developed an interest in entomology, particularly bark beetles, and this led him to study at OSU, where he received his MS (1962) and PhD (1964) degrees.
in forest entomology. From 1963 to 1966 he was employed at the Boyce Thompson Institute Laboratory in Texas. He also served as an adjunct professor of forest entomology at Stephen F. Austin State University in Nacogdoches, Texas. This led to a faculty position in forest entomology at the State University of New York, College of Forestry, in Syracuse in 1966. But after just two years there he joined the UW CFR faculty.

Professor Gara was a wonderful, animated teacher who sprinkled humor through all his lectures. His stories were legendary and included a wonderful mixture of history, entomology, biology, and ecology. He taught a variety of courses, including forest entomology, forest biology, pesticides in the environment, introduction to forestry, forest health and protection (with Edmonds and Agee), urban plant protection (with Edmonds), and international silviculture. It was truly a pleasure to teach with him. Many of his courses involved field trips, especially to eastern Washington, with its many insect problems.

His research was wide-ranging, covering bark beetles (Douglas-fir and mountain pine beetles), defoliators (spruce budworm and Douglas-fir tussock moth), Sitka spruce weevil, Dutch elm disease, arthropods on Mount St. Helens, insects in dead and dying Douglas-fir, and even aquatic ecology—ship worms and insects associated with salmon carcasses. Many of his students conducted research in Latin America (Costa Rica, Chile, and Venezuela). Altogether he advised 56 master's and 25 PhD students, second only to Dave Scott. Bob spoke fluent Spanish and was very active in consulting and teaching outreach classes in Latin America. After retirement he continued teaching and advising graduate students in the College as an emeritus professor and taught community classes in Anacortes, Washington, where he retired.

The Wildlife Scientist

Richard "Dick" Taber (1921–2016), professor of wildlife science, was a California native and received an AB from the University of California, Berkeley, in 1942. Soon after graduation he enlisted in the US Marine Corps in World War II and served in the Pacific. Following his discharge, he applied to graduate school at the University of Wisconsin, where he was a student of Aldo Leopold, the father of the College's Adjunct Professor Estella Leopold. Unfortunately, before Dick finished his MS, Leopold died, so he completed his degree in 1949 under another professor. He then earned a PhD in 1951 at the University of California, Berkeley, under Aldo Leopold's son, A. Starker Leopold. In 1955, he was appointed to the faculty at the University of Montana, and in 1968 he moved to the UW to start the Wildlife Science program in cooperation with faculty in the College of Fisheries. He retired in 1985 after serving 27 years in the College.

Dick taught survey of wildlife ecology and conservation; human culture and wildlife conservation; and biology and conservation of mammals. Although his primary research interest was in ungulate ecology, he studied a wide variety of animals, both terrestrial and aquatic, including elk, deer, foxes, small mammals, orcas and otters, and even invertebrates (banana slugs). I remember the big walk-in freezer in the basement of Winkenwerder, where large research animals were stored. His research program involved 30 master's and 13 PhD students. He received numerous professional awards. Perhaps his most precious award was the Aldo Leopold Award in 2008, the highest award presented by The Wildlife Society.

The Social Scientists

Gordon Bradley, professor of forest land use, conservation planning, and urban forestry, held a faculty position from 1972 to 2014 (42 years). Professor Bradley was born in Bellingham, Washington, but spent most of his formative years in Sacramento, California. He received a BS in landscape architecture from California Polytechnic University (1969), a Master of Landscape Architecture from the University California, Berkeley (1972), and a PhD in urban, technological, and environmental planning from the University of Michigan (1976). He taught many courses, including field studies in outdoor recreation (with Grant Sharpe); outdoor recreation planning; forest recreation policy, law and planning (with Ann Forest Burns); introduction to forest resources management (with Bob Lee); and environmental impact assessment and regulation in forest resources management (with Tom Waggener). Field
trips were a feature of his classes. One of them involved a trip through Yellowstone, the Tetons, Jackson Hole, and Hells Canyon.

Gordon’s research interests also spanned a wide range of topics, including environmental policy, land-use planning, urban ecology and urban forestry, the urban-forest interface, forest land use conversion, visual resource management on forest lands, and social impacts of wildlife recovery.

One of his most rewarding experiences was serving as principal investigator for the urban ecology NSF-IGERT. This grant allowed him and several colleagues, including Professors Clare Ryan and John Marzluff, to work and travel internationally with doctoral students to address pressing environmental issues. Gordon advised 62 master’s and 4 PhD students, who took positions in Washington, Alaska, Thailand, Wyoming, and California.

He spent time as a division chair and faculty chair after the divisions were dissolved. He was responsible for College planning, especially faculty hiring. Gordon advised and consulted widely in both the public and private sectors, including city, county, state, and federal agencies, timber companies across the region, and nonprofits such as Forterra and the Mountains to Sound Greenway Trust.

Robert “Bob” G. Lee was professor of forest sociology and served on the faculty for 30 years (1978–2008). He is a native Californian born in Deer Park, just north of San Francisco. After receiving a BS in forestry from the University of California at Berkeley in 1964, he worked as the forest manager for Rockport Redwood Company. In 1969 he earned an MFS from Yale’s School of Forestry and Environmental Studies. Bob then returned to California and in 1970–1972 was a research sociologist for the NPS in San Francisco. He earned a PhD in 1973 from UC Berkeley, studying sociology, anthropology, ecology, and outdoor recreation. After graduation he served as an assistant professor of forestry and assistant resource sociologist in the USDA Agricultural Experiment Station located in the College of Natural Resources at UC Berkeley before joining the College faculty.

When Bob arrived at the College, forest sociology was a new intellectual field; today, it is now an integral part of SEFS. His courses included natural resources sociology; social functions of forest ecosystems; sociology of leisure and wildland recreation; human ecology and forest ecosystems; and management of wildland recreation and amenities. In the summers he taught a class on forestry in Washington for education majors and teachers, and in retirement he offered a course for teachers at the ONRC.

Bob conducted research on tourism, rural development, the sociology of native populations, and social conflicts associated with forest management—particularly the influence of spotted owl protection on logging operations and sawmills. His research was conducted in a number of western states (Washington, New Mexico, and Alaska) as well as in Africa, Australia, China, Costa Rica, India, Japan, and Mexico. Bob supervised 19 master’s and 12 PhD students. He also held a number of administrative positions in the College, including chair of the division of forest resource management (1983–1988) and associate dean for academic affairs (1994–1997).

Bob’s views on the spotted owl controversy of the 1990s conflicted with those of many of his fellow faculty members as well as some agency personnel. He predicted that timber-dependent communities would be completely devastated by the Forest Service’s Northwest Forest Plan. Complete devastation did not occur, but certainly these communities were impacted—timber jobs were lost and their economies were radically altered.

Adjunct and Joint Faculty

Many UW adjunct and joint faculty have contributed to the College, including Joseph Ammirati (Biology), Douglas Chapman (fisheries), Erica Cline (UW Tacoma), Loveday Conquest (fisheries/statistics), Vincent Gallucci (fisheries), Warren Gold (UW Bothell), Christian Grue (fisheries), Stevan Harrell (anthropology), Richard Horner (civil and environmental engineering), Jens Jorgensen (engineering), Estella Leopold (biology/quaternary research center), Peter Kahn (psychology), Joseph McCarthy (chemistry), Jeffrey Richey (oceanography), Iain Robertson (landscape architecture), Roger Rosenblatt (health sciences), John Skalski (fisheries/statistics), Glenn Van Blaricom (oceanography), Elizabeth Van Volkenburgh (biology), and Robert Wisssmar (fisheries). One who deserves special mention is Richard “Dick” Walker (botany and biology). He worked closely with Stan Gessel, David Scott, Dale Cole, and Leo Fritschen.
The Staff

Many administrators, office staff, student advisors, librarians, research staff, computer technicians, field assistants, gardeners, and horticulturalists were invaluable to the functioning of the College. There have been hundreds of staff members—typically two or three times the number of faculty. Unfortunately, I can pay tribute here to just a few of them. Below are my memories of some of the staff with whom I worked.

The forestry library was a focal point in the College before the computer revolution, document digitization, and the availability of so much information on the internet. In 1948 the library was moved from its inadequate facility upstairs in Anderson Hall to the east side of the ground floor of Anderson, in the area now occupied by classrooms 108 and 109 and several other rooms. In 1969 it moved to a much larger space in the basement of Bloedel Hall. Unfortunately, the forestry library was closed in 2004 and the collection was moved to the Allen Library, as a result of University budget cuts and the need for more efficiency in the library system.

The forestry librarians provided great assistance to students, faculty, other staff, and forestry researchers outside the University. They were your friends. I have strong personal memories of Bernice (Bea) Smith, who was the librarian when I first arrived at the College, Barbara Gordon, Margaret Hinshaw, and the last librarian located in the College, Carol Green. They were so pleasant and helpful. The faculty, students, and staff at CUH are lucky today to have the Elisabeth Miller Library on site.

Staff administrators at the College, such as Frank Fisher, Steve Archie, and Beverly Anderson, also provided invaluable service. The dean's secretary and division secretaries were well known because the faculty interacted with them so much. The offices in Winkenwerder, Bloedel, and Anderson Halls were busy places where faculty would interact, get their typing done, arrange for meetings, receive visitors, get copies of documents on the copy machine, and stop in for coffee. Lynn Catlett, who was employed in the Ecosystems Division office in Winkenwerder Hall, was a joy to work with—she was awarded the UW Distinguished Staff award in 1999. These offices no longer exist, and the buzz of activity has gone. With the advent of word processors, office typists were not needed. All our typing, particularly of large documents, was then done in the word processing office, located on the second floor of Anderson Hall. Margaret Lahde was one of several helpful word processors there.

The research staff was indispensable. Among them was Bob Gonyea, who may have had the longest tenure of all College employees, and was the reason the measurement of the hundreds of RFNRP field plots, started in the 1970s under Stan Gessel, went so smoothly. The staff who ran the shops in Bloedel—Dick Hinshaw (electrical shop), Steve Harmon (wood shop), and Wayne Hughes (metal shop)—also contributed greatly to the College’s research efforts. Student services deserves particular mention, especially directors Cherie Renfrow-Starry and Michelle Trudeau and staff member David Cameron. Staff have been essential to the smooth functioning of the accounting, development, continuing education, and outreach offices, information technology (IT), CINTRAFORE, and the Washington Pulp and Paper Institute. They have also been essential to the smooth operation of the UW Botanical Gardens (Fred Hoyt), Pack Forest (Stan Humann), the ONRC (John Calhoun and Ellen Matheny), and the canopy crane (David Shaw and Ken Bible).
CHAPTER 6
THE STUDENTS AND ALUMNI

Introduction

Thousands of students have walked the halls of Anderson, Winkenwerder, Bloedel, and Merrill Halls over the years since the School of Forestry was established in 1907. Not all pursued forestry-related careers, but their science education served them well. Lack of employment in forestry is usually due to forestry jobs being hard to find, better opportunities in other fields, changes in the needs of forest industry and government agencies, and other factors. Also, the types of available jobs have changed with time. Some positions are in areas that did not exist even a decade ago. Forest management and logging engineering jobs used to be readily available, but as the field of forestry changed, the need for these jobs has lessened. Forest engineering is no longer offered, and there are very few students graduating in forest management.

Most of the early undergraduates obtained employment in private forest industry or with government agencies such as the US Forest Service. They now have a much wider range of employment opportunities, not only with the forest industry and government agencies such as the Forest and National Park Services, but also with other federal, state, and local agencies, consulting firms, nonprofits, international organizations, and even in foreign countries.

Of the undergraduate students who obtained their degrees between 2014 and 2016, only 32.5 percent had found jobs related to their education at the time of graduation, but most were actively looking for jobs. Many decided to broaden their horizons by traveling overseas before they undertook their first jobs. Graduate students had higher percentages of employment at graduation: MS, 43.6; MEH (Master of Environmental Horticulture), 42.9; MFR, 60.0; and PhD, 64.3 percent.

Below I write about the students—their backgrounds, the makeup of the student body, what attracted them to the College, student organizations (e.g., the Forest Club and Xi Sigma Pi), graduation, and, finally, the careers of alums.

Student Backgrounds

The backgrounds of undergraduate students have changed over time. Early undergrads tended to have a more rural upbringing, while current students tend to be more urban. This largely reflects the change in demographics of the US from a predominantly rural society before the twentieth century to an urban service-oriented economy today. In 1900, about 61 percent of the US population was rural, while the urban population was just 39 percent. Just a decade later, in 1910, the urban population was 52 percent and the rural had declined to 48 percent. This changed little until after World War II, but then the gap steadily widened, so that by 2000, 82 percent of the population was urban and only 18 percent lived in rural areas—proportions are similar today.

Most of the College’s early undergraduate students hailed from Washington State, often from families connected to the forest industry, whereas today students come from many states and foreign countries. In 1999, undergrads came from 22 states, although the majority were still from Washington (79.6 percent) and three other western states—California (5.6 percent), Oregon (5.3 percent), and Idaho (1.5 percent).

Graduate students have also mostly come from the US, but 54 other countries are represented—a testimony to the worldwide reputation of the College. These countries are: Albania, Argentina, Australia, Austria, Bangladesh, Belgium, Belize, Brazil, Burma (Myanmar), Bulgaria, Canada, Chile, China, Colombia, Congo, Costa Rica, Czechoslovakia (Czech Republic), Ecuador, Ethiopia (Eritrea), Finland, France, Germany, Ghana, Honduras, Hungary, India, Indonesia, Iran, Italy, Japan, Malaysia, Mexico, Nepal, Netherlands, New Zealand, Nicaragua, Nigeria, Pakistan, Peru, Philippines, Poland, Russia, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Togo, Uganda, United Kingdom (England and Scotland), Venezuela, and Vietnam.
The Makeup of the Student Body

For most of the history of the College, the majority of undergraduate students were male and Caucasian. Only a few women enrolled before the 1960s. The first degree awarded to a woman, Estella Grace Dodge, was an MF, in 1924. Her thesis title was “The significance of spiral fission in the middle lamella in the prosenchymatous tracheids of Douglas-fir with special reference to shrinkage.” In 1948, 24 years later, a second woman, Ellen Lois Johnson, was awarded a bachelor’s degree. Before the 1960s women were actively discouraged by forestry faculty, and it wasn’t until the late 1960s that they began to be accepted in the field. (The story was similar in Australia; see Underwood 2017.) I believe the first forestry female undergraduate in the 1960s was Lois Kelly (BSF 1968), who went on to receive an MA in economics at the UW in 1971. The enrollment of undergraduate and graduate women steadily increased after that—it was 35 percent in 1990, and rose to 50 percent in 2011, 53.4 percent in 2014, and 63 percent in 2018.

The whole forestry student body is now more diverse (African American, Asian-American, Caucasian, Hawai’ian/ Pacific Islander, Hispanic, native American, and two or more races/ethnicities). Caucasians still make up the majority, but only 57 percent in 2018 compared to 85 percent in 1995. Minority enrollment increased from < 10 percent in 1990 to 32 percent in 2018. The increase largely resulted from decreasing Caucasian enrollments and increasing Asian-American (13.7 percent), Hispanic (6.9 percent), and two or more races or ethnicities (8.2 percent) enrollments. African-American, Hawai’ian/ Pacific Islander, and native American enrollments were small (generally < 2 percent for each). Recently, a committee was established to examine diversity, equity and inclusivity of students. More on student enrollments is presented in Chapter 7.

Figures 6.1–6.4 show undergraduate students in 1914, 1926, the 1950s, and 2012, while Figure 6.5 shows graduate students in 2007.

![Fig. 6.1. Class of 1914. Henry Schmitz is second from right at the back; note lots of hats and caps](Source: UW School of Environmental and Forest Sciences).

![Fig. 6.2. Class of 1926 in front of Anderson Hall](Source: UW School of Environmental and Forest Sciences).
Fig. 6.3. Undergraduate students at Pack Forest in 1950 (Source: UW School of Environmental and Forest Sciences).

Fig. 6.4. Undergraduate students in my Forest Ecosystems Class, at Snoqualmie Pass in 2012. Steve West, my faculty colleague in Wildlife Science, is on the far right. Note the large proportion of women students—85 percent.

Fig. 6.5. The incoming 2007 graduate student cohort at their orientation at Pack Forest—53 percent female and 47 percent male.
What Attracted Students to the UW College of Forestry?

It is interesting to ponder why students go into the field of forestry. Those from rural areas usually had family members working in forestry, while those with urban backgrounds were drawn in after taking trips to the forests and mountains as children with their parents. I am not exactly sure why I went into forestry. As a youth I spent a great deal of time in a greenbelt near my home in the Sydney suburb where I grew up. It was comprised of an eucalypt forest through which a small stream meandered. When thoughts of university rolled around, I pondered agriculture, but in the long run chose forestry because of my youthful experiences and the fact that my family knew the head of the New South Wales Forestry Commission.

Many factors have been involved in the decisions of students to enroll in the College, including: the quality of education; the outstanding faculty; love of the Pacific Northwest and its mountains and forests; a desire to work outdoors; offerings in urban horticulture and urban forestry; financial considerations (scholarships, the GI Bill, US Forest Service Cooperative Education Program aid); family members who had careers in forestry and natural resources; ability to switch from other majors to forestry; contact with faculty members; and preparation for careers such as forester or park ranger. For graduate students, the promise of research and teaching assistantships and exciting research opportunities were additional draws.

After World War II, many of our students were returning war veterans who were able to take advantage of the Servicemen’s Readjustment Act of 1944—informally known as the GI Bill—which provided benefits for millions of returning veterans. These included low-cost mortgages; low-interest loans to start businesses; tuition and living expenses to attend university or obtain other education; and unemployment compensation. The bill was signed into law by President Franklin D. Roosevelt, who saw it as a means of thwarting looming social and economic crises (e.g., a great depression), as well as providing personal benefits. After the war there was great concern there would not be enough jobs for returning veterans. Before the war, college attendance was generally an unreachable dream for the average American. But thanks to the GI Bill, many veterans who would otherwise have flooded the job market opted for education. In 1947, veterans accounted for 49 percent of college admissions. By the time the original GI Bill ended on July 25, 1956, 7.8 million of the 16 million World War II veterans had participated in some form of education or training (benefits.va.gov/gibill/history.asp).

The benefits of the GI Bill have been reduced slowly over time. In the original GI Bill, veterans received up to $500 a year for college tuition and other educational costs. Tuition at the UW in 1945 was only $22.50 per quarter, so the GI Bill easily covered education expenses with money left over. The success of the 1944 GI Bill prompted the government to offer similar measures to later generations of veterans. The Veteran’s Adjustment Act of 1952 offered benefits to veterans of the Korean War, but they did not receive the same unemployment benefits. Veterans received a fixed monthly sum of $110, which they used to pay for their tuition, fees, books, and living expenses. Tuition at the UW was just $25 per quarter in 1955. The monthly stipend provided sufficient education funds for most Korean War veterans. By the end of the program on January 31, 1965, approximately 2.4 million of 5.5 million eligible veterans had used their benefits. Roughly 1.2 million veterans used it for higher education.

The next version of the GI bill was the Veterans Readjustment Benefits Act of 1966, which extended benefits to veterans who served during times of both war and peace, including those who participated in the Vietnam War. It was signed into law by President Lyndon B. Johnson on March 3, 1966. This act, however, did not provide the same educational opportunities as its World War II and Korean War predecessors. Initially, single veterans received only $100 a month with which to pay tuition and all their expenses. Most found this amount sufficient only for books and minor fees and not enough to live on or attend college full time. Consequently, during the early years of the program, only about 25 percent of Vietnam veterans used their education benefits. In 1967, benefits were raised to $130 a month, and they increased to $311 by 1977 (https://en.wikipedia.org/wiki/GI_Bill).

Affordable UW tuition used to be a strong drawing card. In-state undergraduate tuition in 1967 was only $115 per quarter. Ten years later, in 1977, undergraduate tuition was $188 and graduate tuition was $208 per quarter. Since then tuition has risen rapidly, and in 2019 undergraduate and graduate tuitions and fees were $3,735 and $6,284 per quarter, respectively. Tuition for out-of-state students is much higher. Graduate students who are
awarded research or teaching assistantships are fortunate because their tuition is paid and they receive a monthly allowance. Today, many students not receiving assistantships or scholarships have to take out loans to pay for their education, saddling themselves with debt that takes years or even decades to repay.

**Student Organizations**

Student organizations include the Forest Club, Xi Sigma Pi, Tau Phi Delta, the SAF UW student chapter, International Forestry Students Association, the Wildlife Club, the UW TAPPI chapter, the Society for Ecological Restoration, the UW Geospatial Club, and the Dead Elk Society. Some, such as the Forest Club and Xi Sigma Pi, date back to the formation of the College. Most have faculty advisors and are designed to foster social interactions and promote science among students through meetings, seminars, and sponsorships to attend conferences. Some organizations expose students to employment opportunities. A forestry fraternity, Tau Phi Delta was initiated in 1923 but ceased operation in 1970.

**Forest Club**

The Forest Club was formed in 1908 to promote social interactions among students (both graduate and undergraduate) in the College. In the early days, officers of the Forest Club worked intensively to bring the College into close touch with the lumber industry. The *Forest Club Quarterly* was published from 1922 to 1951, and included articles about forest management written by the dean, faculty, and industry employees. The first office of the Forest Club was the “old wireless shack,” which was presumably used by a ham radio club. The shack was moved on a Sunday in 1916 from Denny Field to a position next to the Good Roads Building where the College of Forestry was located. The move on a Sunday was considered by some as a desecration of the sabbath.

Over time the Forest Club sponsored many events, of which the most infamous was Garb Day. The term “garb” refers to informal clothing. Students used to come to school in more formal clothes than they do now, and Garb Day allowed them to relax and dress informally for a week. This annual celebration featured a variety of logging sports, including log sawing (using crosscut saws and chainsaws), log chopping, axe throwing, tree climbing, and log rolling. Log rolling was conducted in the Frosh Pond, where would-be woodsmen got frequent dunkings trying to stay atop spinning logs (Fig. 6.6).

![Fig. 6.6. College of Forestry students competing in a log-rolling contest in the Frosh Pond for Garb Day, November 7, 1957 (Source: UW Libraries, Special Collections, Neg. # NIS (11) 5030B).](image)

Garb Day received many mentions in the *Seattle Times*, including this one in the November 15, 1946 issue of the paper:
When a 60-foot tree crashed to the ground on the UW campus this forenoon, Dr. Raymond B. Allen, President of the University, dashed from his office to see what the commotion was all about. Students quickly assured Dr. Allen that everything was in order—bearded forestry students, clad in woodsmen's clothing, merely were celebrating their traditional Garb Day and the first event on the program was falling a tree outside of the President's office. This is great stuff, Dr. Allen declared as he watched Wallace Pesznecker and Robert Powell pull a cross-cut saw through an 18-inch log in a double bucking contest. Pesznecker, 22-years old, of Vancouver, Washington, and Powell, 23, from Lake Forest Park, had difficulty getting their saw through the tough, damp wood.

I am a bit skeptical about this story. One could certainly not get a permit to drop a tree like this on campus today. All male forestry students were required to grow beards for the event, but Montgomery Johnson, a forestry senior, felt that he could not wear a beard in his capacity as ASUW President. According to the Forest Club newsletter, "Johnson was tossed into Frosh Pond both yesterday and today as ‘punishment’ for failure to observe the whisker regulation." The event culminated in the “Loggers Brawl” dance in Anderson Hall—students participated attired in “tin” pants, flannel shirts, and red hats. A Timber Queen was also crowned.

Professor Dale Cole provided a report on the 1954 Garb Day events when he was an undergraduate student in the College. His recommendations for future Garb Days were: discontinue the power saw demonstrations—not appropriate for campus; do not let down on the publicity—we had very large crowds due to the wide and intensive publicity; and the evening Logger’s Brawl dance should be the climax of the day's celebration, not the anticlimax. I can remember a loud souped-up chainsaw demonstration on Rainier Vista in the 1980s, so apparently the Forest Club that year had not read Cole's first recommendation.

Garb Day was held on campus until the 1970s, when it was moved to Pack Forest, having been deemed unsuitable as a campus activity, mostly for safety reasons. However, it occasionally reappeared on campus after that—one in the 1980s that I mentioned above and another in 2000 which featured a logging sports demonstration as well as a forestry open house. Today, Garb Day is no longer conducted formally, but students participate in log rolling and sawing, axe throwing, tree climbing, and tug-of-wars as a social event at Pack Forest.

For many years the College had a logging sports team that competed in the annual association of western forest club’s conclave, but it was disbanded in the early 1970s. However, during the 1996–1997 academic year, a small group of forest management students, including women, competed at the fifty-eighth annual conclave, where they finished dead last. To get more students involved in the sport, they won the bid to host the conclave the following year and raised more than $20,000 to construct competition grounds at Pack Forest for the event. That year the College finished second to Flathead Community College in Montana, where logging sports is a fully funded varsity sport. Dean Bare provided financial support to the logging sports team, some of which was used to hire a professional coach. I believe it had ceased to exist by 2005–2006.

The Forest Club Room (223 Anderson Hall; see Fig. 10.12 right, in Chapter 10) is widely used for seminars and symposia, such as the annual Graduate Student Symposium, social events, as well for studying. Interestingly, this is the only room on campus specifically allocated to undergraduate students. In recent years an annual holiday tree sale has been conducted by the Forest Club as a fundraiser.

**Xi Sigma Pi**

Xi Sigma Pi, a national forestry honorary society, was founded at the UW on November 24, 1908. The Xi Sigma Pi logo is shown in Fig. 6.7. Forty chapters have now been established at other forestry schools. The objectives of Xi Sigma Pi are to secure and maintain a high standard of scholarship in forestry education, to work for the improvement of the forestry profession, and to promote a fraternal spirit among those engaged in activities related to the forest. To be eligible for membership, students must be at least juniors or graduate students, have a 3.00
grade point or better, and show an interest in school activities. Xi Sigma Pi now honors the academic achievements of students in SEFS.

In the early days of Xi Sigma Pi, activities included encouraging participation in the school essay contest, cleanup of school equipment and supplies, attending banquets honoring new members, and selection of the outstanding freshman. One of the highlights of Xi Sigma Pi’s school year was the initiation of new members. This used to involve wearing woods clothes for a week, making a plaque from a cross section of an assigned tree species, and providing a luncheon with entertainment for members. At the initiation, members solemnly informed new members what Xi, Sigma, and Pi represented.

The top and bottom surfaces of my initiation plaque—made from a cross section of a western hemlock stem—are shown in Fig. 6.8. New members were required to obtain ten signatures from current members. My disc includes signatures from faculty members (Reini Stettler, Ben Jayne and Harvey Erickson), former dean Gordon Marckworth, and several students, including Lois Kelly. Most new members now produce artwork of their favorite trees, although some still gather signatures on stem cross sections.

**Fig. 6.8. Left: Top surface of my Xi Sigma Pi initiation plaque made from a western hemlock stem. Right: Bottom surface.**

**Tau Phi Delta**

In 1921–1922 several students in the College established a non-fraternity boarding house—Washington Forestry House—limited to men in the College of Forestry, to enable them to form strong bonds with other forestry students.

On April 16, 1923 they founded the alpha chapter of the Washington Tau Phi fraternity. Immediately following its organization, Tau Phi negotiated with the alpha chapter of Kappa Phi Delta (a forestry fraternity located at Pennsylvania State College) to merge into a national society. In 1924 the charter of Tau Phi Delta—a combination
of both names—was drawn up. The Washington chapter occupied a house at 4616 21st Ave NE, before moving to its final location at 1616 NE 50th St. (Fig. 6.9). The Tau Phi Delta chapter at the UW ceased to operate in 1970, but the Pennsylvania State University chapter is still functioning, with bonding activities based on hunting and fishing.

![Fig. 6.9. Tau Phi Delta Forestry Fraternity, now Alpha Xi Delta Sorority, at 1616 NE 50th St., Seattle.](image)

To advance their chosen profession, the fraternity brothers strove to keep their scholastic standing high, support the Forest Club, participate in house activities, and maintain a high standard of efficiency and ethics after graduation. Tau Phi Delta ranked high in the scholarship standings of organized living groups on campus and won the Inter-Fraternity Mothers Club Perpetual Trophy for high scholarship. Members participated in speaking programs and athletics and ran tree-farm tours.

The saying “All work and no play make foresters dull boys” was heeded by members of the fraternity. The brothers took studying seriously, but a good percentage of time was taken up with parties, homecoming, winter formals, exchanges, picnics, and other get-togethers throughout the school year. Each new student was issued a pledge manual containing strict rules: No profanity, respect kitchen and dining room rules, follow house study hours (7:30–10:30 p.m. Sunday to Thursday), and learn how to answer the telephone. (It was to be answered “Good evening, Tau Delta Phi Fraternity.”) The phone had to be answered by the end of the third ring.

**Society of American Foresters UW Student Chapter**

The mission of the UW SAF Student Chapter, which is affiliated with the national SAF, is to promote the practice of sound forestry and to provide forestry outreach to the UW community. After having been defunct for several decades, the UW chapter was officially reinstated by a small group of graduate students in August 2000 and continues. It hosts events such as the Natural Resources Career Fair.

**International Forestry Students Association**

The UW chapter of the International Forestry Students Association (IFSA) is one of many chapters worldwide. IFSA was founded in 1973 and is headquartered in Freiberg, Germany. It is the world’s largest student-run nonprofit organization engaged in sustainable development. As the youth voice for the United Nations, its mission is to engage students in environmental issues on the international level, ranging from policy and economics to science and education. The UW chapter sponsors Earth Week activities, publication workshops, alumni networking, and movie screenings on worldwide restoration activities. The chapter has also conducted field trips for students from other student chapters in Canada and the US.
UW Student Chapter of the Wildlife Society

The UW Wildlife Society student chapter was founded in 1937 to inspire and enable wildlife professionals to sustain wildlife populations and habitats through science-based management and conservation. It provides activities and events that focus on wildlife issues, especially wildlife conservation.

Student Chapter of the Technical Association of the Pulp and Paper Industry

The UW student chapter of the Technical Association of the Pulp and Paper Industry (TAPPI) was chartered on October 22, 1974. In the US and Canada there are 139 student TAPPI chapters. The UW chapter holds on-campus events and assists students in attending the annual TAPPI conference. One of their most interesting events is the holiday paper fundraiser.

The Society for Ecological Restoration Student Guild

One of the College’s graduate students, Lauren Urgensen, founded the first student guild of the Society for Ecological Restoration (SERUW) in the nation in 2008. The guild brings together UW students with a common interest in the science and practice of ecological restoration, and fosters the sustainability of plant biodiversity on the UW campus.

The UW Geospatial Club

The UW Geospatial Club was founded in 2007 and focuses on promoting geospatial sciences and technology at the UW. It advances knowledge to improve the understanding of mapping sciences and promotes the responsible applications of photogrammetry, remote sensing, geographic information systems (GIS), drone/UAS (Unmanned Aircraft System) use, and other geospatial technologies. Most of the students who participate are from SEFS.

Dead Elk Society

The Dead Elk Society is a social graduate student organization, but faculty and undergraduates are invited to participate. It serves as a mixing environment for students and holds public lectures covering topics such as eating on the wild side, life on the conservation front line, and Earth Day.

Graduation

Graduating students may participate in two graduation ceremonies—the large UW commencement ceremony, typically held in Husky Stadium on the Saturday after exam week each June, and a smaller, more intimate ceremony for forestry students conducted on the preceding Friday. The forestry ceremony has been held in a variety of locations on campus and is now held in Kane Hall. Speakers have included representatives from industry, private companies, and state government, as well as alumni, deans and faculty. From 2005–2017 the speakers in chronological order were Cassie Phillips (Weyerhaeuser); Curt Smitt (ex–State Fish and Wildlife Department, USFWS, and consultant); Nalini Nadkarni (Evergreen State College and University of Utah); Roger Hosterey (‘80) (Trust for Public Land); James Agee (faculty); Janet Wainwright (‘75) (private company); Lisa Graumlich (‘85) (Dean, College of the Environment); Robert Edmonds (‘68, ‘71) (faculty); Thomas Maness (‘85) (Dean College of Forestry, OSU); E. David Ford (faculty); Melody Mobley (‘79) (US Forest Service); Philip Rigdon (‘96) (Yakama Tribe); Brian Kertson (‘10) (Washington State Department of Fish and Wildlife); and Julie Combs (‘05, ‘11) (ecological consultant). Graduating undergrad and graduate students chosen by their peers also speak about their experiences.
Students participating in the forestry graduation are not required to wear caps and gowns, but those attending the University ceremony do wear them (Fig. 6.10). A large number of our faculty have participated in the ceremony over the years. I participated for more than 30 years.

Before 2000, the UW commencement ceremony was held in the Hec Edmundson Pavilion. In 2000 it was moved to Husky Stadium. Before 1990, the commencement speaker was the University president, but after that well-known personalities from outside the university were invited, including Madeleine Albright (Secretary of State); Steve Ballmer (CEO Microsoft); Tom Brokaw (TV news journalist, NBC Nightly News); Norman Dicks (US representative for Washington’s sixth district); Robert Gates (Secretary of Defense), William H. Gates, Sr. (attorney and philanthropist); Christine Gregoire (Washington State Governor); Jon Huntsman (US Ambassador to Russia); Lisa Jackson (EPA administrator); Sally Jewel (Secretary of the Interior); Quincy Jones (musician); Kathleen Sebelius (Secretary of Health and Human Services); William Ruckelshaus (EPA administrator, FBI director, US deputy attorney general, and Weyerhaeuser Company), Robert Rubin (Secretary of the Treasury), and others.

Alumni Careers

In 2013 and 2014, more than fifty undergraduate and graduate alums provided me with stories about their careers. I have selected some of their stories to tell here, in chronological order.

Undergraduate Alums

The story of Patrick “Pat” J. Cummins (BSF 1950, Forest Management) is typical of the forest management graduates in the 1950s. He was born in 1926 and raised in a middle-class family near Ravenna Park in Seattle, just north of campus. His father loved to take the family for walks in Ravenna Park and on vacations to Mount Rainier National Park. As a high school student, Pat worked one summer as a firefighter for the State of Washington. He was later employed in Olympic National Park as a fire guard, fire crew foreman, and temporary ranger. Becoming a permanent park ranger was his goal, and though he never became one, he did have a long career in forestry.

Pat was hired initially by the Weyerhaeuser Timber Company, where he cruised old-growth forests east of Enumclaw, Washington. Many of our graduates started their careers as timber cruisers. In 1967 Pat left
Robert L. Edmonds

Weyerhaeuser and founded the Forest Technology Program at Green River Community College in Auburn, Washington, where he taught hundreds of students over the 24 years he was on the faculty. He was very active in the South Puget Sound Chapter of the SAF and served two terms as chapter chair. In 1991 he was elected Washington State SAF chair and became an SAF Fellow. He was also active in College affairs and served as alumni chair. Pat participated in my oral history project. His interview can be heard on ResearchWorks (see Appendix A.)

Matthew C. “Chuck” MacLearnberry earned a BSF in logging engineering in 1959. Logging engineers were in demand in the 1950s, although their enrollment numbers in the College were always much lower than those in forest management. His stepfather owned a string of logging trucks, and partly as a result of riding with him, Chuck developed a love for the woods. After graduating from high school in 1953, he volunteered for the Korean War. On his return he was able to get assistance from the GI Bill and entered the UW in the fall of 1955. He did not have a long career in logging engineering but was employed by Pope and Talbot for a period as a staff engineer. The College’s logging engineering curriculum included a course on the survey of public lands, which led him to obtain a professional land surveyor's license. At the end of 1976 he left Pope and Talbot and started his own land surveying and engineering company. He retired in 2009. Like many of the graduates of the time, he felt that turning vast areas of our national forests into wilderness areas available for only recreational uses was not proper forest management.

C. M. Hotes (BSF 1953, Logging Engineering) used his engineering education to manage the design, production, and testing of complex machinery for laying deep-sea cables and oil production. Hotes is an example of students who used their logging engineering degrees to pursue careers unrelated to forestry. He was also involved in the recovery of the Soviet atomic submarine K-129, which was lost in March 1968 at a depth of 19,000 feet in the Pacific Ocean. The US Navy had built the USNS Hughes Glomar Explorer for this type of purpose.

Stanley “Stan” Humann (BSF 1961, Forest Management) had a distinctly rural background. He was born in Enumclaw, Washington, in 1937 and grew up in Franklin, a coal-mining town northeast of Enumclaw. As a youth his family moved a lot. His father was a logging contractor who cut mine props; in the summers he spent time logging in eastern Washington, but couldn’t find permanent work in Ellensburg and decided to move his family to North Dakota. They then moved back to Cumberland, Washington—an abandoned mining town. His father eventually bought an 80-acre farm near Naches in eastern Washington, where Stan finished high school. His father continued to work as a logger but also raised livestock on the farm. Conditions were somewhat primitive; there was no running water, power, or telephone in the farmhouse. In school in Naches, Stan met the sons of two US Forest Service rangers who piqued his interest in forestry. After graduating from high school, he decided to pursue a chemistry degree at the UW in 1955, but after a year he switched to forestry. He spent the summer cruising timber before starting classes in the fall. In advance of graduation he took a position with Northern Pacific’s (NP) railroad timberlands division, and then finished his degree. After graduating he returned to NP, which eventually became Burlington Northern (BN) railroad, and worked as a forester in Idaho. He then moved back to Seattle to take a position in the BN land management program, working on land sales, acquisitions, and leasing. Eventually he became the western region director. In 1982 he left BN and took a position as the manager of the College’s Pack Forest. He retired in 2003.

Stan was very active in the forestry community, was a member of SAF for more than 40 years, and served on a number of SAF accreditation committees. He also served on the board of trustees of the Washington Forest Protection Association. Stan participated in my oral history project. His interview can be heard on ResearchWorks (see Appendix A.)

James “Jim” Gullickson (BSF 1964, Forest Management) was raised in Centralia, Washington. He enjoyed the outdoors and worked in forestry as a student at Centralia College. In the summers he was employed by the Forest Service at Randle, Washington, and gained experience in cruising old-growth timber and surveying. He received an AA degree from Centralia College and was inspired by his forestry instructor, Rufus Kaiser, to transfer to the UW College of Forestry. He started courses at Pack Forest in 1961.
Jim's UW degree prepared him for a career in the forest industry. He started at the Weyerhaeuser Forest Research Center in Centralia in the summer of 1964, but soon saw active military service at Adak, Alaska, and in Vietnam. When he was discharged in October 1966, forestry jobs were hard to find, but he was able to find a position as a “production trainee” with Crown Zellerbach Corporation at Nehah Bay, Washington. In late December 1966 he was reemployed by Weyerhaeuser in Chehalis, Washington, supervising forestry projects. This was the start of a 34-year career at Weyerhaeuser spent entirely in Washington State, as an inventory forester, logging contract supervisor, and then overseeing logging and road building. His last two and a half years were spent as the marketing manager for Weyerhaeuser in New Zealand.

John Hammons (BS 1965, Forest Management) visited Pack Forest as a high school student, where a presentation by Professor Scott influenced his decision to enroll in the UW forestry program. After graduation, he took a position with International Paper (IP) in Longview, Washington. He was employed by IP in two periods of about ten years each, with a one-year break to work for MacMillan Bloedel as an industrial forester on Vancouver Island in British Columbia. During his time at IP he rose to chief forester for their Washington, Oregon, and California operations. Following his days with IP, he worked for three years for the New Zealand Forest Service in their fast-growing plantations of radiata pine, and helped to develop and implement a forest management planning system. After returning from New Zealand, he obtained an MBA and worked for three years managing a small integrated-forest-products company in South Dakota. In 1980 he moved to Vancouver, BC, where he spent over 20 years consulting for the government, international agencies, and private clients. John retired to Whistler, BC, but continued his forestry interests by being involved with the local 30,000-acre community forest and the local museum.

Robert “Bob” Alverts (BS 1966, Forest Management) was born in Burien, Washington. His interest in forests came from his outdoorsy family and his long hikes as an Eagle Scout in Mount Rainier and Olympic National Parks, and national forests. He also had early contact with the College faculty. At age 14, he met Dave Thomas and at age 15 he attended a CFR Alumni banquet where he met Stan Gessel. He also met Frank Brockman. Bob enrolled in CFR in 1962 and graduated in 1966. In summers he worked for the NPS, the US Forest Service, and the St. Regis Company. In one of the summers he took classes at Pack Forest. He was vice-president of the Forest Club at the College and continued his connection with the College as a member of the Alumni Association. Bob also served on the dean’s visiting committee and advisory board.

His entire career was spent with the BLM. Right after graduation he took a position in Medford, Oregon where he stayed for seven years. He was involved in many projects including timber cruising and sales, establishing property lines, installing partial cut silvicultural treatments, fire protection, recreation (establishing campgrounds), range and wildlife, and selecting the route for the last 36 miles of the Pacific Crest Trail before it reached Northern California.

In 1977 he moved to the BLM Burns district in eastern Oregon, where he worked on fish habitats and a plan for management of wild horses in the region. He then moved to Roseburg, Oregon in 1997, where his emphasis was on timber, wildlife and recreation. Bob moved to BLM state headquarters office in Portland in 1991 where he became involved with the spotted owl controversy and the Northwest Forest Plan—particularly the influence of BLM timber sales on owl habitat. He worked on his PhD at the College during this period, but decided not to pursue his studies when he retired from BLM in 2006. In retirement he was an associate research scientist at the Desert Research Institute, in Reno, Nevada, and part-time faculty at the University of Nevada, Reno.

Bob was a very active member of the SAF since joining it right after graduation. He served as the Oregon State chair, on the SAF Council, and was both the SAF vice president and president. He was very concerned about how changing societal values were affecting the practice of forestry, particularly on federal public lands. He was a strong advocate for their management, especially with respect to fire, insects, and diseases which were affecting forest health.

He believed that undergraduate education in forestry needs continuous attention and that continuing career education was essential. Bob strongly supported the idea that life-long learning would allow people with disparate
views to come together to solve problems. Bob participated in my oral history project. His interview can be heard on ResearchWorks (see Appendix A.)

Benjamin “Ben” Harrison (1925–2018; BS 1966, Forest Management) had an unusual story. He was born in Rochester, Washington, just southeast of Olympia. His father was a logger, and the family lived in many western Washington towns as well as Rochester—Chimacum, Port Angeles, Washougal, Vancouver, and others. He graduated from high school in 1941 and worked with Crown Zellerbach Corporation and then at Kaiser shipyards in Vancouver, Washington, as an electrician. He volunteered for the US Navy in 1943 and served until 1946. During that period, he received further training as an electrician, became a submariner, and served in the South Pacific.

Ben rejoined the Navy and served from 1948–1953 during the Korean War. In 1949, he assisted a botany professor who was studying the effect of introduced snails on the native vegetation on the Bonin Islands, which are located 600 miles south of Tokyo. This experience introduced him to scientific forestry, but because he was a trained electrician, he applied to the Electrical Engineering department at the UW and was accepted. When he arrived on campus he quickly decided to switch to forestry, largely because of time spent with his father in the forest as a youth. Before enrolling he worked with the Forest Service and then attended Pack Forest in 1956. However, he did not continue his forestry studies and decided to again join the Forest Service to work on fire management. In the fall of 1958, he went back to work as an electrician for the Boeing Company. But his interest in forestry continued, and after several years he returned to the UW to finish his BS, graduating in 1966 at age 41. He then worked briefly with Weyerhaeuser and the Crown Zellerbach Corporation at Neah Bay. The Weyerhaeuser Company recognized his potential and offered him a position as a regeneration forester at Snoqualmie in 1968. Ben’s affable character and knowledge of forestry led to his appointment as the Weyerhaeuser representative for the Washington Family Tree Farm program, counseling small forest landowners with harvesting, timber sales, and regeneration, as well as writing logging plans to protect soils and streams for fish passage. After his retirement he kept in close touch with the forestry faculty and received the College’s honored alumnus award in 1992. He died in 2018 at age 93. Ben participated in my oral history project. His interview can be heard on ResearchWorks (see Appendix A.)

Ann Forest Burns (BS 1971, Forest Science) was born in Yakima, Washington (nee Ann Forest) where her parents, who were attorneys, owned a cattle ranch. The family moved to Sequim, Washington when she was just two and a half; it was a logging and dairying community at the time. Her mother set up a law practice which included forestry. Ann’s early appreciation of forestry came from conversing with loggers who were consulting with her mother. She would go to her mother’s office after school. Ann graduated from high school in 1966, and in that year, she observed active timber sales and wanted to know more about them. Thoughts about becoming an author writing about natural resources issues crossed her mind, but she never did this. She enrolled at the UW in fall 1966, but not in forestry. However, she thought that Forestry 101, Development of Forestry, would be an interesting class to take. She was discouraged by the professor teaching the class, who said it was only for majors. In response, she told him she would change her major. But he replied that this wouldn’t be a good idea because she was a girl and jobs would not be available. But after a conversation with Dean Bethel her class entry card was signed by Associate Dean David Scott and she declared forestry as her major.

Forestry students were required to spend a quarter at Pack Forest, but student accommodations were not designed for women. The attic area above the Dining Hall was the only space available and Ann and two other female students shared it. Male students were warned not to venture up the stairs.

Ann graduated in 1971 and pursued a law degree at Willamette University in Oregon; she graduated in 1973. She then passed the Washington bar exam and started a small practice. After a year she decided to use her expertise in the field of forestry to assist Georgia Pacific negotiate the Forest Practices Act that had just been passed. She worked for Burlington Northern from 1976–1978 and then took a faculty position in forest policy at CFR. But research dollars were hard to find, so she decided to open her own forest law practice in 1981. In 2006 she worked with the WFPA and in 2007 took a position with the Great Lakes Timber Professionals Association in Rhinelander.
Wisconsin. But the cold weather was too much, so in 2008 she returned to the Pacific Northwest and was employed as the vice president of the American Forest Resources Council, which was headquartered in Portland, Oregon.

It wasn’t easy to be a woman in a predominantly male profession combining forestry and law, she says. Ann had to prove herself and convince others she was the right person for the job. To her forestry was a team sport; you can’t cruise timber and build roads all by yourself. Forestry and law mesh. She was very active in the SAF and became the program chair for the Puget Sound Chapter, Chair of the Washington State SAF, and served on the SAF Council (now the board of directors). She also served on the accreditation and the national ethics committees.

Ann fondly remembers David and Carolyn Scott and the strong relationships she developed with the Scott family at Pack Forest, the social gatherings at their home in Seattle, and faculty like Frank Brockman (she took his last dendrology class), Ken Turnbull, Reini Stettler, and Dale Cole. She participated in my oral history project. Her interview can be heard on ResearchWorks (see Appendix A.)

Malcolm R. “Bob” Dick, Jr (BS 1974, Forest Management), was brought up in rural western Washington. His father graduated from the College in 1939 with a degree in forest products, and Bob followed in his father’s footsteps, seeking to become a professional forester. Just two days after graduation he went to work for Boise Cascade in Aberdeen, Washington, as a forester. He was given the responsibility of creating commercial and pre-commercial thinning programs for managed forests. With his trusty malamute, Kulik Bear, he spent the next two years slogging through dense young forests, often rain-soaked, often sweating and swatting bugs and avoiding bees. Using a paint gun, Bob marked stands for thinning and then watched the contractors turn a wild, untamed stand into an orderly forest, free to grow.

His next position was a log-buyer’s job for Boise Cascade that included log inventory and loading of Japan-bound ships. It was a valuable education in the world of business and economics. This prepared him for the position of Alaska state forester and director of the Department of Natural Resources’ Division of Forestry in Anchorage.

After his time in Alaska, Bob returned to work with the WADNR in Olympia, where he became an expert on sustained-yield harvesting, the management of state trust lands, and forestry politics. His position with WADNR gave him an opportunity to once again develop a close relationship with the College through the Alumni Association. Bob spent two years as president of the association and helped shape the careers of dozens of new forestry students. However, he felt that the change from a college with an emphasis on forestry to a school in the College of the Environment was ill-advised and an affront to those who had fought so hard to keep Anderson Hall a place of honor for foresters. Bob chronicled his life and career in a book (Dick and White 2012).

Melody Mobley (BS 1979, Forest Management) was the first female African American graduate of the College. She grew up in Louisville, Kentucky and initially studied classical zoology, though her real interest was in wildlife biology, which she was able to pursue only later in her career. The US Forest Service Cooperative Education Program opened the door for her to pursue a BS in Forest Management in the College. After graduation Melody had a 28-year career with the US Forest Service. She first worked in the Mount Baker–Snoqualmie National Forest. Her next stop was the Cleveland National Forest in southern California, where she worked in public affairs and timber sale management. During her time in California, she also had a temporary assignment as assistant district ranger on the Klamath National Forest in northern California. Moving once again, Melody took a position in central Florida serving as a timber and wildlife management staff officer. After two years in Florida she moved to Forest Service headquarters in Washington, DC, to manage several national programs: state forest resource planning, monitoring the implementation of forest plans, and executive correspondence.

Her strong desire to work in the area of conservation of threatened and endangered wildlife species was finally fulfilled when Melody was able to complete a two-year assignment on loan to the World Wildlife Fund and the Smithsonian Institution’s National Zoo. She was fortunate to be able to work in South America and Africa. Melody was selected as the SEFS commencement speaker in 2014 and is now retired.

On a personal note she adds that it was difficult to work in the white male-dominated field of forestry as an African American woman. Her story is very relevant to today. She was subject to all forms of racism, her credentials
Robert Curtis were constantly challenged, she was passed over for advancement, felt isolated in small communities, and looked upon with suspicion. But her love for forests and wildlands kept her going. She has some suggestions for the future. Most people of color reside in urban areas, but it is a myth that Black people aren’t interested in nature, or afraid to work in the woods. They just need to be given opportunities to develop a passion for the wildland environment at an early age. However, they must be effectively mentored through their careers to develop survival skills. In addition, the culture of employers needs to change. But despite all this she feels that the positive aspects of her career outweighed the negative.

Morgan Holen (BS 2001, Forest Management) is another example of a student who attended the College because of a family member—her father was an alum (class of 1969). Growing up, she spent a lot of time in the woods and mill with him. She had wanted to be a meteorologist, but didn’t enjoy it as much as she thought. After taking my CFR 101 class, Forests and Society, she declared her major—forest management. (I am not sure I can take credit for this.) Beyond graduation she worked for a local tree service company in Colorado and sold lift tickets at Breckenridge. She then earned a Master of Environmental Management at Yale and was employed by the Temperate Forest Foundation, escorting K-12 grade teachers on tours of mills and forests throughout the US and Canada. After earning an arborist certification, Morgan started her own company in 2011—Consulting Arborists and Urban Forest Management in Lake Oswego, Oregon, providing services throughout Oregon and southwest Washington.

Angela Mallon (BS 2002, Conservation of Wildland Resources) worked for the Forest Service in her first summer out of high school laying out planting units following post-fire salvage harvest on the Wenatchee National Forest. She had thought of becoming a doctor, but instead decided to study forestry and forest conservation. Angela had grown up on a certified Tree Farm and had spent many hours working in the woods. After graduation from the College she decided to pursue a Master of Natural Resources at OSU. This led her to spend time in the Peace Corps working as an agroforestry extension agent in Paraguay. Angela now works (in 2014) as a stewardship program manager with the Montana Department of Natural Resources, overseeing technical and financial assistance programs designed to give landowners the tools to practice good woodland stewardship.

Graduate Alums

Robert “Bob” Curtis (PhD 1965, Mensuration/Growth and Yield) received an MF from Yale in 1951. There he met David Scott, who at that time was a teaching assistant completing his PhD. In 1961, when Bob decided to return to graduate school, his first thought was to contact Scott, who by then held a faculty position in the College. Professor Scott encouraged him to undertake a PhD under his supervision. After graduation, he took a position with the US Forest Service Pacific Northwest Research Station in Portland, Oregon, working on the growth and yield of Douglas-fir. Curtis was one of the founders of the Stand Management Cooperative, which is described in Chapter 8. In 1978, his project in Portland was discontinued and he transferred to the Station’s Forestry Sciences Laboratory in Olympia, Washington. Here he continued mensuration research, including the development of DFSIM (Douglas-fir Simulator)—a stand growth and yield simulator for coastal Douglas-fir.

John C. Hendee (PhD 1967, Wilderness Management) had a distinguished career. He earned a BS in Forestry from Michigan State University in 1960 and in 1961 took a position with the US Forest Service on the Siuslaw National Forest in coastal Oregon. While there, he completed an MF at OSU before transferring to the Forest Service Pacific Southwest Experiment Station in Berkeley, California, in 1964. Eager to continue graduate school, and with a growing interest in recreation, wilderness, and forestry/people conflicts, he enrolled in the PhD program in the College of Forestry in the fall of 1964 to study under Professor Frank Brockman. His research involved sociology, political science, and economics. During his graduate studies John continued to be employed by the Forest Service, and this joint assignment in Seattle continued after he graduated. During this period, he taught a course in wilderness management in the College, which stimulated him
to coauthor a textbook on that subject with his father, Clare Hendee, who after retiring as Deputy Chief of the US Forest Service, taught forestry at the University of Maryland. John and his father then joined Professor Grant Sharpe in coauthoring the fourth through seventh editions of the McGraw-Hill textbook *Introduction to Forestry*. John continued his interest in updating the book and coauthored the eighth edition with Chad Dawson of the State University of New York (SUNY) in 2012.

In 1976 John was transferred from Seattle to the Forest Service’s Legislative Affairs office in Washington, DC, and began a fourteen-month American Political Science Association Congressional Fellowship. He served six months on the staff of Senator Frank Church of Idaho and eight months with Congressman Jim Weaver of Oregon, Chair of the House Forests Subcommittee. This was in the era of debate and passage of the National Forest Management Act and RARE 2—the second Forest Service Roadless Area Review and Evaluation—an exciting experience for him.

After completing the fellowship, he became the assistant director of the Forest Service’s Southeast Forest Experiment Station in Asheville, North Carolina. In this position he oversaw research units at universities in several southeastern States—North Carolina, South Carolina, Georgia, and Virginia. In 1985, after seven years in Asheville and 26 years with the Forest Service, he left to assume the position of professor and dean of the College of Forest, Wildlife and Range Sciences (now Natural Resources) at the University of Idaho. After retiring from the deanship in 1994, he became director of the University of Idaho’s Wilderness Research Center, where he launched the *International Journal of Wilderness*. He also fostered the idea of “using wilderness for personal growth and healing,” especially for at-risk youth, in a series of programs at four Federal Job Corps Centers. After retirement in 2002, he continued as director of the WILD Foundation, a non-governmental organization dedicated to protecting wilderness and wildlife worldwide and to sponsoring world wilderness congresses.

*James “Jim” P. Lassoie* (BS 1968, Forest Science; PhD 1975, Forest Ecophysiology) was born in California, but moved to Washington at a young age. He attended junior high and high school in Tacoma and enjoyed hiking and climbing mountains. In high school he took a forestry course at a summer field camp, which influenced his decision to obtain an undergraduate degree from the College of Forestry. Jim thought this might lead to an outdoor job that would allow him to hike in the Pacific Northwest for the rest of his life. However, after starting in the College in 1963, he immediately transferred to the general studies program in the College of Arts and Sciences because the forestry curriculum was far too restrictive for his free spirit—too many required courses. But after a couple of quarters struggling as a self-identified “pre-med,” he gravitated back to Anderson Hall, largely because two years of a foreign language weren’t required to be a “dirt forester.”

After receiving his BS, he continued on as a graduate student under the guidance of Professor Scott. Jim was initially interested in alpine ecology, but after working with Jim Woodman—a past Scott PhD—at Weyerhaeuser’s Research Center in Centralia, he developed an interest in tree physiology, especially water relations. Following graduation, he obtained a postdoctoral position at the University of Missouri, Columbia, and in 1976 took a faculty position in the Department of Natural Resources at Cornell University. He spent his entire academic career at Cornell and held administrative appointments there, including department chair and director of the Cornell Center for the Environment.

His initial research involved the impacts of air pollution, especially acid rain, on tree physiology. In addition, he developed public education programs related to nonindustrial uses of private forest lands. After 1990, Jim’s research focused on the application of interdisciplinary science to environmental conservation, integrated land management, and sustainable development in developed and developing countries. In 2007, he developed a website (www.conservationbridge.org) that includes a portfolio of collaborative, multi-media case studies that provide learning experiences for students. It connects them directly with practitioners.

*Robert “Bob” Michael Pyle* (MS 1973, Outdoor Recreation/Nature Interpretation) was born and raised in Colorado and has lived in the Pacific Northwest, California, New England, and Great Britain. At the UW he received a BS in General Studies from the College of Arts and Sciences focused on nature and its protection. Looking to further
his studies in this area, he pursued an MS in CFR under the tutelage of Professor Grant Sharpe. He then shifted gears to obtain a PhD at Yale in lepidopteran ecology and conservation.

Bob then had a succession of positions: a ranger/naturalist in Sequoia National Park, a butterfly conservation consultant for the government of Papua New Guinea, a northwest land steward for the Nature Conservancy, and co-manager of the species conservation monitoring center in Cambridge, UK. He founded the International Xerces Society for Invertebrate Conservation (http://www.xerces.org/), later chaired its monarch butterfly project, and was the founding chairman of the IUCN’s (International Union for Conservation and Nature) Lepidoptera Specialist Group.

Bob has been a full-time biologist, writer, teacher, and speaker. He has taught writing and natural history seminars for many colleges and institutes around the world, presented hundreds of invited lectures and keynote addresses, and has published hundreds of articles, essays, papers, stories, poems, and eighteen books, including novels, poetry, and butterfly works. He has won many awards for his work, including the College’s distinguished alumnus award.

Thomas “Tom” Swen Friberg (BS 1970, Wood and Fiber Sciences; PhD 1976, Pulp and Paper Science and Engineering). In making his decision to attend the College, Tom was greatly influenced by a conversation he had in high school with a College alum who was employed as the plant manager for a Kingsford Charcoal facility. For his PhD he studied monosaccharides and organic acids in wood under Professor Bjorn Hrutfiord. Most of Fribergs’s career was spent in research and development at the Weyerhaeuser Company. Initially he conducted research, but he soon moved on to being a research, development, and implementation manager and eventually became vice president for technology. One project Tom says he was particularly proud of was the development and commercialization of fully automated equipment to sort recovered paper into appropriate grades, an innovation that was sold worldwide. The single recycling bin that you may have at your home or workplace came about because of this innovation. Tom was very active in the College’s Alumni Association.

Christina “Chris” Pfeiffer (MS 1986, Urban Horticulture) was inspired to apply to CUH after she met Professor James Clark, who held a position in the Michigan State University Horticulture Department. Clark later took a faculty position at CUH. In 1984 she was one of the first of graduate students to go through the new degree program. After graduation she obtained a position as a horticulture supervisor at the Washington Park Arboretum that she held for 14 years. Since then she has worked as a consulting arborist and educator; has taught Pro-Hort seminars as well as three quarters of ESRM 480 (landscape management) during a faculty vacancy; and has worked as an education coordinator. After this she participated in part-time college teaching, and gave professional and public seminars.

Clayton “Clay” Antieau (MS 1987, Urban Horticulture) applied for graduate study at the UW in 1982 after obtaining an undergraduate degree in horticulture from Purdue University. He was the third graduate student at CUH and conducted research on variation in native plants, especially oceanspray.

Clay has worked for Seattle Public Utilities since 2000 as a watershed planner, botanist and an environmental review and permit specialist. His work covers rare plant biology and management, wetland science and ecological restoration. Between 2000 and 2009, he was the lead planner in the implementation of the City of Seattle’s Cedar River Watershed Habitat Conservation Plan.

He is a recognized local authority and educator in northwest plants—native and non-native—and has taught courses in plant identification, horticulture, landscape management, wetland science, and restoration science at the UW and many technical and community colleges throughout the region. Clay is a past president of the Washington Native Plant Society, served on the boards of the Society for Ecological Restoration’s Northwest Chapter and the Washington Trails Association, and served on the science advisory committee for EarthCorps.

Kenneth “Ken” R. Peer (MS 2007, Soil Pedology) enrolled in the College based on its reputation, the interdisciplinary environmental graduate programs, and his experience assisting one of Professor Hinckley’s graduate students
with his research. At this time the Elwha dams on the Olympic Peninsula were being removed. It was the nation’s largest dam removal project and there was great interest in the recovery process. Under the tutelage of Professor Zabowski Ken’s research focused on N cycling in riparian areas to show how anoxic soils may mask marine derived N inputs from salmon.

After graduating he was employed with the Marine Monitoring Unit of the Washington State Department of Ecology, where he studied the impact of low dissolved oxygen levels in South Puget Sound on fish kill. In his next position Ken worked as a marine environment adviser providing management oversight for a $5 billion capital dredge project in the South Pacific. Upon completion of his contract, he moved to New Zealand and started a marine environment consultancy—Environmental LP. His education at the College, together with earlier work in Silicon Valley as an equipment manufacturing engineer, enabled him to work with marine developers to reduce environmental impacts through scientific monitoring and management.
CHAPTER 7
ACADEMIC PROGRAMS

Introduction

Humans have long used forests for their own purposes, particularly in the area we know now as Europe. In the Bronze Age (3300–1200 BCE) the native beech and oak forests there were widely utilized—the Romans, for instance, used forests for firewood, building construction, and ships. They also recognized that forests were a source of water and animals. Roman ideas about the use of forests were adopted by tribes, especially the Allemanni, who lived in the region that is now Germany. As the population increased, exploitation of the forest grew, particularly during the Middle Ages (1100–1450), when feudal ownership dominated and hunting was common. Later, between 1750 and 1850, European forests were decimated as a result of clearing for agriculture, timber cutting, and their use for firewood, charcoal production, and mining. A serious lack of wood resulted. To combat this, during the late 19th and 20th centuries a huge amount of artificial reforestation was carried out, particularly with conifers, which had a high economic value. In Germany forests now cover 32 percent of the country, and 60 percent of these are conifer plantations: Norway spruce (Picea abies) and Scots pine (Pinus sylvestris) are the most common species, along with a small proportion of firs (Abies) and even Douglas-fir. The remainder are oak, beech, and other hardwood species. I remember visiting a Norway spruce plantation near Kassel, in central Germany, while attending a scientific meeting. Trees were planted in perfectly straight rows with a consistent spacing between trees. Of course, the stand lacked diversity and there were no understory plants on the forest floor.

Concern about the state of German forests in the late 1700s spurred academics to start teaching forestry courses. In 1778, a course was added to the curriculum at the University of Giessen, Hesse-Darmstadt, and in 1790 a school of forestry was established in Munich, Bavaria. Thus, it is not surprising that Germany is considered to be the fatherland of forestry. In the 1800s more forestry programs were established in Germany, as well as in Russia, Hungary, Austria, France, Spain, Croatia, Italy, India, and Japan. In 1898, Dr. Carl Schenck established the first forestry school in the US (the Biltmore Forest School in Asheville, North Carolina) with courses in silviculture, surveying, tree and plant identification, zoology, and law (Green 2006). Instruction was offered in both the classroom and the field.

It is worth noting that just before the establishment of the Biltmore School, a course in general forestry was listed in the UW catalog of 1894–1895 in the Department of Natural Science (Schmitz 1973), as part of the botany series. Three courses were offered, the third of which was the forestry course, which required systematic botany, structural and cryptogamic botany, and microscopy as prerequisites. It consisted of practical laboratory work, fieldwork, and reading, and was to be held twice a week during the second semester. It was presumably taught by Professor Orson Bennett Johnson—Johnson Hall on campus is named for him. However, it is not known whether any students registered for the course. Anderson (2007) describes the start of forestry education at the UW.

In 1895, after the UW moved from the downtown building to the present campus, general forestry was offered as a single course taught by Professor Charles Hill in the Department of Natural Science and had three botany prerequisites. At the same time the new Department of Terrestrial Physics and Geography offered two courses—Washington forestry, and the development of Washington. Both were taught by Mr. Edmond Stephen Meany (profiled in Chapter 4). The Washington forestry course consisted of lectures accompanied by fieldwork and reading. It required only one botany prerequisite, perhaps indicating that Meany approached the subject not from a biological perspective, but from an historical one. Thus, two departments were offering competing forestry courses. This was unacceptable to University President Harrington, who determined that forestry instruction should only be offered in the Department of Terrestrial Physics and Geography.

But the Department of Terrestrial Physics and Geography was to be short-lived. After its dissolution, Meany was appointed professor of American history and a lecturer in forestry in the Department of Biology, which was
formed in 1898 when the Department of Natural Science was split into several departments (Walker 2003). By then the UW had changed from semesters to the quarter system. The three forestry courses Meany taught were: (1) the history and progress of forestry as a science; (2) a continuation of the first course; and (3) a continuation of the first two courses, but with attention to forestry problems relative to the Northwest.

In 1900, a slight change was made in the description of the forestry courses to be offered. The course description read as follows: “Forestry I, II, III. History and progress of forestry as a science; sylviculture [sic] and uses of trees; and problems presented for solution in the Pacific Northwest.” Lectures, theses, and fieldwork (twice a week throughout the year) were part of this sequence. This arrangement continued until the establishment of the School of Forestry in 1907. In 1910, the School of Forestry became the College of Forestry, and the first logging engineering curriculum in the US was established in 1911. In 1912, interestingly, the University regents rejected recommendations to merge the Colleges of Forestry and Engineering.

**Enrollments and Degrees**

Thousands of undergraduate and graduate students have been enrolled since 1907 (Fig. 7.1). The makeup of the student body (male, female, minority) is presented in Chapter 6. Enrollments have fluctuated considerably over time, more so in undergraduate enrollments than graduate. These ups and downs were a result of factors such as changing views of the field of forestry, wars, perceived job opportunities, the health of the forest industry, economic recessions and depressions, and politics. After a promising start, enrollments declined during World War I reaching a low of just 12 in 1918. The 1918 Spanish Flu pandemic also played a role. They increased to a high of 454 in 1936 and then plummeted during World War II to 15 in 1943. After the war enrollments rapidly rebounded to 365 in 1947 as a result of the GI Bill and perceived job opportunities as the need for lumber increased. They fluctuated from the 1950s to the early 1960s and then rose steeply in the late 1960s and 1970s to an all-time high of 648 in 1975. This reflected college draft deferments during the Vietnam War and the return of war veterans, increasing environmental awareness, and the broadening of course offerings in the College. In the next decade, however, undergraduate enrollments dropped to 137. They recovered, but in 2005 and 2006, when CFR was pressured to join the College of the Environment, it was declining again. After the merger, enrollments increased.

![Fig. 7.1 Undergraduate and graduate UW Forestry enrollments from 1907 to 2018.](image)

Graduate enrollments have generally been lower than undergraduate, and fluctuations have been fewer and less dramatic (see Fig. 7.1). The first graduate students were enrolled in 1915. Before the 1960s graduate enrollments were very low, but when Dean Bethel expanded the faculty and the research program grew, they increased, reaching a
maximum of 313 in 1980. From 1985 to 1992, graduate enrollments were higher than undergraduate. They remained relatively stable for the next twenty years, but have declined slowly over the last ten years to just 117 in 2018.

Table 7.1 shows degrees awarded by decade from 1907-2018. Altogether 8,441 degrees were awarded (5,750 undergraduate and 2,691 graduate). The highest numbers of undergrad (1,150) and graduate (590) degrees were awarded in the 1970s and 1980s, respectively. Both master's (2050) and PhD (641) degrees have been granted. Master's degrees fall into two categories (thesis and non-thesis). Thesis degrees included MS (Master of Science), MSF (Master of Science in Forestry), and MF (Master of Forestry). Non-thesis degrees encompassed MFR (Master of Forest Resources) and MEH (Master of Urban Horticulture), as well as some MS and MFR degrees. The MEH was added in 2004. Mid-career students in the Silviculture Institute (1985–1992) and the Natural Resource Institute (1993–1998) received a diploma. If desired, however, they could proceed to an MFR with additional credits. Not all the master's degrees were offered at the same time—some simply represent changes in degree names.

<table>
<thead>
<tr>
<th>Decade</th>
<th>BS</th>
<th>Thesis master's</th>
<th>Non-thesis master's</th>
<th>PhD</th>
<th>Total graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1907-1919</td>
<td>63</td>
<td>12</td>
<td>2</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>1920-1929</td>
<td>173</td>
<td>22</td>
<td>0</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>1930-1939</td>
<td>324</td>
<td>41</td>
<td>1</td>
<td>3</td>
<td>45</td>
</tr>
<tr>
<td>1940-1949</td>
<td>347</td>
<td>42</td>
<td>0</td>
<td>4</td>
<td>46</td>
</tr>
<tr>
<td>1950-1959</td>
<td>525</td>
<td>62</td>
<td>0</td>
<td>15</td>
<td>77</td>
</tr>
<tr>
<td>1960-1969</td>
<td>473</td>
<td>127</td>
<td>1</td>
<td>43</td>
<td>171</td>
</tr>
<tr>
<td>1970-1979</td>
<td>1150</td>
<td>212</td>
<td>183</td>
<td>120</td>
<td>515</td>
</tr>
<tr>
<td>1980-1989</td>
<td>713</td>
<td>241</td>
<td>109</td>
<td>159</td>
<td>509</td>
</tr>
<tr>
<td>1990-1999</td>
<td>593</td>
<td>251</td>
<td>71</td>
<td>121</td>
<td>443</td>
</tr>
<tr>
<td>2000-2009</td>
<td>568</td>
<td>320</td>
<td>95</td>
<td>83</td>
<td>410</td>
</tr>
<tr>
<td>2010-2018</td>
<td>821</td>
<td>232</td>
<td>95</td>
<td>83</td>
<td>410</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5750</td>
<td>1562</td>
<td>488</td>
<td>641</td>
<td>2691</td>
</tr>
</tbody>
</table>

**Undergraduate Curricula**

Undergraduate curricula in the College underwent very little change from 1907 to 1970, but since then curricula have undergone continuous revision. The number of curricula has varied from one to eight, along with specializations, options, and minors.

From 1907 to 1922 there was just a single curriculum. Specializations, or what are now called options, began to be offered in 1914 and included forest management; logging engineering; forest products and milling, marketing, and the business of lumbering. In the 1923–1939 period, five curricula were offered—forest management, forest engineering, lumber manufacturing, forest products, and forestry sciences. Forestry sciences included a specialization in forest pathology and entomology. Only three curricula (forest management, logging engineering, and forest products), with no options, were offered from 1940 to 1970.

The concept of forest conservation proposed by Carl Schenck, Gifford Pinchot, John Muir, and others in the 1890s and early 1900s provided the foundation of the early days of scientific forestry (see Chapter 2). However, it wasn't until the mid-1960s that forestry curricula began to broaden to include not just timber production but the multiple use of forests for water, range, recreation, and fish and wildlife habitat. In 1970, the number of curricula
increased to eight: forest management, forest engineering, wood technology, pulp and paper technology, forest sciences, wood and fiber science, outdoor recreation, and wildlife science. There were no options within these.

In the 1970s curricula changed again in response to concerns about the future sustainability of forests, the effects of forest practices, reduced need for students trained in the technical aspects of forestry, and greater need for students with a broader array of skills enabling them to hold newly emerging jobs. In 1980, six curricula were provided with fourteen options: forest resources (ten options); outdoor recreation (three); wildlife sciences; pulp and paper; wood and fiber science (one); and forest engineering.

From the mid-1980s to the early 2000s, the number of curricula varied from five to six, sometimes with options, sometimes not. Some curricula were dropped (wood science and technology and forest engineering) and some added (urban forestry); renaming was common. Minors were offered in international forestry, streamside studies, conservation of wildland resources, sustainable resource management, and environmental horticulture and urban forestry.

Many of the six curricula offered in 2000 had just a few students enrolled. Revisions, once again, were needed. In autumn quarter 2003, with pressure from the upper campus administration, the number of curricula was reduced to three—environmental science and resource management; environmental horticulture and urban forestry; and paper science and engineering. By autumn 2006, only two curricula were offered, with five options. Paper science and engineering had become bioresource science and engineering. The curricula have been essentially unchanged since then.

**Graduate Curricula**

Graduate curricula were never as formal as the undergraduate curricula. Each grad student developed his or her program on an individual basis with their graduate committee. Master's degrees are usually completed in two years. The time limit for PhD students is 10 years. It used to be much longer, but one of the College's students took 19 years to finish, prompting the graduate school to impose a shorter time limit. To prepare for graduate work, students could take undergraduate or graduate forestry courses, as well as courses outside the College.

In the early years, graduate students were required to have a BS in forestry for admission to the MSF program, but this was later changed to “a BS in forestry or equivalent.” Admittance to the MF required a BS in forestry until the mid-1950s. Until the 1970s the PhD required reading proficiency in two foreign languages. I chose French and German when I started my PhD studies in 1970, but shortly after this time, the requirement was reduced to one language. Passing these language exams proved to be a major obstacle for many students who simply could not pass two (or even one) of them despite many tries, in some cases developing psychological blocks or suffering near nervous breakdowns. A proposal was put forth to substitute a computer language for a foreign language, but this idea didn’t fly. Eventually the mandatory language requirement was removed. By the 1970s the graduate programs were managed by the divisions. This continued until the divisions were dissolved. Research interest groups carried on after this.

**Courses and Curricula**

Each curriculum had its own set of undergraduate and graduate courses, with some overlap. I cannot cover all the curricula here, so I have chosen the courses in the undergraduate forest management and the pulp and paper curricula to illustrate the courses involved and how they changed over time. All the courses offered in the College over its history can be seen in the old university catalogs.

**Forest Management Curriculum**

Courses in the first undergraduate curriculum in forestry in 1908, as well those in the Forest Management curriculum in 1965 and the Environmental Science and Resources Management (ESRM) Sustainable Forest Management option
in 2016, are shown in Table 7.2. Until the 1960s courses were taught in traditional forestry subjects such as forest management, forest products, mensuration, silviculture, surveying, lumbering and logging engineering, dendrology, ecology, economics, fire science, entomology, pathology, soils, plant physiology, wood identification, wood chemistry, paper science, air photos, and statistics. Typically, the first two years were devoted to the basic sciences, while specific forestry courses were taught in the junior and senior years. The courses taught in 1965 were remarkably similar to those in 1908. Major differences were the addition of the summer quarter at Pack Forest, as well as the broadening of the course list to include statistical methods, English composition, entomology, pathology, fire, recreation, wildlife, air photos, wood anatomy and utilization, and electives. The 2016 courses were similar in basics, but illustrate a different approach, with emphasis on environmental protection and sustainability of natural resources.

Table 7.2. Courses in the Forest Management Curriculum at the UW in 1908, 1965, and 2016

<table>
<thead>
<tr>
<th>1908</th>
<th>1965</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRST YEAR</strong></td>
<td><strong>FIRST YEAR</strong></td>
<td><strong>2016</strong></td>
</tr>
<tr>
<td>Trigonometry</td>
<td>Calculus</td>
<td>English composition</td>
</tr>
<tr>
<td>Algebra</td>
<td>Physics</td>
<td>Natural world</td>
</tr>
<tr>
<td>Chemistry</td>
<td>General and organic chemistry</td>
<td>Visual, literary and performing arts</td>
</tr>
<tr>
<td>Drawing</td>
<td>Botany</td>
<td>Individuals and society</td>
</tr>
<tr>
<td>Surveying</td>
<td>English composition</td>
<td>Electives</td>
</tr>
<tr>
<td>Economics</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SECOND YEAR</strong></td>
<td><strong>SECOND YEAR</strong></td>
<td><strong>ESRM major requirements</strong></td>
</tr>
<tr>
<td>Analytical geometry</td>
<td>Dendrology</td>
<td>Communications/public speaking</td>
</tr>
<tr>
<td>Botany</td>
<td>Physical geology</td>
<td>Economics</td>
</tr>
<tr>
<td>Geology</td>
<td>Economics</td>
<td>Statistics</td>
</tr>
<tr>
<td>Political economy</td>
<td>American Government</td>
<td>Biology</td>
</tr>
<tr>
<td>Forest botany</td>
<td>Physics</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Physics</td>
<td>Statistical methods</td>
<td>Earth science</td>
</tr>
<tr>
<td></td>
<td>Plane surveying</td>
<td></td>
</tr>
<tr>
<td><strong>SUMMER QUARTER (Pack Forest)</strong></td>
<td>Forest ecology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forest surveying</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forest mensuration</td>
<td></td>
</tr>
<tr>
<td><strong>THIRD YEAR</strong></td>
<td><strong>THIRD YEAR</strong></td>
<td><strong>SUSTAINABLE FOREST MANAGEMENT OPTION</strong></td>
</tr>
<tr>
<td>Mineralogy</td>
<td>Forest economics</td>
<td>Silviculture</td>
</tr>
<tr>
<td>Forest mensuration</td>
<td>Forest mensuration</td>
<td>Measurements</td>
</tr>
<tr>
<td>Forest organization</td>
<td>Silvics</td>
<td>Remote sensing</td>
</tr>
<tr>
<td>Silviculture</td>
<td>Forest entomology</td>
<td>Forest management and economics</td>
</tr>
<tr>
<td>Forest finance</td>
<td>Forest pathology</td>
<td>Natural resources policy and planning</td>
</tr>
<tr>
<td></td>
<td>Fire control</td>
<td>and one of four courses in soils and hydrology</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>and one of eight courses in ecosystems, silviculture, fire management, entomology, forest operations and wilderness management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and one of five courses in marketing, economics/finances and conflicts in the US and developing world</td>
</tr>
<tr>
<td><strong>FOURTH YEAR</strong></td>
<td><strong>FOURTH YEAR</strong></td>
<td></td>
</tr>
<tr>
<td>Forest management</td>
<td>Wood anatomy</td>
<td></td>
</tr>
<tr>
<td>Silviculture</td>
<td>Wood utilization</td>
<td></td>
</tr>
<tr>
<td>Dendrology</td>
<td>Forest policy and administration</td>
<td></td>
</tr>
<tr>
<td>Timber physics</td>
<td>Forest photo interpretation</td>
<td></td>
</tr>
<tr>
<td>Timber testing</td>
<td>Recreational use of wildlands</td>
<td></td>
</tr>
<tr>
<td>Seminary (seminar)</td>
<td>Forest management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Field studies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td></td>
</tr>
</tbody>
</table>


Some unusual courses were taught. The 1908 catalog lists a fourth-year course called Seminary—simply an old word for “seminar,” and not associated with religion. A course in forestry camping and packing was offered. Figure 7.2 shows students learning how to erect a tent, light a fire, and pack a mule. Physical education was required from 1920 to 1963, and a course in first aid to the injured is listed in the 1940–1941 catalog.

![Fig. 7.2. Students with tent and mule taking the forestry camping and packing course, on the UW campus, ca. 1925 (Source: UW Libraries, Special Collections, Negative Number UW19513).](image)

Perhaps the most unusual course was military science. This is listed in the 1916–1918 catalog as Military Science and Tactics. It was added in response to US involvement in World War I. In accordance with the National Defense Act of 1916, the War Department established and maintained an infantry unit at the UW in order to prepare male students to perform the duties of a commissioned officer. All able-bodied male students, except those from foreign countries not intending to become naturalized, took three hours a week of military training, offered every quarter or semester in the first and second years. In 1950–1951 this was expanded to include air and naval science; the last military course was offered in 1963. Dean Bare adds that when he was an undergraduate at Purdue University (1960–1964), all male students were required to take military courses in their first two years, like the UW. He chose military band.

A number of courses were offered to fulfill science requirements for students in other schools and colleges—e.g., introduction to forestry, forests in the life of humans, and environmental science. Some courses are no longer taught, such as wood science, logging engineering, forest genetics, forest pathology, and micrometeorology. These areas of expertise were deemed no longer needed, or relevant. Ironically, there are now no faculty who specialize in wood identification. Even the teaching of dendrology has diminished greatly.

The sustainable forest management option in the ESRM curriculum in 2016–2018 does not show the courses by year but rather by topic (see Table 7.2)—namely, (1) general education requirements, (2) ESRM major requirements, (3) ESRM core and capstone, and (4) the sustainable forest management option, which includes one course in each of three basic areas (soils and hydrology, forest management, and economics and trade). Although there are some similarities with the 1965 forest management curriculum, there are many differences. The obvious emphasis is on sustainability and social science. There is little exposure to forest health—fire, entomology, and pathology—and because a quarter in residence at Pack Forest is no longer required, field exposure is much less.

The courses offered in the College in 1965 were similar to those in other forestry schools in the US and internationally at that time (Innes 2010). For example, in the early 1960s, the courses I took at Sydney University over my first two years consisted of the basic sciences (chemistry, physics, botany, geology, and mycology), which provided the background for the forestry classes. Over the two subsequent years at the Australian Forestry School in Canberra I took air photos, dendrology, finance, forest engineering, forest entomology, forest management, forest pathology, forest policy, forest products, mensuration, meteorology, silviculture, soils, surveying, wood anatomy and identification, statistics, and utilization.
**Pulp and Paper Science Curriculum**

Lower and upper divisions courses in the Pulp and Paper Technology curriculum in 1972 and the Bioresource Science and Engineering curriculum in 2016 are shown in Table 7.3. The courses are quite different from those in Forest Management. Mathematics, chemistry, physics, and engineering were the backbone. However, students took some courses in botany, biology, the development of forestry and human/social sciences. There was no requirement to complete a quarter of field classes at Pack Forest.

<table>
<thead>
<tr>
<th>Table 7.3. Courses in the Pulp and Paper curriculum at the UW in 1972 and the Bioresource Science and Engineering curriculum in 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower Division</strong></td>
</tr>
<tr>
<td>Mathematics—calculus, differential equations</td>
</tr>
<tr>
<td>Sciences—chemistry, chemistry, physics, botany</td>
</tr>
<tr>
<td>Human/social sciences—English, economics</td>
</tr>
<tr>
<td>Engineering—general, chemical</td>
</tr>
<tr>
<td>Pulp and paper technology</td>
</tr>
<tr>
<td>Development of forestry</td>
</tr>
<tr>
<td><strong>Upper Division</strong></td>
</tr>
<tr>
<td>Sciences—inorganic and organic chemistry</td>
</tr>
<tr>
<td>Forest biology</td>
</tr>
<tr>
<td>Forest economics and utilization</td>
</tr>
<tr>
<td>Wood and paper science—wood chemistry, pulp and paper technology and lab, polymer chemistry</td>
</tr>
<tr>
<td>Professional courses other than forestry—chemical engineering</td>
</tr>
<tr>
<td><strong>Number of Courses</strong></td>
</tr>
<tr>
<td>Hundreds of undergraduate and graduate courses have been taught since 1907—many more undergraduate than graduate.</td>
</tr>
<tr>
<td>The total number of courses in the College was just 16 in 1910. It steadily increased until it reached a peak of 220 in 2000.</td>
</tr>
<tr>
<td>Some courses, although listed, were not being taught. The deletion of these courses and the presence of fewer faculty resulted in a reduction to 129 in 2013.</td>
</tr>
<tr>
<td>In 2018, 141 courses were offered (101 undergraduate and 41 graduate).</td>
</tr>
<tr>
<td><strong>Field Studies</strong></td>
</tr>
<tr>
<td>Field studies have been an integral component of forestry at the UW and, indeed, in all universities teaching forestry globally.</td>
</tr>
<tr>
<td>Figure 7.3 shows students on campus in 2010. Until recently, students spent a whole quarter at Pack Forest learning field skills, and field trips are still included in many courses. Starting in 1907, forests on campus were used for fieldwork, as well as forest lands beyond the campus.</td>
</tr>
</tbody>
</table>
Field trips have been conducted in Washington State, other states, and also in foreign countries. These locations have included the main UW campus; Union Bay Natural Area; Washington Park Arboretum; Seattle and Mercer Island Parks; Bellevue Botanical Garden; the I-90 corridor; the Cedar River watershed; Lee Forest; Pack Forest; the Olympic Peninsula; the Cascades; eastern Washington; Oregon; National Parks; Canada; and Costa Rica. Transportation for field trips has always been a challenge, especially when classes were large. Personal vehicles, twelve- and fifteen-passenger vans, and even buses were used. Fifteen-passenger vans were banned by the University for safety reasons after several serious crashes, and in 2013, twelve-passenger vans were also banned. This left only seven-passenger mini-vans, or eight- or nine-passenger SUVs. As many as twelve vehicles were used in a procession in some classes, and keeping track of these vehicles was problematic. Often, drivers would get lost and students had to return to campus without completing the field trip. Today, with cell phones and GPS, there is less chance of vehicles going astray.

Old school buses were utilized for field trips when the students spent a quarter in residence at Pack Forest and also for spring field trips. From 1950 to 1995, Forest Management and Forest Engineering students took field trips in the spring quarter of their senior year. They usually stayed in camps at locations on the east side (e.g., Boise Cascade at Teanaway) and west side of the Cascades (e.g., the DNR camp at Forks on the Olympic Peninsula). At these sites, forest management students gained “real life” experience in practical forest management, conducting surveys and forest inventories, while logging engineering students produced logging and road location plans and cost estimates for landowners. The school buses often broke down or became bogged, and had to be pushed by students or towed to a passable road (Fig. 7.4 left); this also happened frequently on field trips at the Australian Forestry School (Fig. 7.4 right). More class field trip photos are shown in Figures 7.5 and 7.6. Pulp and paper students also made field trips to mills.
Accreditation of Curricula

Curriculum accreditation is important to universities as an indication of the quality of their programs, and is used as a factor in obtaining high national and international ratings. Students commonly use it to find an institution that meets their goals, and accredited degrees are also important to potential employers.

Accrediting agencies, usually national, set the educational standards. The agencies used by SEFS are the SAF and the Accreditation Board for Engineering and Technology (ABET). Both are nonprofit, nongovernmental organizations. Accreditation of the College by SAF began in 1935. Reviews are undertaken every ten years—with a midterm review after five years—by a committee appointed by SAF (usually made up of academics, employers, and a SAF representative). The committee evaluates curricula and options with respect to the following standards: forestry program goals, objectives, and policies; curriculum organization and administration of the forestry program;
faculty; students; parent institution support; physical resources and facilities; and research, continuing education, and public service. I served on two accreditation committees for forestry programs at California State University, San Luis Obispo, and at Northern Arizona University. It was an interesting experience to assess forestry programs at other universities compared to the UW. With the fast-changing nature of the field of forestry, SAF has struggled with accreditation as programs have shifted to a more environmental and social-science focus rather than traditional forestry.

As a result, the College challenged the idea that SAF accreditation was needed. With the revisions to the curricula initiated in fall 2003, and the fact that fewer students were enrolling in forest management, the College gave up accreditation of undergraduate curricula. However, a non-thesis MFR in Sustainable Forest Management was accredited in 2005. When the MFR was accredited, it was viewed as a continuum of our previously accredited undergraduate program, so that the UW is listed as having a continuously accredited forestry program since 1935. After the 2015 evaluation, the MFR was recertified along with the undergraduate sustainable forest management option—with an additional year, an MFR could be earned. SAF also provisionally accredited the natural resource and environmental management option. In 1994, SAF created the certified forester program—a national certification program for foresters and other natural resources professionals that is needed for employment in many states, although not in Washington State.

Past engineering programs in the College, including logging engineering, were accredited by ABET, which was founded in 1932. After the pulp and paper technology program was established in the 1960s, there was a move to have it accredited by ABET. However, it wasn’t until 2002 that accreditation took place. The current bioresource science and engineering curriculum is accredited for students seeking education in chemical and physical sciences and in chemical engineering as applied to manufacturing fiber products, fuels, and chemicals from biomass resources.

**Student Support**

Many students have been supported by scholarships from a multitude of donors, such as the College, the University, the Washington Pulp and Paper Foundation, and teaching and research assistantships. Over the last fifty years, graduate students have received fellowships from a wide range of federal programs, including the National Defense Education Act (NDEA), Title IV, National Science Foundation (NSF), NSF-IGERT (Integrative Graduate Education and Research Traineeship), and the National Aeronautics and Space Administration (NASA). Graduate students have also been supported through campus sources: ARCS (Achievement Rewards for College Scientists), the graduate school, and SEFS endowments. Many former students, faculty, and friends of the College/School have financed endowments that provided scholarships and funds for undergraduate and graduate students and faculty.

The Washington Pulp and Paper Foundation represents a connection between academia and industry. It was incorporated in 1968 to support students in the newly established Pulp and Paper Technology degree, using contributions from companies. It also provided a pipeline for engineers to jobs that required students to obtain both engineering and communication skills.

Initial members were Weyerhaeuser, Boise Cascade, Georgia Pacific, and the Pacific Section of TAPPI. By the 1970s membership had grown to 26 members, reaching a peak of 91 in the 1990s. At first, scholarships covered full tuition for 20 students per year. However, as tuition continued to rise, especially for out-of-state students, the foundation was forced to provide less than 100 percent tuition coverage. The stock market crash of 2008 resulted in a substantial loss in endowment income, and the movement of CFR to the College of the Environment led to less support from the University. Member companies have employed 80 percent of the graduates of the UW’s Pulp and Paper Technology degree.
CHAPTER 8
RESEARCH

Introduction

The year was 1969, and there I was, 60 feet above the ground in the canopy of a Douglas-fir stand at Pack Forest, installing air-monitoring equipment for my PhD research. I had climbed a small triangular steel tower and it did not feel very safe to be held in by just a small safety belt, which I had to uncouple to move. Now, safety is paramount in canopy research. Accessing canopies is not easy, and is done mostly by climbing ropes and towers. Fig. 8.1 shows SEFS graduate student Russell Kramer using climbing ropes in the canopy of a Sitka spruce more than 230 feet above the forest floor in Olympic National Park. With the employment of canopy cranes exploring canopies has been made easier (see later in this chapter).

Fig. 8.1. SEFS graduate student Russell Kramer gathering data on three-dimensional crown structure in an old-growth Sitka spruce tree canopy in the Hoh River Valley, Olympic National Park (Source: Stephanie Kramer-Read).

Canopy studies represent a final frontier in ecosystem research and have been conducted by a number of the UW College of Forestry’s faculty and graduate students. The best known is Nalini Nadkarni (Fig. 8.2), who received her PhD from the College in 1982 and is regarded as the “Queen of Canopy Research.” Nalini has spent decades climbing trees in the Pacific Northwest, Costa Rica, Papua New Guinea, and the Amazon, exploring canopy-dwelling biota. She spent many years as a faculty member at Evergreen State College in Olympia, Washington and is currently the director of the Center for Science and Mathematics at the University of Utah, as well as an affiliate professor in SEFS. Nalini has written four books, received many awards, and has been a TED (Technology, Entertainment and Design) speaker twice. She shares her findings not only with the scientific community but also with non-scientists, with the assistance of poets, preachers, and performers. Through a partnership with the State of Washington, she worked with prison inmates and inspired them to appreciate nature, improve their time in prison, and prepare them for life beyond its walls. One of her projects involved teaching inmates to grow moss for the horticulture trade in order to relieve the collection pressure on wild mosses.
She also has a strong interest in teaching children about nature. In the 2000s she created a doll she called “Treetop Barbie.” Recently, she has been working with the toy manufacturer Mattel to create a line of dolls centered around science, exploration, and conservation. The line includes a wildlife conservationist, an astrophysicist, a polar marine biologist, a wildlife photojournalist, and an entomologist. Nalini is an outstanding example of the accomplishments of the College’s graduate students.

Robert Van Pelt, another of the College’s graduate students, is also well known as a canopy researcher. He has climbed some of the tallest trees in the world including redwoods in California and eucalypts in Australia. His drawings of forest canopies are amazing.

Of course, canopy studies represent only a very small proportion of the College’s basic and applied research. From 1907 to 2018, a total of 2,691 graduate degrees were awarded (641 PhDs; 1,562 thesis master’s; and 488 non-thesis master’s). Most of the research was conducted in Washington, Oregon, California, and Alaska, but also in other states, in many countries, and on all seven continents.

Little research was conducted in the early years, largely because of the lack of research funding from the University or other sources, a small faculty, and heavy teaching loads—faculty had to conduct research on their own time and with their own funds. Because they had nine-month appointments, faculty had to seek employment outside the University in the summer. This meant that they could not conduct research during the time that most research would be conducted. It was not until the late 1940s that things began to change.

Right after World War II, the College was able to obtain some research equipment through war surplus, but the supply was short-lived. In 1947, the Institute of Forest Products (see below) was established by the Washington State legislature. Although summer salaries were provided, there were no research funds. Furthermore, state funds were becoming more and more restricted as a result of budget cuts. Thus, began the quest for research funding. Professor Gessel found an unusual source—State Initiative 171. This allowed liquor to be sold by the drink, with each drink being taxed by the state. A portion of these taxes was allocated to the University. Gessel was able to access this fund to conduct research on soils, silviculture, and forest growth. However, Initiative 171 funds were far from enough to develop a strong research program; regularly budgeted funds to support graduate students, facilities, and equipment were needed.

This sorry situation meant that the College was falling behind other universities, including OSU and WSU (formerly the State College of Washington). Unlike the UW, both OSU and WSU are land-grant institutions of higher learning designated to receive the benefits of the Morrill Acts of 1862 and 1890. The 1862 act granted land to institutions that were to teach practical agriculture as well as classical studies. Ultimately, most land-grant colleges became large public universities that today offer a full spectrum of educational opportunities. The act of
1890 was aimed at the former Confederate states and required that race not be an admission factor. They were granted cash in lieu of land. A number of Black and Native American institutions are now included among the seventy land-grant colleges and universities that exist today.

Land-grant universities receive consistent financial support for research through the 1887 Hatch Act, including technical support staff. Faculty typically spend half the year teaching and the other half doing research—quite an edge. Although not benefitting from funds available to land-grant universities, the College began to receive stable federal funding in 1962 from the McIntire-Stennis program (Bullard et al. 2011). The McIntire-Stennis Act of 1962 (P.L. 87–788) made research funding available to a number of non-land grant forestry schools and colleges, like the UW College of Forestry. Research must be supported with both McIntire-Stennis and matching funds.

McIntire-Stennis research has generally concerned forest management; reforestation; range and wildlife habitat, outdoor recreation; protection of forest and resources against fire, insects and disease; development of land management policies; the promotion of the fullest and most effective use of forest resources; and utilization of wood and other forest-related products. Many of the research projects are performed cooperatively with scientists at the laboratories of the US Forest Service.

The funds are noncompetitive and are distributed by the use of a formula that allocates 40 percent of the funding according to a state's share of the nation's total commercial forest land, 40 percent according to the value of its timber cut annually, and 20 percent according to its state appropriation for forestry research. Typically, the UW has been awarded 55 percent of the funding in Washington State while WSU received 45 percent. Dean Bethel used it to expand the faculty in the 1970s by splitting salaries—half on McIntire Stennis and half on state salary. There was little left over for research support. As these faculty retired or left the University, their McIntire-Stennis salaries were reallocated to graduate student research.

The remainder of the chapter covers the Institute of Forest Resources; long-term research sites; faculty research, integrated research programs; cooperatives and centers; research funding sources; and dissemination of results.

The Institute of Forest Resources

In 1947 the Washington State legislature created the Institute of Forest Products (IFP)—now the Institute of Forest Resources (IFR)—as the research arm of the College (Reeves and Smith 1947). Its major objectives were to encourage faculty to pursue research-funding opportunities, conduct research in Washington State and elsewhere, foster outreach, and publish research results, including production of College publications. With the influx of new state funding for summer salaries through the IFP, the College moved from nine- to eleven-month faculty appointments. This was unusual in the University since most faculty are on nine-month appointments. Thus, there was always concern that the upper-campus administration might take these summer salaries for other purposes during University budget-cutting periods. So, in 1995, summer funding was incorporated into the College's budget, and faculty returned to nine-month appointments.

By the 2000s the IFP had become largely quiescent, so Dean Bare began to explore its rejuvenation as the IFR. In 2011 the legislature directed the IFR to pursue interdisciplinary education, research, and outreach, focused on emerging issues related to forest and environmental sciences in Washington State's rural and urban forest ecosystems. The vital benefits that forests deliver, such as ecosystem services, were recognized.

Long-Term Research Sites

Remote long-term research sites have been a feature of the College's research for decades, although some sites are now rarely used or discontinued. The locations of the eight sites are shown in Figure 8.3. Four of these sites (Pack Forest, the ONRC, Lee Forest, and the Denney Moore Forest) were owned and operated by the College and are described in Chapter 12. The four non-College-owned sites are described here: The Cedar River Watershed (City of Seattle); Markworth Forest (Washington DNR); and Mount Saint Helens and the Wind River Experimental Forest and Canopy Crane (both US Forest Service).
The Cedar River Watershed

Since the 1960s the College has conducted research in the Cedar River Watershed (Fig. 8.4), which is owned by the City of Seattle and is its primary source of drinking water. The 90,638-acre watershed is located about 37 miles southeast of campus. A mutual agreement was made in the early 1960s between the City of Seattle and the College to allow faculty to conduct research there. The first research, which involved soil and nutrient cycling studies, was conducted in 1962 by Stan Gessel and his graduate student Dale Cole in the lower watershed. When the first research was conducted, the city did not own the whole watershed. Portions were owned by private timber companies, including Weyerhaeuser, but they were eventually transferred to the city. The US Forest Service owned a considerable area in the upper watershed, in a checkerboard ownership pattern. The process of obtaining the Forest Service land was much more difficult and did not occur until 1996. The city is now the sole owner and manager of the entire watershed.

I was fortunate to serve on the Cedar River Secondary Use Committee from 1982 to 1984. It was formed by Seattle Mayor Charles Royer to explore whether the watershed could, or should, be used for purposes other than water supply, timber production, research, and education. The lower watershed had a long history of timber harvesting that continued until the early 1980s. Very little of the watershed is now in old-growth forest—just over 14,600 acres exist in the upper watershed. After considerable deliberation the committee resolved that public access
for recreational activities such as hunting, fishing, and hiking should not be allowed; that timber harvesting should be limited to protect wildlife habitat and water quality; that revenue should be used for forest restoration purposes with the aim of producing old-growth forest structure; and that research and education would continue.

The watershed was used extensively for research and course field trips until September 11, 2001, in the wake of which security was increased and access became limited. It was an ideal site for research since it contained a gradient of ecosystems ranging from low-elevation Douglas-fir to high-elevation Pacific silver fir forests. Furthermore, fences excluded people who might be intent on damaging research equipment.

Two dedicated research sites were used—the Allen E. Thompson site in the lower watershed, and the Findley Lake site in the upper watershed (now the Joseph Monahan Findley Lake site). Thompson was Seattle’s first forester, and Monahan was a CFR graduate who served as the watershed manager for many years. Sites were accessed at Landsburg and Cedar Falls, through locked gates. Before 9-11 it was relatively easy to enter the watershed. The College had keys to locks on the gate chains. Altogether there must have been about 20 locks on the chains, reflecting the number of different agencies and organizations that had access. Neither of these two sites is currently active, although research in the watershed continues at other locations.

The Thompson site was at an elevation of 721 feet and located in a second- and third-growth Douglas-fir and red alder forest (Fig. 8.5). Average annual precipitation is 51 inches and falls mostly as rain. Soils are generally poor and formed from moraine and glacial outwash materials. Facilities at the Thompson site were somewhat primitive and included a field laboratory, small support buildings, and a meteorological tower—power was available, however. Most researchers did not stay overnight, but a house trailer was used for a time in the 1970s.

Fig. 8.5. Second-growth Douglas-fir forest at the Thompson site in the lower Cedar River Watershed. The garbage cans are stemflow collectors.

The Findley Lake site (Fig. 8.6 left) is located at an elevation of 3,700 feet in a glacial cirque. Annual average precipitation is 106 inches, mostly as snow, which is present on the site from October to May and sometimes into June—snow packs are typically more than 6 feet. The pristine subalpine forest is dominated by the high-elevation species Pacific silver fir and mountain hemlock. The oldest trees are now more than 230 years of age. Soils are residual andesites with tephra from several volcanic eruptions of Mount Saint Helens and Mount Mazama. The main structure was an A-frame cabin (Fig. 8.6 right), which was used as a laboratory and eating area and provided overnight sleeping accommodation. A complex of canopy towers was constructed. Power mostly came from a generator on nearby Findley Creek, solar panels, and storage batteries. Access was difficult—a steep trail from the end of a logging road to the lake. In winter, the end of the road was reached by snowcat, and it was snowshoes from there on. A lower, shorter, flatter trail was eventually constructed.
A helicopter was also used for winter access—it landed on the frozen lake surface. This practice was discontinued, however, after the ice collapsed under one of the helicopter’s pontoons during a landing, breaking the rotor when it hit the ice. A rotor blade ended up in a tree adjacent to the lake, where it remained for years. Luckily, no one was seriously hurt. The buildings have been removed at the Thompson site, and only the A-frame cabin remains at Findley Lake, waiting for research to begin anew before it rots away.

The period of highest activity in the watershed occurred from the early 1970s through 1995. A wide array of research was conducted involving forest soils, tree nutrition, canopy physiology, forest and ecosystem ecology, ecological forestry, stream and lake ecology, fish studies, wildlife science, forest meteorology, carbon (C) and water budgets, air pollution (acid rain and ozone), effects of clearcutting, disease and insect studies, and more (Cole et al. 1988). The watershed was a major research venue for the Coniferous Forest Biome Program (1970–1978; described later). Scores of graduate students have worked in the watershed, and some have occupied or are now occupying positions on the watershed staff.

**Marckworth Forest**

The 6,900-acre Gordon D. Marckworth Experimental Forest, which is owned by the WADNR, was named after Dean Marckworth. It was established in 1967 and is located some 20 miles east of the campus. The site has a variety of forest and soil conditions, making it an ideal site for research and teaching. It was logged in the 1910s and is now a second- and third-growth forest—Douglas-fir, western hemlock, western redcedar, and red alder are the dominant species. The forest was mostly used for silvicultural, forest pathology, and paleoecological research.

**The Wind River Experimental Forest and Canopy Crane**

The Wind River Experimental Forest (WREF; Herring and Greene 2007) is located about 180 miles south of the UW’s Seattle campus in the Gifford Pinchot National Forest, just north of the Columbia River. The WREF was established in 1932. Old-growth forest is still present; many of the trees are more than 500 years old. Douglas-fir (~43 percent of the total basal area), western hemlock (~32 percent), and western redcedar (~20 percent) are the primary species. Minor species include Pacific yew (*Taxus brevifolia*), Pacific silver fir, and grand fir (*Abies grandis*).

The UW has a long history of conducting research here, but the most notable was the establishment of the Wind River Canopy Crane Research Facility. Professor Jerry Franklin spearheaded the canopy crane’s establishment.
in 1995 in the T. T. Munger Natural Area. A diagram of the construction crane in relation to the vertical profile of the canopy is shown in Fig. 8.7. Its jib was 279 feet long and the tower was 264 feet high. A professional crane operator in the cab gently guided a four- or eight-person gondola over the treetops and down to a tree or snag of interest. Fig. 8.8 shows a view of tree crowns from the gondola. The crane was able to access 300 trees, the tallest which was about 216 feet high, in a 5.7-acre area.

![Fig. 8.7. The canopy crane in relation to the vertical profile of the canopy (Source: Robert Van Pelt).](image)

![Fig. 8.8. View of tree crowns from the gondola.](image)

The project represented a cooperative scientific and educational and research venture among the US Forest Service (Pacific Northwest Research Station and the Gifford Pinchot National Forest) and the College. Many researchers from the UW, OSU, University of California at Davis, the US Forest Service, and other institutions conducted research here during the crane’s 16-year operation, including studies of canopy lichens and mosses; birds; insects; dwarf mistletoes; canopy and ecosystem C fluxes; water relations; micrometeorology; and canopy development and function.

In 2011, the jib was removed from the crane. The tower remains, however, and is being used as a research site for the US Forest Service climate change network, Ameriflux (C, water and energy fluxes), Phenocam (cameras for observing phenology), and NEON (National Ecological Observatory Network), which is gathering data at 80 other sites on the impact of humans on ecology.
Mount Saint Helens

Starting with a 5.1 earthquake at 8:32 a.m. on May 18, 1980, Mount Saint Helens erupted with great force, reducing its height from 9,677 to 8,363 feet, as well as creating a mile-wide north-facing, horseshoe-shaped crater. Landslides, pyroclastic flows (superheated ash, rock, and gas), lahars (volcanic ash mixing with melting snow and ice), and mudflows were associated with the eruption process. The landslide on the north side of the volcano filled Spirit Lake with downed trees. A bare area (Fig. 8.9) was created in front of the volcano. Thousands of trees, plants, and wildlife were killed, and fifty-seven people lost their lives. A vertical cloud of ash (tephra) was produced until late in the afternoon, rising to a height of about 15 miles. The cloud moved in a northeast direction, depositing ash in the adjacent forest, eastern Washington, Idaho, Montana, and Colorado, and eventually circumnavigated the globe. Smaller eruptions occurred on May 25, June 12, July 22, August 7, and October 18.

The different phases of the eruption produced a diversity of ecological disturbances. Five impact zones were recognized—the blast zone close to the mountain; the tree fall zone; the standing dead tree zone; the sear zone; and the ash fall zone in the green trees. Near the mountain on Forest Service and Weyerhaeuser land, as much as a foot of ash was deposited on the forest floor (Fig. 8.10). Ash depth decreased with distance from the mountain.
Quite a few College faculty were involved in research on the effects of the eruption, including Jerry Franklin (ecology); Chuck Grier, Dale Cole, Fio Ugolini, and myself (soils and nutrient cycling); Grant Sharpe (recreation); Tom Hinckley (ecophysiology); Bob Gara (entomology); Ken Raedeke (wildlife); and, more recently, Sergey Rabotyagov (cost benefit analysis of a Mount Saint Helens wolf population). It was a rare unique opportunity to conduct research on the influence of volcanic eruptions. To determine what type of research could be conducted, a number of scientists, including myself, took a helicopter flight (Fig. 8.11) in July 1980.

Of course, we didn’t know whether the mountain was going to erupt again, so we put ourselves somewhat at risk. Jerry Franklin, who was then with the US Forest Service and OSU in Corvallis, arranged the flight on a twelve-passenger Forest Service Bell 212 helicopter used for wildfire control, which had been flown over from Montana. Landings were made at several sites in the ashfall and mudflow areas. While the chopper was on the ground, the pilot kept the engine going in case another eruption occurred. A small single-engine plane circled the mountain well above the crater, keeping watch. It was an exciting day despite the fact that ash in the air permeated your hair and mouth, resulting in stiff hair and gritty teeth. Several sites were selected for studying plant succession on the pyroclastic flow material, and tree growth and mortality and litter decomposition in the forest ashfall zone.

Proposals were submitted to the National Science Foundation (NSF) but few were funded, largely because of concern about the lack of control sites—nobody had thought to cover areas with tarps before the eruption. However, NSF did provide funding in the form of small grants (around $13,000) to scientists who had existing NSF grants—and luckily, I did. Tom Hinckley and Virginia Seymour (a graduate student in Botany with Dick Walker) also received a grant. The Forest Service was also able to provide funds.

There was also considerable interest in conducting research in the Cedar River Watershed on the effects of ash on soils. No ash had actually fallen there, so ash that was deposited on the Yakima airport (located at a similar distance as the watershed from Mount Saint Helens) was trucked to Cedar River and applied to plots to study mineral weathering, nutrient cycling, and decomposition.

Ecosystem recovery was a major thrust of the research. Surviving plants and the arrival of airborne seeds, especially of early successional N-fixing lupines and fireweed, contributed to the recovery, as did the presence of snags and logs. Many soil organisms survived and insects were blown in. Although larger animals like deer and elk died, many small mammals managed to stay alive. The needles of old-growth Pacific silver trees in the ash fall zone were coated with a thick layer of concrete-like ash that did not easily wash off. Despite this, the trees survived, largely because the first eruption had occurred before bud break and the new uncoated needles that emerged continued to photosynthesize. Furthermore, the

Fig. 8.11. Helicopter on the mudflow on Pine Creek on the east side of Mount Saint Helens, July 1980. Note scientists in jumpsuits.
ash fell over snow, which retained soil moisture and increased forest-floor decomposition rates, releasing nutrients that resulted in tree growth beyond normal. The ash did not reduce oxygen flow to the soil as expected. But several years after the eruption there was a massive decline of trees to the north and northeast of the volcano. Forty years after the eruption, important ecological information continues to emerge from Mount Saint Helens research.

Faculty Research

Describing all the research conducted by the scores of faculty members and thousands of graduate students at the College is an almost impossible task. I present just a taste here. An astounding amount of research has been conducted by the 175 tenure-track and research faculty members. It encompasses wood science; logging and forest engineering (Fig. 8.12 left); forest management and silviculture (Fig. 8.12 right); new techniques (LIDAR) for forest measurements (Fig. 8.13 left); forest soils (Figs 8.13 right and 8.14 left); forest ecology (Fig. 8.14 right); forest autecology and ecophysiology (Fig. 8.15 left); paleoecology; aquatic ecology (Fig. 8.15 right); genetics and molecular biology (Fig. 8.16 left); forest health and protection—entomology, pathology, and fire (Figs 8.16 right and 8.17 left); forest micrometeorology (Fig. 8.17 right); hydrology (Fig. 8.18 left); wildlife science (Figs. 8.18 right and 8.19 left); social science (Fig. 8.19 right); urban horticulture and forestry and ecosystem restoration (Fig. 8.20 left); and bioresources—pulp and paper science and biofuels (Fig. 8.20 right). Research is no longer conducted in some areas—e.g., wood science; forest engineering; pathology; micrometeorology; hydrology; and genetics.

Fig. 8.12. Left: Shovel logging at Pack Forest. Right: A thinned second-growth Douglas-fir stand.

Fig. 8.13. Left: Airborne LIDAR System (ALS) image of trees surrounding Anderson, Bloedel, and Winkenwerder Halls on campus (Source: Jonathon Batchelor). Right: Cross section of a Douglas-fir stem showing increased radial growth after biosolids application.
Fig. 8.14. Left: Soil profile at Findley Lake in the upper Cedar River watershed. Tubes lead to tension lysimeter plates for sampling soil solutions under each horizon. Right: Forest structure in a Douglas-fir/western hemlock stand at Pack Forest showing a well-developed understory, downed logs, deep crowns, and small understory hemlock trees on a nurse log.

Fig. 8.15. Left: Ecophysiology research in the upper Cedar River Watershed. Sap flow is being measured in the wrapped trees (Source: Tom Hinckley). Right: Stream sampling for water chemistry.

Fig. 8.16. Left: Giant hybrid poplar leaves (Source: Tom Hinckley). Right: NPS employee (left) Jim Agee (center), and PhD student Dan Perrakis (right) at a controlled burn site near Crater Lake, Oregon (Source: Jim Agee).
Fig. 8.17. Left: Western pine beetle galleries (Source: Connie Mehmel, US Forest Service). Right: Douglas-fir lysimeter tree (center right) in a “pot” at the Thompson Site in the lower Cedar River watershed. The white stand pipe to the left of the tree measures water level and water loss from the tree.

Fig. 8.18 Left: V-notch weir on a small stream used for measuring stream flow. Right: John Marzluff holding a crow (Source: Keith Brust).

Fig. 8.19 Left: Two gray wolves in Yellowstone National Park (Source: John Marzluff). Right: Tourists at Paradise Visitor Center in Mount Rainier National Park.
With the rapid increase in faculty numbers in the 1970s, research groups composed of faculty with similar interests were formed. Initially, they were related to the academic division structure—biological sciences, forest management and social sciences, and wood and paper science. Later, research groups were formed that reflected the dominant research at the time. The research interest areas in 2018 were bioresource and engineering; forest ecology; forest soils; restoration ecology and urban horticulture; social sciences; sustainable resource management; and wildlife science. Many faculty participated in more than one interest area, making it difficult to pigeonhole them—hence their names appear in more than one of the research categories described in what follows.

Below are some highlights of faculty research. More on the research of the twenty faculty members profiled in Chapter 5 (Bradley, Brockman, Brubaker, Bryant, Cole, Dowdle, Franklin, Gara, Gessel, Hinkley, Hrutfiord, Lee, Oliver, Robertson, Scott, Sharpe, Stettler, Taber, Thomas, and Turnbull) is presented here. Of course, most of the research was conducted by graduate students. A list of the graduate students, along with their thesis and dissertation titles and faculty advisors from 1909 to 2018, can be seen online at UW ResearchWorks (see Appendix A).

**Wood Science**

Interest in wood science research followed the establishment of the US Forest Service wood-testing laboratory on campus several years before the formation of the College. At the time, much needed to be learned about the wood properties of Pacific Northwest species as well as trees in other countries. These properties included strength, hardness and stiffness, specific gravity, chemistry, and anatomy. The first research was conducted by Bror Grondal (1913–1955) on the properties of Douglas-fir wood, as well as wood from Japan, India, and China. He was the only faculty member studying wood science before World War II.

In the immediate postwar years three faculty were hired—Harvey Erickson (1947–1977), Benjamin Bryant (1949–1982), and David Thomas (1950–1983). They continued to examine the properties of solid wood, but also wood composites (particleboard, plywood, and veneers), as well as preservation, seasoning, and drying, with emphasis on Douglas-fir.

The 1960s was an active period, with the addition of four faculty—Larry Leney (1960–1983), James Bethel (1964–1981), Howard Gardner (1966–1979), and Benjamin Jayne (1966–1976). Leney studied ring shake and compression wood as well as the surface characteristics of veneers. Bethel conducted research on seasonal stem-growth periodicity and decay resistance in tropical hardwoods in Costa Rica. The properties of reused or recycled fibers were investigated by Gardner, while Jayne examined wood fiber systems and the properties of laminated beams and particleboard. W. Ramsey Smith (1978–1990) studied wood properties including the effects of fertilization. Non-destructive evaluation of wood quality in standing Douglas-fir trees and the effect of silviculture and climate on Douglas-fir wood specific gravity were investigated by David Briggs (1980–2011). Research in wood science was discontinued in the 1980s.
Logging engineering research was initiated with the appointment of Elias Clark (1911–1928) and continued until 1988. Clark worked on logging methods in Pacific Northwest forests, especially cable and tractor logging, and the application of North American logging methods to the Himalayan forests of India. After Clark left the College in 1928 it took another seven years before J. Kenneth Pearce (1935–1967) was hired. Like Clark, he conducted research on logging systems in the Pacific Northwest and the use of logging equipment in India, China, Indonesia, Burma, Colombia, the Philippines, and Pakistan. His focus was on skyline systems, use of helicopters, and road engineering.

The small-diameter second-growth trees that developed after the harvesting of old growth required new harvesting techniques that would take into consideration environmental concerns, such as soil compaction, erosion, and the influence of roads and culverts on streams. Six faculty members joined the College from the late 1940s to 1988—George Stenzel (1949–1976), William Atkinson (1971–1980), Peter Schiess (1975–2012), Doyle Burke (1979–1984), Frank Greulich (1977–2014), and James Fridley (1988–). Their research involved feller bunchers, shovel logging (see Fig. 8.12 left); whole tree harvesting; stand thinning using partial cut skylines; pee wee yarders; disposal of forest residues; forest soil compaction; forest road designs; log truck performance; the influence of forest roads; culvert removal from streams; and the use of GIS (Geographic Information System) and LIDAR (Light Detection and Ranging) for stream mapping. Logging systems in Burma, Taiwan, and Indonesia were also studied. Jens Jorgensen, a joint faculty member in the Department of Civil Engineering, also conducted research on logging systems.

Forest Resources Management

Research in forest resources management, now better known as sustainable resource management, has focused on silvicultural principles and practices, forest economics, and trade.

Silviculture. Silviculture has been taught in the College since its inception; but little research was conducted until after World War II, when James Robertson (1945–1969) was appointed. A succession of faculty followed—Phillip Haddock (1947–1952), David Scott (1955–1988), Krishna Rustagi (1973–1997), Chadwick Oliver (1975–2001), and Douglas Maguire (1986–1993).

Robertson and Haddock conducted research on forest productivity, while Scott studied the ecological basis for silvicultural treatments—growing space; crown and stem development; stem analysis and its applications; root development; stem fluting; and the influence of thinning (Fig. 8.12 right) and fertilization on tree stem development. All three conducted research in other countries—introduction of Douglas-fir into Turkey (Haddock); establishment of eucalypts in the Philippines (Robertson); and canopy structure in the dry dipterocarp forests of Thailand (Scott).

The emphasis of Oliver’s research was on stand development (stand initiation, stem exclusion, understory initiation, and multilayered canopies); thinning, pruning, and spacing effects on Douglas-fir growth; wind stability at forest edges; management of streamside forests; and development of the landscape management system (LMS, described in Chapter 9). Rustagi investigated growth and yield modeling and forest management planning in the Pacific Northwest and tropical forests in Malaysia, while Maguire conducted research in upper slope forests.

The current faculty are Eric Turnblom (1994–) and Gregory Ettl (2006–). Turnblom’s research includes development of silvicultural prescriptions for late successional characteristics; growth and yield in Douglas-fir in relation to fertilization, stem density, vegetation, and climate change; and quantitative models and management tools to sustainably manage forests. Ettl has studied the impacts of harvesting on sustainable forestry; the influence of forest management on C storage and wildlife habitat; forest restoration; the influence of climate change on the growth of Douglas-fir and western hemlock; tree water relations; and red alder mycorrhizas. Internationally he has worked in Ghana, Venezuela, and Chile.

Forest economics. Forest economics research began with Barney Dowdle (1962–1999), who explored public policy, forest taxation methods, and optimal allocation of forestland to timber production in the Pacific Northwest.
Internationally he studied social forestry in India; the economics of softwood and hardwood lumber in Mexico; and the contributions of forestry to the economy of Alberta, Canada. Much of Thomas Waggener’s (1966–2000) research involved the US Forest Service—e.g., the economic impact of the Northwest Forest Plan; the influence of the North American Free Trade Agreement (NAFTA) on Mexican forest products; and the economics of importing raw wood materials from Russia.

Along with Dowdle, Bruce Bare (1969–2014) studied the impacts of forest taxation on the Washington State economy, especially in relation to changing environmental policies, timber valuation, and C sequestration. The microeconomics of timber production, including log size value and the use of wood for fuel, were explored by Gerhard Schreuder (1971–2007). Schreuder also had a strong interest in Asia and conducted research on the economics of log processing and export in Japan, and the pulp and paper industry in South Korea.

International trade. International trade of forest products from the Pacific Northwest began as far back as the 1800s, but it was only a tiny proportion of the total annual cut until the 1960s. The Columbus Day storm of 1962 created a huge amount of blowdown in coastal Washington that needed to be quickly utilized. A rapid increase in international trade in forest products resulted—particularly with Japan. In the 1980s raw logs were being exported from industry and state lands, but were banned from federal forests. To study this aspect of international trade, CINTRA/FOREST was established in the College (see later in this chapter) under the direction of Tom Waggener. As well as exports, imports of forest products became a topic of interest, especially the import of cheap lumber from Canada to the US, which resulted in trade agreements with Canada in 1988, and inclusion in NAFTA in 1994.

In the 1990s three faculty were added—Bruce Lippke (1990–2009), John Perez–Garcia (1990–2015), and Ivan Eastin (1992–2015). Lippke was appointed the second director of CINTRA/FOREST and developed a research program involving economic forecasting; industry analysis; environmental assessment; life cycle assessment of forest products; the impact of wildlife and fish protection on timber harvest; and the benefits of sustainable forest management on economic, environmental, and social values. Perez–Garcia investigated world paper demand, wood import to Japan from private sources, illegal logging, and China’s forest sector. Eastin studied wood products markets in Asia (China, Vietnam, and Japan) as well as the impacts of the Canada/US softwood agreement.

Indroneil Ganguly (2016–) and Kurt Wheiler (2017–) are the current faculty. Ganguly is exploring forest products marketing; construction of green wooden buildings; and life cycle assessment and environmental footprint analysis for the Northwest Advanced Renewables Alliance bio-jet fuel project. Wheiler is the current director of CINTRA/FOREST and is conducting research on sustainable forestry; wood products production, distribution, and use; and international markets and trade.

Forest Measurements, Biometrics, and Natural Resource Informatics

Data on tree species, diameter, height, age, site quality, and defects are typically collected from forest stands. From this information forest inventories are compiled—e.g., the number of trees, basal area, and volume of trees per acre; forest biomass; C storage; and wildlife habitat. New fields are now being explored, such as forest biometry (the application of statistical methods) and natural resource informatics (analysis of environmental data from many fields to optimize forest management with respect to environmental regulations, economic constraints, and ecosystem services).

Research on forest measurements began after World War II. James Robertson (1945–1969) explored the role of permanent sampling plots and the use of remote sensing (aerial photos) for cruising second-growth Douglas-fir stands, while Kenneth Turnbull (1958–1980) studied Douglas-fir growth and yield; fertilization effects on tree growth; and the use of cameras to estimate tree diameters.

Mechanical measuring devices like diameter tapes and calipers, and clinometers to determine tree heights are the mostly commonly used instruments—diameter tapes for centuries and clinometers since 1889. They are still commonly utilized, but digital instruments with laser technology are coming to the forefront. Remote sensing is now routine and has expanded well beyond aerial photos, which were first employed in the 1930s. Satellite imagery,
LIDAR (see Fig. 8.13 left), Interferometric Synthetic Aperture Radar (IFSAR), and the Global Positioning System (GPS) are now in the mix. LIDAR has shown great potential for producing digital surface models, orthophotographs and land cover maps, and for determining vertical and horizontal forest structure, leaf area indexes, floodplain hydrology, wildlife habitats, and forest canopy fuels. Drone images are also being used.

The current faculty members are Eric Turnblom (1994–), Monica Moskal (2006–), Sandor Toth (2007–), and Van Kane (2016–). Moskal is director of the Precision Forestry Cooperative (PFC, described later in this chapter) and is well known for her work using remote sensing and biospatial analysis to study sustainable resource management, forest ecology, and wildlife science. She is especially interested in detecting changes in the structure of managed and natural forests caused by fire or other disturbances. Kane is studying forest structure patterns and processes using remote sensing, especially airborne LIDAR and satellite data. Turnblom is researching the potential use of LIDAR for determining tree species remotely—something that has proved to be very difficult to do using air photos.

Using natural resources informatics, Toth is developing analytical methods to quantify the tradeoffs of different management goals by exploring questions such as: (1) how much timber revenue would have to be foregone to increase C sequestration, provide clean water, or reduce fire hazard in a given area; and (2) what is the cost of providing contiguous forest reserves, and how would the health and integrity of forest ecosystems be affected if woody bioenergy was to be produced?

**Forest Soils**

Soils provide a multitude of ecosystem services, including water, nutrients, physical support for plants, and C sequestration. Unfortunately, they usually don’t get the protection they deserve. Montgomery (2017) estimated that about one-third of soils on the planet have been degraded by humans in some way, resulting in compaction, soil erosion and topsoil loss, loss of soil C, salinization, nutrient imbalances, contamination from pesticides and heavy metals, acidification, soil warming, and loss of soil biodiversity. Yet without healthy, fertile soils the productivity of crops and forests cannot be maintained. In recognition of this, in 2013 the United Nations designated December 5 as World Soil Day.

The soils of Washington are extremely variable and include poor soils formed after glacial retreat; cold soils in the Cascades; deep, productive soils such as those in river valleys and along the coast in western Washington; and prairie soils in eastern Washington. Like the state tree, Washington has a state soil—the Tokul series, a fertile soil found in western Washington.

Forest soils research in the College was initiated when Stan Gessel was hired in 1948. Since then, a wide variety of research has been carried out in three major areas—soil chemistry and development; soil ecology; and soil disturbances. Soils research is now less active than it was in the past. In the 1980s there were eight faculty (five tenure-track and three research faculty). Currently there are just three.

**Soil chemistry—N fertilization; tree nutrition; biogeochemical cycling; and soil genesis.** Research in tree nutrition and biogeochemical cycling was conducted by Stanley Gessel (1948–1985), Dale Cole (1964–1997), myself (1974–2012), Charles Grier (1974–1985), Robert Harrison (1987–2018), and Brittany Johnson (2018–). Fiorenzo Ugolini (1966–1990), and Darlene Zabowski (1993–2015), conducted research on soil chemistry and development, while Robert Zasoski (1973–1986) studied heavy metals. Much of this research was conducted in the Cedar River Watershed, at Pack Forest, and in Olympic National Park, although many other sites were also involved, including some in other countries.

Gessel’s research showed that Douglas-fir trees on poor soils can be N deficient, resulting in low foliage N concentrations and poor growth. These trees responded well to urea-N fertilization and N in applied sewage sludge (biosolids; see Fig. 8.13 right), but not to the addition of other nutrients. Harrison found that there was a long-term response to N fertilization. Trees on fertile sites had little or no response to N fertilization. Research on tree nutrition led to the development of a large decades-long research program in biogeochemical cycling that enabled researchers to study the processes involved with ecosystem functioning.
The study of biogeochemical cycling is very data intensive because information must be collected on atmospheric inputs; crown interception; litterfall; nutrient reallocation from old to new needles before litterfall; stemflow; litter decomposition; soil N-fixation; soil storage; root uptake; soil leaching; and stream losses. The major elements studied were C; N; phosphorus (P); potassium (K); sulfur (S); and the heavy metals aluminum (Al), cadmium (Cd), copper (Cu), lead (Pb), zinc (Zn), and nickel (Ni). Carbon storage in soils and trees is important to the remediation of global warming.

Cycling and retention of N and other elements in relation to forest productivity was studied intensely. Many innovative techniques were involved, including the use of soil tension lysimeters (see Fig. 8.14 left)—a technique developed by Dale Cole—to sample soil solutions and determine leaching losses. Forest soils of the Pacific Northwest are naturally acidic. A feature of acid soils is high Al concentrations, which can be toxic to trees. Zasoski discovered that native tree species are able to grow in this soil by increasing the pH of their rhizosphere, thus inhibiting Al uptake and favoring N uptake. Grier studied above- and belowground productivity as well as the influence of volcanic ash on nutrient movement in the forest floor. Johnson is studying soil chemistry.

In the 1960s interest in soil genesis led to the hiring of Ugolini, who studied soil properties, chemistry, and mineralogy. He had a particular interest in cold soils and conducted research on subalpine soils in the Washington Cascades, as well as soils in Alaska, Canada, Greenland, Svalbard, and Antarctica. The eruption of Mount Saint Helens in 1980 gave him an opportunity to study the influence of tephra on forest soils and soil genesis in pyroclastic flows, where soil development was faster than he expected. Zabowski studied soil development in lake sediments after the removal of the upper Elwha River dam on the Olympic Peninsula; the formation of organic canopy soils in old-growth forests (large branches of old-growth conifers and deciduous species, such as big leaf maples, allow the growth of mosses and the collection of litter that decomposes to form organic soils); and the importance of N in the coarse fraction of soils (rocks).

Soil ecology. Two research faculty—Caroline Bledsoe (1973–1992) and Kristiina Vogt (1980–1986)—and three tenure-track faculty, myself, Daniel Vogt (2000–), and Thomas DeLuca (2012–2016), conducted research in soil biology and ecology. The main focus was on mycorrhizae (or mycorrhizas)—a symbiotic mutualistic relationship between plant fine roots and fungi. Bledsoe studied nutrient uptake in mycorrhizal Douglas-fir seedlings in the lab, but the major effort was on field studies. Kristiina Vogt and I studied the ecology of mycorrhizas in low- and high-elevation forests in the Cedar River Watershed. At the high-elevation Findley Lake site, Vogt found that Pacific silver trees rely more heavily on fine roots and mycorrhizas for growth and survival than Douglas-fir trees lower in the watershed—the biomass of mycorrhizal fungi at Findley Lake is among the highest in world. In addition, I studied the influence of new forest management practices (such as green-tree retention) on mycorrhizal fungi, mycorrhizal networks, soil invertebrates, and coarse woody debris (CWD) and litter decomposition. Dan Vogt worked on slash decomposition after clearcutting and the development of canopy soils and the presence of mycorrhizal fungi, while DeLuca researched biological N-fixation.

Soil disturbances—forest practices; natural disturbances; soil pollution; climate change; and soil restoration. All the faculty mentioned above conducted research in this area, as well as Sharon Doty (2001–) and three research faculty members—Stuart Strand (1982–2009), Charles Henry (1990–2003), and Sally Brown (1990–). Many different types of disturbances were studied, including forest practices (fertilization, clearcutting, and whole tree harvesting); natural disturbances (fire and volcanic eruptions); soil pollution (acid rain, heavy metals, organic solvents, and mine spoils) and climate change. Pollution from fixed sources, e.g., deposition of heavy metals in the vicinity of the Tacoma smelter, was studied by Harrison. Loss of soil N and reduced forest productivity as a result of harvesting practices was of great concern.

As a result of Gessel’s research, urea fertilization was adopted operationally by many forest companies in Washington—thousands of acres were fertilized. But because of concerns about nitrate contamination of streams and the uncertainty of returns on investments, this practice has been curtailed. In contrast, the application of biosolids to forest soils as a fertilizer and soil organic-matter amendment is still practiced.
In 1973, Dale Cole and his colleagues pioneered research on the application of biosolids to Douglas-fir stands at Pack Forest (see Chapter 12). Although the growth response was outstanding (see Fig. 8.13 right) there were concerns that excess N and heavy metals in biosolids could be leached from the soil and contaminate nearby streams. A wide array of heavy metals was present in biosolids, including Cd, Cu, Zn, Pb and Ni. Seedlings could also take them up, threatening browsing animals such as deer and belowground voles. Concerns about biosolids application were eventually alleviated through the reduction of concentrations of heavy metals at the source and lowering application rates.

By the 1990s, the use of organic and inorganic amendments in soil restoration had become a major focus of the soils group. Henry and Brown conducted research on the influence of application of pulp and paper sludge, biosolids, and wood ash on soil health. Their premise was that the ecologically sound use of resource wastes as soil amendments can help society live in a more sustainable manner. They also studied mine tailings along with Zabowski who studied the restoration of copper and coal mine tailings.

Strand found that soil pollution caused by carbon tetrachloride (a cleaning fluid and degreasing agent) and dichloroethylene (a solvent) could be reduced by plant uptake or phytoremediation. Doty is studying how microbial endophytes in plants can remove harmful pollutants from soils, and how they can assist plants to grow in N-poor environments, which is more sustainable than application of inorganic fertilizers. Fast-growing poplars and willows are able to remove pollutants as well as preventing soil erosion loss and protecting waterways.

Johnson has commenced research on the influence of soil conditions (chemistry, and water movement) on the response of Ponderosa pine trees to climate change, as well as soil water repellency after forest fires.

**Forest Ecology**

Understanding forest ecology is the basis of sustainable forestry. Forestry plantations in the Pacific Northwest typically consist of single-species stands (mostly Douglas-fir) with low genetic and structural diversity. Although this makes sense from an economic perspective and Douglas-fir naturally grows well in well-lit clearcuts, these forests are a far cry from the diverse old-growth forests that used to cover the landscape. Modern sustainable forestry is attempting to increase diversity while reducing economic values as little as possible.

Although some ecological research was conducted in the early years of the College, it wasn’t until 1955 that a forest ecologist, Professor Scott, was appointed. Here I describe the array of forest ecology research done at the College, including ecosystem ecology, disturbance ecology, and ecosystem management and restoration. Paleoecology, ecophysiology and autecology, and aquatic, wildlife, soil, and urban ecology are covered in other sections.

*Ecosystem ecology—forest succession and stand development; structure and function of old-growth forests; forest productivity and carbon sequestration; fire ecology; conservation biology and ecological modeling.* Faculty involved in research in this area of research were Dave Scott, Chad Oliver, Chuck Grier, **Jerry Franklin** (1986–2017), Dan Vogt, Kristiina Vogt, **Charles Halpern** (1991–2019), and me. Professors Scott and Oliver studied forest succession, species competition, and forest productivity in a variety of ecosystems in Washington. Dan Vogt also studied productivity in Douglas-fir in relation to stand age and site quality. Interest in belowground processes began in the 1970s. Grier and Kristiina Vogt studied both above- and belowground productivity, including fine-root biomass production and turnover in Douglas- and Pacific silver fir ecosystems. Colder ecosystems have much more belowground production in comparison to aboveground production than lower-elevation ecosystems do. Grier also studied the net primary production of epiphytes in the canopies of temperate and tropical forests.

With Grier’s departure in 1985, the College hired Franklin who conducted research on the structure and function of natural forest ecosystems. Franklin determined that the major structural components of these forests were large old trees of various species; standing dead snags and large logs on the forest floor (CWD); deep canopies; canopy gaps; and high biodiversity of plants, animals, birds, and soil microbes (for some of these structures, see Fig. 8.14 right). Tree seedlings and other vegetation establish on nurse logs, while snags provide habitat for animals and birds. Franklin also studied the growth and mortality of old-growth trees and their ability to sequester C despite
their age at the canopy crane site. This is an interest I shared with him in my research in the Olympic Peninsula rainforest. Franklin's many research contributions are summarized in Chapter 5.

Understory plants are important components of forest ecosystems and they were the main focus of Halpern’s research. He studied understory plant survival, conifer encroachment, soil seed banks at the interface of forests and subalpine meadows, interactions among species in plant communities, and conifer regeneration in riparian forests. In addition, he explored the effects of climate change on understory plants as well as the consequences of ecological thinning, prescribed burning, and timber harvesting on understory plant species diversity and community structure.

Research on the fire ecology of natural systems has been studied by a number of faculty; but since it can be considered to be a disturbance, I describe it in the next section.

**Disturbance ecology.** Disturbances cause profound changes in ecosystem structure and function, C sequestration, biodiversity, and other attributes, depending on their severity and extent. They can be natural—e.g., disease, flooding, insect outbreaks, wildfire, wind storms and volcanic eruptions, or human caused or exacerbated by activities such clearcutting, riparian zone harvesting, introductions of exotic insects and diseases, deliberately lit fires, and, now, climate change.

Fire is a common disturbance in the dry forests of eastern Washington, but also can occur in the moister forests of western Washington, though less often. Considerable research has been carried out by the fire ecologists—**James Agee** (1978–2007), **David Peterson** (retired) and **Donald McKenzie** (Forest Service scientists with appointments in the College), **Ernesto Alvarado** (2009–), and **Brian Harvey** (2016–). Agee studied fire history; species succession after fire; the effects of wildfire on forest regeneration, stand structure, and stand development; relationships between fire and bark beetles; and riparian fires. Most of his studies were conducted in national parks and national forests.

Peterson conducted research on regeneration of subalpine trees after fire and relationships between fuel treatments and fire hazard, while McKenzie studied fire effects in alpine tree-line ecotones, and the influence of climate-driven changes on fire regimes and C storage. Alvarado has carried out research on fire history, behavior, and ecology; C emissions; and the relationship between fire and climate change. He has worked in many ecosystems—boreal forests in Alaska; temperature forests in the western US; tropical forests in Brazil and Bolivia; as well as ecosystems in Mexico and Paraguay. Harvey, a landscape ecologist, is studying how climate change influences fire and insect outbreaks, their interactions, and forest structure and function.

As well as fire, insects have a huge influence on forest ecology. Starting in the 1960s, Robert Gara studied the impact of bark beetles, weevils, and defoliators on Pacific Northwest ecosystems, as well as the interactions between bark beetles and fire. Patrick Tobin, an insect ecologist, is studying the influence of insects on ecosystem services and biodiversity. More on fire, insects, and diseases is presented in the forest health section.

Climate change is now a major focus of ecological research in SEFS. **Joshua Lawler** (2007–), a landscape ecologist and conservation biologist, is studying how climate change influences plant and animal distributions, biodiversity, ecosystem services, species adaption, and vulnerability of wildlife species in western North America. In an era of rapid climate change, animals and plants will need to move to more suitable habitats. Climate corridors will be needed to allow species to move safely to new locations. Lawler’s research team is determining the potential future habitats for more than a thousand species of plants, birds, mammals, reptiles, and amphibians across the continental US. Greg Ettl has studied the influence of climate change on Douglas-fir and hemlock growth.

Recently, Lawler became engaged in conservation psychology—i.e., exploring how people make environmental decisions and what psychological benefits people gain from nature. As a member of EarthLab in the College of the Environment, he has developed “Climate Quest,” a video game to educate children about the effects of climate change.

**Ecosystem management and restoration.** Knowledge of natural ecosystem structure and function is now being applied to forest ecosystem restoration and management using thinning, CWD and green tree retention, snag creation, and prescribed fire. Both Franklin and Halpern have been involved in the Demonstration of Ecosystem Management Options (DEMO) study, which was initiated in 1994 to test some of the recommendations in the Northwest Forest Plan for matrix lands. Six sites—two in western Oregon and four in western Washington—were established in
mature forests dominated by Douglas-fir. Green tree treatments with 15 and 40 percent retention in both aggregated and dispersed patterns were implemented. The short-term and long-term responses of understory and overstory vegetation, wildlife, arthropods, and fungi were determined relative to different forest structures. In addition, they participated in an ecosystem restoration project in the Cedar River Watershed involving ecological thinning and gap creation to increase understory plant and habitat diversity.

Ettl has studied the impacts of forest management on C storage and the delivery of ecosystem services. He has designed harvest practices that are beneficial for the forest owner while simultaneously enhancing wildlife habitat and restoring historic forest conditions. A number of CUH faculty also studied ecosystem restoration. Their contributions are described in the urban horticulture section.

**Autecology and Ecophysiology**

Autecology is the study of individuals of a given species in relation to their environment. How the environment—both physical and biological—interacts with the physiology of an organism is ecophysiology. Many of Dave Scott’s students carried out research in these fields. A large number of western tree species were studied, including Douglas-fir; Pacific silver, subalpine and noble firs; white spruce; lodgepole, ponderosa, and western white pines; western hemlock; and red alder. Also included were understory species—salal, sagebrush, and salmonberry. Many of the studies involved the influence of temperature and plant water stress on photosynthesis, transpiration, and tree growth. Scott conducted research in Washington, Oregon, Alaska, Montana, and British Columbia. The Duff and Nolan (1953) stem dissection technique for estimating tree growth in young trees was a feature of much of his research.

Tom Hinckley is well known for his research in ecophysiology. He studied relationships between soil temperature and seedling water potential in subalpine fir; light and water relations in Pacific silver fir—e.g., sap flux (see Fig. 8.15 left)—and hybrid poplars; the effects of Mount Saint Helens ash on stem growth in Pacific silver and Douglas-fir; and shade tolerance. Further research involved root/shoot interactions, crown architecture, branch autonomy, and stomatal response to poplar rust in resistant and nonresistant clones of hybrid poplar. Much of his research was conducted at or near Findley Lake in the Cedar River Watershed.

**David Ford** (1985–2013), a plant physiologist and modeler; studied the dynamics of old-growth tree canopies at the canopy crane site. Ecologists have always pondered how old-growth canopies develop from younger trees that grow with strong apical dominance, conical crowns, and lower branch death. Ford discovered that deep old-growth canopies develop through the maturation of epicormic buds in the stems and branches. Shoots and needles compete for light, and the presence of canopy gaps provides the light necessary for them to develop. Thus, the crowns appear to be growing downward. Several ecophysiologists, including Soo-Hyung Kim, conducted research at CUH—their research is described later in the chapter.

**Paleoecology**

**Linda Brubaker** (1973–2006) brought a very new area of research to the College—paleoecology, or ecology over geologic timescales. By analyzing lake-sediment fossil pollen and tree rings, Brubaker was able to study past vegetation and the influence of climate change. Thousands of years ago, western Washington had a much colder and drier climate with lodgepole pine, Engelmann spruce, and mountain hemlock as the main species. With the retreat of the continental ice sheet about 10,000 years ago and a warmer and wetter climate, Douglas-fir, western redcedar, and western hemlock began to appear. Brubaker’s regional-scale research indicated that the forests of western Washington have been relatively stable over the past 6,000–7,000 years. **Doug Sprugel** (1984–2013) showed that species composition and fire frequency over geological time scales varied significantly at the stand level, particularly on drier sites within the region. Additionally, Brubaker used tree ring analysis to predict future temperature and precipitation trends in the Pacific Northwest and southwest Alaska.
Like Brubaker, Estella Leopold (1976–2000), who was a faculty member in Biology, the Quaternary Research Center, and the College, also studied paleoecology, as did Lisa Graumlich (2010–), the first dean of the College of the Environment. Her primary research interest now is the adaptation of ecosystems and human societies to climate change, especially severe and persistent drought.

**Aquatic Ecology: Riparian, River, and Stream Ecology, and Aquatic-Terrestrial Interactions**

Before the 1970s, research on streams and lakes was conducted independently from research in the surrounding forest, even though they were parts of the same larger ecosystem. But in the 1970s, as part of the Coniferous Forest Biome Program, research on the chemistry and biology of Findley and Chester Morse lakes in the Cedar River Watershed in relation to the surrounding forest was conducted by Robert Wissmar (Fisheries) and Jeffrey Richey (Oceanography)—both of whom held joint positions in the College.

Connections between terrestrial and aquatic ecosystems became more apparent when concerns were raised in the 1980s about the influence of forest clearcutting and road construction on riparian areas, streams and fish—particularly migrating salmon. To determine the impact of disturbances, streams are commonly sampled for chemistry, flow, turbidity, temperature, invertebrates, algae, and fish populations (see Fig. 8.15 right). The research of Robert Naiman (1988–2012), who was the first director of the Center for Streamside Studies (discussed later), was focused on the influence of forest harvesting on stream ecology. CWD, also called LWD (large woody debris) in streams, had typically been removed during clearcutting operations, but its retention was now seen to be important for the well-being and recovery of salmon, as well as providing habitat for small mammals and birds. Naiman also drew attention to the protection of riparian areas.

Perhaps Naiman’s most interesting research was conducted in Alaska, where he found that migrating salmon acted as conveyor belts for N and P from the ocean to streams and then to the forest. By consuming and moving salmon carcasses from streams, brown bears deposited the nutrients in the adjacent forest. Richard Edwards (1996–2000) studied the biology and hydrology of riparian and hyporheic zones in the floodplain of the Queets River on the western Olympic Peninsula.

I also conducted aquatic research involving stream chemistry and biology in a small old-growth watershed in Olympic National Park, as a part of a nationwide research program on acid rain. In addition, in cooperation with scientists from the USFWS, the US Forest Service, the WADNR, and UW faculty in fisheries, I studied the influence of clearcut harvesting on small stream ecology and fish habitats, the effects of retaining riparian strips during harvesting on stream temperatures and turbidity, the influence of wood in streams on salmon habitat, the effect of salmon carcass placement in riparian areas on stream chemistry, and the impact of the persistent airborne pollutant TCNB (tetrachloronitrobenzene) on salmon in the Cedar River Watershed. Dan Vogt also conducted research on the influence of forest harvesting on stream temperatures and chemistry.

Other aquatic scientists include the USGS scientist Christian Torgersen, David Butman (2014–), and Philip Levin (2016–). Torgerson’s research focused on spatial heterogeneity in aquatic ecosystems, including patterns in the location of Chinook salmon reds, eggs to fry survival, aquatic insect assemblages, and mountain white fish. Levin is a marine ecologist who was appointed Professor of Practice and holds positions in SEFS and the Nature Conservancy, where he is a lead scientist. His interests include interdisciplinary conservation science, ecosystem-based natural resource management, and marine and coastal conservation biology. He is examining the impacts of ocean acidification on human culture, particularly that of Native American tribes.

Butman is a member of the UW Freshwater Initiative, an interdisciplinary research program that explores ways to measure, quantify, and understand the impacts of climate, land use, and management on water resources and C cycling. The objectives of his research are to determine how natural systems change as a result of anthropogenic C emissions, how climate change is altering the landscape, and how to better understand how humans might be able to mitigate resource degradation.
Genetics and Molecular Biology

In the 1960s there was interest in increasing the growth and yield of Douglas-fir through genetic selection and breeding. Reinhard Stettler (1963–1970) was appointed to explore this potential. Most of Reini’s research, however, was conducted on the genetics of native black and eastern US cottonwood hybrids (Populus trichocarpa x Populus deltoides) rather than Douglas-fir. Hybrid poplars with their huge leaves (see Fig. 8.16 left) are fast-growing and suitable for solid wood products, pulp and paper, and biofuels. Reini also studied the establishment of black cottonwood in riparian zones and river gravels.

William Hatheway (1969–1995) studied natural variation in native understory plants. Toby Bradshaw (1994–2003), a research faculty member, conducted research on the genetic basis of adaptive trait evolution in natural populations of plants, especially in relation to the origin of new species via plant-pollinator co-evolution. He also studied the susceptibility of poplar clones to an introduced poplar rust disease. Sharon Doty (mentioned earlier) has determined that transgenic poplars have great potential for remediation of chemically contaminated sites and production of bioenergy. She currently chairs the working party on Environmental and Ecosystem Services under the International Poplar Commission of the Food and Agriculture Organization of the United Nations.

A shared genetics lab, managed by wildlife scientist Laura Prugh (2015–), has recently been established in SEFS. It is designed to collect low-quality/low-quantity DNA from hair, scat, and saliva of animals to identify species, sex, and individuals. Water, soil and other types of samples are also analyzed in the lab.

Forest Health and Protection: Fire, Entomology, and Pathology

The concept of forest health and protection was introduced in the 1980s as an analogy to human health. Before that time, insects, diseases, and fire were studied as separate disciplines in the College, with little connection. In the 1990s, Jim Agee (fire), Bob Gara (insects), and I (diseases) joined forces to teach and conduct forest health research.

Fire. Although fire was considered to be a major threat to Pacific Northwest ecosystems, little research was conducted in the College until the 1960s. The first fire scientist, James Murphy (1968–1978), studied airplane firefighting, particle emissions, and prescribed burning. Six years later he was joined by Stewart Pickford (1974–1999). Pickford was a graduate of the College who conducted research on fire physics and behavior, including the influence of fuel moisture on prescribed fires, relationships between drought and fire, and fire severity and its relationship to topography. Internationally, he worked on prescribed fire in Parana, Brazil. Murphy left the University in 1978, and was replaced by Jim Agee. In contrast to Murphy and Pickford, whose research was focused on fire behavior and management, Agee studied fire ecology, as well as fire management, including controlled burning (see Fig. 8.16 right). There is currently no tenure-track fire scientist, but Ernesto Alvarado, who is a WOT Professor, has continued fire research, including fire behavior and fuel treatments—especially on tribal and federal lands.

Entomology. The overall emphasis of the forest entomology program has been on the study of bark beetles and defoliators. Research only began in the early 1960s, with the hiring of Hermann Heikkenen (1962–1970), who studied Sitka spruce weevils and the role of terpenes in bark beetle ecology. After Heikkenen left the University, the research was continued by Robert Gara. Over his long career he conducted research on bark beetles (Fig. 8.17 left) and weevils (Sitka spruce weevil, and mountain pine and Douglas-fir beetles); bark beetle/root rot interactions; defoliators (Douglas-fir tussock moth, gypsy moth, and western spruce budworm); and aquatic and urban insects. Many of his students conducted research in Latin America (Costa Rica, Chile, and Venezuela). The current entomologist is Patrick Tobin (2014–) who studies insect invasions and population ecology.

Pathology. The main emphasis of forest pathology research was on root diseases, foliage and canker diseases, and air pollution. Charles Driver (1965–1987) focused on laminated root rot, Heterobasidion root and butt rot, Rhizina
root disease, and dogwood canker. My pathology research also involved the biology and management of root
diseases, including spore dispersal in the forest, as well as madrone canker, and air pollution in the Puget Sound area.

**Micrometeorology and Hydrology**

Leo Fritschen (1966–1992) conducted research on micrometeorology, which largely involved studying energy
budgets—sensible heat, short- and long-wave radiation, heat storage, and latent heat (evaporation and transpiration).
He believed that much of the functioning of forests, including plants, animals, and microbes, could be explained
through an understanding of their energy budgets and the microclimate in which they lived. One of his unique
projects involved water use by a 90-feet-tall Douglas-fir tree in the Cedar River Watershed. To do this he constructed
a weighing lysimeter (see Fig. 8.17 right) consisting of two large steel tanks, one inside the other, with a curled hose
filled with water under the bottom of the inside tank, which held the tree and soil. The hose led to an aboveground
stand pipe in which water level was measured to calculate evapotranspiration. Fritschen determined that water
loss from the tree could conservatively be as much as 30 gallons per day in summer (Fritschen et al. 1977). He also
studied the behavior of wind in forest interiors and edges, and smoke management in relation to slash burning.
Little microclimatology research was conducted after he retired.

In the late 1960s it became apparent that research on hydrology was needed to answer questions concerning the
effects of forest management on the hydrological cycle. In total, four faculty conducted research on forest hydrology:
2015). As the first forest hydrologist, Wooldridge conducted research on streams in small watersheds including
relationships between vegetation and stream flow; stream chemistry in undisturbed streams; sediment production;
and the effects of clearcutting on soil and water runoff and snowmelt. One of the features of hydrology research is
the use of V-notch weirs (see Fig. 8.18 left) to measure stream heights and determine watershed discharge. Small
streams, like this, can make up half of the stream mileage in a watershed. Just prior to Wooldridge’s retirement,
Cundy joined the faculty and continued research on the influence of forest management on hydrological processes.
The major focus of his research was the influence of logging, road construction and maintenance, and truck traffic
on water infiltration and runoff; sediment yield; landslides; and loss of lateral root reinforcement. He also studied the
influence of vegetation on runoff, sediment production, and snowmelt, including the effects of rain on snow events.

Harr was a forest hydrologist employed by the US Forest Service with a joint appointment in the College. One
of his most interesting studies involved the contribution of fog condensation in old-growth tree canopies to the water
supply of Portland, Oregon, from the Bull Run Watershed. A considerable portion of water reaching dams was from
fog drip—no fog drip occurs in clearcuts. Harr also studied sediment transportation in upper-slope watersheds.

Bolton was the last faculty member appointed and continued research on the impact of forest management on
hydrological processes. She studied land use effects on salmon streams; influence of timber harvest on streamflow
and sediments; effects of LWD on hydraulic flows; channel migration; the influence of riparian vegetation on
extreme stream temperatures; stream restoration; and rain on snow events. Internationally, she conducted research
on the effects of dam removal in Taiwan and stream ecology in Costa Rica, and as a contributor to Engineers
without Borders she developed socially sustainable strategies for producing clean water and improving sanitation
and hygiene for native populations in South America. On campus she made a significant contribution to a cross-
campus interdisciplinary program studying relationships among medical, social, and biophysical sciences.

**Wildlife Science**

Before the 1960s little was known about wildlife in Washington’s forests except for big game animals, which were
hunted for food and considered to be pests—deer consumed seedlings and bears damaged and killed larger trees.
In the 1960s it was recognized that other wildlife played important ecological roles in forests, and that forest
management was affecting them.
In fall 1967, the UW president Dr. Charles Odegaard suggested that a joint interdisciplinary wildlife program be established between the Colleges of Fisheries and Forestry. A year later, Richard Taber (1968–1985) was appointed as the first wildlife faculty member. In the more than 50 years since Taber was hired, considerable research has been conducted on the ecology of birds, mammals, and amphibians; habitat loss and restoration; endangered species; species conservation and reintroduction; and the influence of forest management.

Although Taber’s primary research interest was ungulate ecology—deer and elk—he studied a wide variety of other wildlife species, including red foxes, mountain goats, birds, bobcats, aquatic animals (harbor seals and river otters), and even invertebrates—banana slugs. The ecology of slugs was studied in the Cedar River Watershed. They were kept in small enclosures so that they could be recaptured for periodic measurements. To identify them individually, numbers were freeze-branded on their heads. Taber conducted research in both forest and urban environments in the Pacific Northwest as well as in Alaska, Nepal, Costa Rica, and Chile. But he couldn’t conduct all the needed research alone—other faculty were required to specifically study birds, small and large mammals, and amphibians.

**Birds.** David Manual (1972–2008) was the second wildlife faculty hired. His interests embraced nesting ecology and breeding, avian response to urbanization, and the development of management strategies for wildlife habitat areas. Manuwal studied terrestrial birds, including red wing blackbirds, brewer’s blackbirds, barn owls, brown creepers, spotted owls, and cavity nesting birds, as well as aquatic birds—tufted puffins, auklets, fork-tailed storm petrels, sea ducks, murreas, bald eagles, Hawai’ian geese, Canada geese, trumpeter swans, and wetland birds.

John Marzluff’s (1997–) research involves habitat fragmentation, bird conservation, and avian social ecology and demography. He is well known for his research along the urban/rural gradient—high species diversity is common in the suburbs. Corvids (ravens, crows, and jays) and raptors (falcons and hawks) are his main subjects. Crows (see Fig. 8.18 right) are particularly “smart” birds and have adapted well to urban environments—they are very aware of humans. To determine just how “smart” they are, Marzluff exposed them in 2006 to people wearing masks, including him, with threatening human faces (cavemen) and neutral faces, to see if they could remember them later and what their response would be. The crows were held captive for four weeks and released. Students wearing the masks then walked on campus. Those wearing threatening masks were harassed, while those with neutral masks were not. Fourteen years later in 2020, Marzluff walked on campus wearing the caveman mask and the crows scolded him including several from the 2006 study. Crows can not only remember, but can apparently teach their offspring and other crows in their murder about specific threats. To further illustrate their smartness, crows use “tools” and have been observed placing walnuts on roads to be run over and opened by passing cars. Marzluff also studied the influence of land management on marbled murrelets and spotted owls; relations between song birds and predators (Cooper’s hawks and Hawai’ian hawks); blackfooted albatrosses; and Steller’s jays.

**Small mammals and amphibians.** In the late 1970s Steve West (1979–2013), whose expertise was in small mammal and amphibian ecology and conservation, was appointed. He studied snowshoe hares, pygmy rabbits, northern flying and gray squirrels, voles, and bobcats, as well as salamanders and frogs in forest streams and stormwater ponds. Beyond small mammals and amphibians, he studied the importance of habitat connections for spotted owls; carnivore conservation; and the ecology of South Asian tallgrass communities.

**Large mammals.** Adding to the ungulate research conducted by Dick Taber, Kenneth Raedeke (1981–2006, research faculty) investigated large terrestrial mammals (deer, elk, mountain goats, and elephants in forest reserves in Tanzania); marine mammals (harbor seals and porpoises); and Magellan penguins. Many of his studies involved the impact of natural and human disturbances on wildlife—e.g., the effects of recreation on elk recovery at Mount Saint Helens, and of timber harvesting on black-tailed deer.

Predator-prey interactions in both terrestrial and aquatic ecosystems have been studied by Aaron Wirsing (2008–). Predatory sharks in Western Australia were the subjects of his PhD research, and although it was conducted in a marine ecosystem, his knowledge was easily adapted to the study of top predators in Pacific Northwest forests—gray wolves (see Fig. 8.19 left) and black bears, which shape wildlife communities through their presence.
Wirsing is currently studying their reintroduction in the North Cascades. He also investigated monitor lizards in Indonesia. Laura Prugh (2015–) also studies predator/prey species interactions—e.g., the effects of wolves on smaller carnivores such as coyotes, foxes, and lynx in Denali National Park in Alaska, and the response of wildlife communities to global change.

Species conservation and management. Wildlife species conservation and management have been studied by all of the aforementioned faculty, especially the well-known and charismatic species such as spotted owls, marbled murrelets, black bears, gray wolves, and Roosevelt elk. Beth Gardner’s (2016–) goal is to improve decision-making for wildlife conservation and management using spatial statistics, mathematical modeling, camera trapping, and hair snares. Gardner also manages the Quantitative Ecology Laboratory, which is developing innovative methods to study wildlife, plant, and fish populations around the world.

The Washington Cooperative Fish and Wildlife Research Unit

Federal government scientists on campus associated with fisheries and forest wildlife have contributed to the College’s research program. As a NPS wildlife scientist, Richard Weisbrod (1972–1978) joined the College with the Cooperative Park Studies Unit. His research was centered on the Northwest national parks, including Alaska. The major cooperative on campus now is the Washington Cooperative Fish and Wildlife Research Unit (WCFWRU). It was originally established as a fisheries unit in 1967, but in 1989 it was combined with the wildlife group in the College, with Christian Grue in fisheries as director. It is one of forty national cooperative units located on university campuses. The cooperators include the USFWS, USGS, Washington State Departments of Fish and Wildlife and Natural Resources, and WSU.

The current unit leader of WCFWRU is Sarah Converse (2017–), who has joint appointments in SEFS and the School of Aquatic and Fishery Sciences. Her group conducts research on terrestrial vertebrates and assists wildlife managers with decision-making in the face of climate uncertainty and complex and conflicting societal values. She is working with faculty in the Center for Quantitative Science in Forestry, Fisheries and Wildlife; the Department of Biology, and the Burke Museum, as well as with collaborators in North America, Europe, New Zealand, and arctic countries.

Social Science

Although the recreational value of forests in Washington was recognized when the Mount Rainier (1898) and Olympic (1939) National Parks were established, little social science research was conducted until after World War II, when research on outdoor recreation commenced. But social science research was slow to develop and did not expand until the 1970s—it is now one of the major thrusts of SEFS research. The main research areas are wildland recreation; land use and urban planning; human dimensions of forestry; and environmental policy and law.

Recreation. Research on forest recreation began with C. Frank Brockman (1946–1967). Most of his research involved national parks—the administrative history of Mount Rainier National Park; plant taxonomy and ecology in Mount Rainier and Olympic National Parks; and development of recreational plans for Pack Forest and Venezuelan National Parks. When Brockman retired his position was filled by Grant Sharpe (1967–1990), who studied a wide array of subjects, including interpretive signage for visitors at Mount Rainier (see Fig. 8.19 right); opportunities and plans for the handicapped in Glacier Peak Wilderness and the Dungeness Spit Wildlife Refuge; the Ross Dam controversy; the use of cameras and photos for understanding dispersed recreation on forest roads; community-based education for river management; pumice removal at Mount Saint Helens; human contact with animals in urban parks; and zoo interpretation. In addition; he worked on international tourism—recreational planning in Nigerian forests and the Marine National Park in Venezuela. His position was not replaced after he retired, and recreation research has not received as much attention since.
S A V I N G  F O R E S T  E C O S Y S T E M S

J. Alan Wagar (1967–2005) was hired at the same time as Sharpe. He studied the impacts of roadways; pheasant hunters in western Washington; environmental interpretation; and recreational use of Puyehue National Park in southern Chile.

The major growth in the social science program started with the addition of Donald Field (1970–1983), who was a NPS employee with a faculty appointment in the College. His research involved community conflict and response to natural resources management; family behavior in parks; forest practices logistics and social values; interpretive activities in parks; the influence of place on recreational behavior; and relationships among hikers.

Land use and urban planning. Gordon Bradley (1972–2014) was the primary faculty member in this area. He had a wide range of interests—environmental policy; land-use change and planning; the urban/rural gradient; urban forest management; and relationships between people and nature. His projects involved the effects of off-road recreational vehicles; the visual characteristics of managed landscapes; and interpretation plans for the NPS and the US Forest Service.

Human dimensions of forestry. Social conflicts are inevitable in the field of forestry—e.g., native populations have been displaced and timber-dependent communities have been impacted by the changing perspectives of modern forestry. Robert Lee (1978–2008) conducted research on tourism; rural development; the sociology of indigenous populations in Alaska and northern New Mexico; social conflicts associated with forest management—particularly with respect to the implementation of the Northwest Forest Plan and the spotted owl on timber-dependent communities; environmental ethics; the sociology of leisure; the impact of forest practices legislation; and perceptions of forest management by different social groups. He conducted research in Washington, New Mexico, and Alaska. Internationally, he worked in Africa, Australia, China, Costa Rica, India, Japan, and Mexico.

Stanley Asah (2008–) is studying how human and organizational behavior and politics can be used to promote sustainable natural resource management and conservation. His research on human-environment interactions includes connecting people to the outdoors—especially children; the social feasibility of family-owned forests to produce biofuels; how ecosystem services provided by US national parks play a role in promoting public involvement in nature-based activities and environmental stewardship; the impact of smoke from wildland fires on small forest communities; and the reintroduction of gray wolves. Asah is using the psychological sciences—including social marketing and persuasive communication—to promote pro-environmental behaviors such as energy conservation and efficiency.

Peter Kahn (2014–) is a professor in the Department of Psychology and SEFS and is the director of the Human Interaction with Nature and Technological Systems (HINTS) lab, which is located in Anderson Hall. He is exploring two trends that are reshaping human existence—the rapid degradation of the natural world, and the speed of technological development. His team is investigating how interactions with nature benefit people physically and psychologically, and how the psychological effects of technologies that simulate, mediate, or augment nature can contribute to urban sustainability. The impacts of nature experiences on human cognitive function and emotions, and the relationship of mental health to ecosystem service assessments are the focus of David Bratman’s (2017–) research.

Environmental policy and law. The 1970s saw the enactment of a variety of laws related to forest policies at the federal level—the National Environmental Policy Act (1970), Endangered Species Act (1973), Forest and Rangeland Renewable Resources Planning Act (1974), and the National Forest Management Act (1976). The important laws at the state level were the Environmental Policy Act (1971) and the Washington Forest Practice Act (1974). Ann Forest Burns (1978–1981), an attorney who had received her undergraduate degree from the College, was hired to teach and conduct research in forest law. In the late 1980s Debra Salazar (1985–1990) studied property and law, land conservation and goods flow, as well as property rights economics.
Margaret Shannon (1992–1998) worked on special forest products management; employee response to incorporation of environmental complexity in the US Forest Service; and transfer of ecosystem science to ecological management. Using a multidisciplinary approach Dorothy Paun (1993–2018) explored the triple bottom line (social/environment/economic relationships) in sustainability management. It involved studying relationships among corporate environmental stewardship, social responsibility, and financial performance. The premise was that corporations will benefit from decreasing their ecological footprints and increasing their social responsibility, leading to higher profits.

In the late 1990s, the impacts of natural resource policy continued to gain in importance, leading to the appointment of Clare Ryan (1998–). Ryan holds appointments in SEFS, the Daniel J. Evans School of Public Policy and Governance, the School of Marine and Environmental Affairs, and the School of Law. In addition, she was the director of the Program on the Environment from 2011 to 2016. Her research focuses on how environmental policies are developed and implemented, conflict resolutions, the integration of scientific data into policy and management decisions, and sustainable forest management. She has conducted research on adaptive management areas, state watershed planning, the regional salmon recovery plan, farm to college programs, visitor recreation, federal fire management, and urban management plans. In Belize she studied debt for nature swaps.

Interface between ecological and social sciences. Most of the social scientists have connected their research to nature, but recently more of their research has been connected to ecological sciences. For example, Stanley Asah and Greg Bratman study ecosystem services. Kristiina Vogt’s initial research involved soil biology, but since she returned to the College in 2000, she has studied the linkages between ecological and social sciences to answer the question: Will human activities cause ecosystems to become unsustainable? She has worked closely with Native American tribes in Washington on conservation planning, sustainable practices of forest land stewardship, and use of forest biomass for sustainable energy. Vogt has conducted research and consulting in the US, including Alaska and Puerto Rico, and in other countries—Bolivia, Indonesia, Iceland, Peru, Malaysia, Mexico, Nepal, Brazil, and Belize. Bernard Bormann (2015–), who is the director of the ONRC, is studying how to improve both ecological and human community sustainability in rural human/forest ecosystems, while Daniel Brown (2018–) is researching the linkage of landscape patterns to ecological and social processes.

Urban Horticulture: Urban Forestry and Ecosystem Restoration

Trees are a primary feature of the urban/rural gradient in the Pacific Northwest. Hundreds of species and millions of individual trees exist in urban and suburban areas, including those along streets and in city parks, arboreta, and private gardens. Trees provide shade, moderate air temperatures, and protect against urban water runoff. Furthermore, in Seattle and other urban areas, forest patches exist. To care for single trees and tree populations, the concept of urban forestry was introduced. Al Wagar and Gordon Bradley conducted research in this area. Kathleen Wolf (2000–2005) studied urban forest management and the role of trees in human well-being—they provide visual pleasure and architectural, recreational, and psychological benefits. The CUH faculty have mostly conducted research in plant physiology and ecophysiology; species conservation, landscape design, and arboretum management; invasive plants species; and ecology and restoration of disturbed areas.

Plant physiology and ecophysiology. Plants in urban environments grow under considerable stress, and the study of their physiology and ecophysiology provides insight into how to successfully grow them. The first research at CUH was focused in this area. James Clark (1981–1991) studied street tree establishment and vitality in relation to lifting date, carbohydrate content, cambial resistance, and microclimate, while Barbara Smit Spinks (1984–1991) was interested in plant responses to root hypoxia. Deane Wang (1986–1989) studied the role of ozone air pollution on plant growth and function.
Linda Chalker-Scott (1997–2004) investigated the ecophysiology and sustainable management of plants in human-altered landscapes, including the study of mulch effects on Pacific Northwest natives, growth response of native shrubs, foliar chlorosis in rhododendrons, and deicer effects on the rare plant *Hackelia venusta*. As a stress ecophysiologist, Soo-Hyung Kim (2006–) explores how plants respond to their environment at the leaf, individual plant, canopy and ecosystem levels, specifically acclimatization and adaption to increased atmospheric CO2 levels and the mitigation of biotic and abiotic stressors. Examples of his research include the effects of mulch and irrigation gel treatments on Douglas-fir seedling survival and growth in Seattle parks; the influence of elevated CO2 and N fertilization on grasses; and the effect of climate change on the timing of peak cherry-blossom production on campus and in Washington, DC.

Species conservation, landscape design, and arboretum management. John Wott (1981–2010) conducted research on landscape design and management in the Washington Park Arboretum. As director, he advised and guided the Arboretum Foundation, City of Seattle, and the University in the transition from the traditional Olmstead taxonomic design for the arboretum to a geographically based ecological design. Clem Hamilton (1985–1999), a botanist, studied the conservation of trees and forests, arboretum management, Pacific madrone decline, and the revegetation of capped landfills.

Invasive plant species. This area of research was initiated by Sarah Reichard (1997–2016), a plant ecologist and taxonomist. Her research covered urban horticulture and beyond, including the management of invasive plants such as Japanese knotweed, English holly, and English ivy; invasive plants in common commercial wildflower seed packets; reconstruction of the historic flora of Seattle in the 1850s; and food production on street parking strips. Farther from urban areas, she conducted research on the influence of fire on bear-grass in the Cedar River Watershed, insects in old-growth forests, and the effects of cattle-grazing on the floristic composition of vernal peas.

Reichard established the Washington Rare Plant and Conservation Program at CUH because the rich plant biodiversity of Washington State was under siege from habitat loss due to land-use practices, invasive species, and climate change. Of the 3,100 vascular plant species in Washington, 350 are rare. She also established the Miller Seed Vault—a temperature- and humidity-controlled seed bank designed to preserve precious seeds of rare plants for posterity. It is one the largest of its kind in the Pacific Northwest.

Ecology and restoration of disturbed areas. Restoration of disturbed ecosystems is a challenge, whether it be in urban areas, forests, alpine areas, or prairies. Kern Ewing (2000–2018) and Jonathon Bakker (2006–) conducted restoration research. Ewing's research included restoration of wetlands, riparian areas, coastal habitats, prairies, old mine sites, and subalpine areas in the Cascades. In addition, he studied grazing of Canada geese on sedges, soil seed banks, and tropical soils. He worked mainly in the Pacific Northwest, but also conducted projects in the intermountain west, Texas, Louisiana, and northern Mexico.

With a grant from the Offices of the Vice Provosts of the UW's three campuses (Seattle, Bothell, and Tacoma), Ewing co-founded the three-campus UW Restoration Ecology Network (UW-REN) in 1999. UW-REN is an integrated restoration education/research project facilitating local ecological restoration efforts while meeting the goals of students (Wood et al. 2017). Many College and SEFS faculty have been involved—current faculty include Jon Bakker, Soo-Hyung Kim, and Jim Fridley. The director is Warren Gold, UW Bothell. Community partners include local governments, nonprofit organizations, and private landowners, who work with UW-REN to restore damaged patches of landscape in the Puget Sound basin of Washington State. For example, planting seedlings in areas where invasive plants have been removed using mulches such as wood chips and cardboard beneath wood chips (see Fig. 8.20 left).

Bakker studies ecological restoration and sustainable ecosystem management in prairies, woodlands, and forests in relation to plant species coexistence, disturbance and climate change, and the influence of loss of biodiversity on ecosystem functionality. He has conducted research on restoration of Garry oak savannah; prairie and forest
ecosystems; conifer invasion in grasslands; the use of prescribed fire in grasslands; restoration of abandoned farmland; butterfly habitats; and agroforestry in Uruguay.

**Bioresources Engineering: Pulp and Paper Science and Engineering and Biofuels**

Bioresources engineering involves production of products from biomass. Research has concentrated on pulp and paper science, wood fiber properties, polymers, biofuels, and high-value chemicals such as xylitol (a sugar-free sweetener).

*Pulp and paper science.* The first pulp mill in Washington began operation in 1914 in the town of Woodland, located just east of Spokane. In the 1920s several pulp and paper mills were established in western Washington—Washington Pulp and Paper Corporation in Port Angeles, in 1921 (later to become Crown Zellerbach); Rayonier in Shelton and Port Angeles, in 1927; and, in 1929, Weyerhaeuser in Longview—the largest pulp mill in the world at that time. There are currently twelve pulp and paper mills in Washington State.

Despite the early beginnings of the pulp industry in Washington, it wasn’t until the 1960s that research on pulp and paper began at the College, with the hiring of wood chemists Kyosti Sarkanan (1961–1990) and Bjorn Hrutfiord (1965–1997). Together they conducted research on properties of pulp and paper; pulping technology (Kraft and mechanical pulping); and delignification and the pulping potential of Douglas-fir, western hemlock, red alder, cottonwood, and wheat straw. Hrutfiord focused on the chemistry of wood extractives that negatively influence pulp properties. Pulp mills are known for the production of unpleasant odors, and Hrutfiord conducted research on the sources of odor. Following up Hrutfiord’s research, Robert Northey (1998–2005) examined the relationship between gaseous emissions and lignosulfonates.

Research on pulp and paper production and properties was conducted by William McKean (1974–2007), Robert Northey, Richard Gustafson (1986–), and Renata Bura (2006–). McKean studied pulping methods, pulping of wheat straw, paper properties, and, interestingly, the use of glass fibers for papermaking. Gustafson's initial research concerned paper-making process simulation; paper-making properties of giant reed (*Arundo donax*); enzymatic pretreatment of wood chips; and hardwood pulping, including hybrid poplars and eucalypts. Bura has conducted research on steam pretreatment of wood chips for pulping. The Bloedel Hall basement is dedicated to pulp and paper research (see Fig. 8.20 right).

*Polymer and fiber science.* The addition of Graham Allan in 1966 provided a new research area involving polymer science, fiber composites, paper fiber/polymer interactions, and ionic bonding. An interesting aspect of his research involved controlled-release herbicides, insecticides, and plant growth regulators. Kevin Hodgson (1991–2013) conducted research on single fiber properties, the reuse of cellulose fibers in municipal waste, newspaper deinking processes, and epoxy composites. His specific projects involved the characteristics of carbon fiber surfaces and the bonding of carbon fiber surfaces with polymers.

*Biofuels and other high-value products.* As a result of concern about global warming, interest in alternatives to fossil fuels began to be explored. Production of carbon-neutral biofuels, such as ethanol from corn, was perceived as one of the solutions—CO2 released from the burning of biofuels would be balanced by plant uptake through photosynthesis. Corn production is prevalent in the midwest US but is low in Washington, so attention was directed to the use of woody or cellulosic biomass for biofuels. The faculty involved include Gustafson, Bura, Fernando Resende (2011–2019), and Anthony Dichiara (2015–). They worked closely with faculty from the Departments of Chemical and Mechanical Engineering. Gustafson’s research emphasis is on the use of short-rotation hybrid poplars and agricultural residues—wheat straw and sugarcane bagasse. Gustafson and Bura participated in the NSF-UW Bioenergy IGERT that aimed to help create more sustainable societies. The IGERT also included other faculty—Kristiina Vogt, Dan Vogt, Monica Moskal, Jerry Franklin, John Perez-Garcia, and Ernesto Alvarado.
Bura has not only researched methods to convert biomass into bioethanol for use in vehicles, but also its conversion to xylitol—a common ingredient in sugar-free chewing gums, candies, and oral-care products.

In 2015 Gustafson and his colleagues were awarded a $40 million grant from the USDA to study biofuel production from hybrid poplars in the Pacific Northwest. Woody biomass can also be converted into jet fuel, a process studied by Resende. Dichiara is researching the synthesis of carbon-based nanomaterials from biomass—single units ranging from between 1 to 100 nm. Nanomaterials have many functions, including as filters to detect and treat various contaminants in wastewater to protect waterways.

Integrated Research Programs, Cooperatives, and Centers

Integrated research programs, cooperatives, and centers have been a feature of the College’s research since they were initiated in the 1960s. They involved many of our faculty as well as faculty from other universities, federal agencies (the US Forest Service, BLM, and the NPS, state agencies (WADNR), and local agencies (King County Metro and the City of Seattle). Private companies such as Weyerhaeuser, smaller companies, and the British Columbia Forest Service were also involved.

Many cooperatives were short-term, but others have continued to operate for over 50 years. Older cooperatives include the RFNRP, which was later incorporated into the current SMC; the western Coniferous Forest Biome Program of the IBP; the McIntire-Stennis Cooperative Forestry Program; the Pacific Northwest Cooperative Park Studies Unit (PNWCPSU); the Snohomish Valley Environmental Network (SVEN); the Water Center (WC) and its various iterations; CINTRAFORE; and the Center for Quantitative Science in Forestry, Fisheries, and Wildlife.

New cooperatives continue to be formed. The most recent ones are the Mount Rainier Institute at Pack Forest; the Paper and Bioresource Science Center; the Precision Forestry Cooperative (PFC); the Restoration Ecology Network (UW-REN); the US Forest Service Fire and Mountain Ecology Laboratory; the US Forest Service Systems Engineering Cooperative; the USGS Cascadia Field Station; ONRC; and CUH. Some of the centers are involved in teaching as well as research. A short history of the cooperatives follows.

Regional Forest Nutrition Research Project

Nutrition studies in coastal forests were initiated by Professor Stanley Gessel shortly after he arrived at the College in 1948. His finding that Douglas-fir responded to N fertilization eventually led to the formation of RFNRP in 1969. It involved more than 35 organizations and produced a large database on the growth characteristics of Douglas-fir and western hemlock. Gessel and his colleagues investigated different types of N fertilizers; the influence of other critical nutrients on tree growth; the effects of fertilization on wood quality; the consequence of fertilization practices on forest ecosystems; and the economics of forest fertilization. An extensive network of field installations was established in western Washington, Oregon, and British Columbia. The oldest installations were located in second-growth unthinned and thinned Douglas-fir stands spanning a range of age, stockings, and productivity classes. Later, plots were installed to examine fertilizer response in young, spaced Douglas-fir stands. The RFNRP was integrated into the SMC when it was formed in 1991.

Stand Management Cooperative

The SMC is a long-term effort integrating research in forest nutrition, silviculture, wood quality, and modeling. It consists of landowners, processors, research agencies, and universities who have committed resources and expertise to provide a continuing source of high-quality data, data analysis, and user outputs; most of the members were involved with the RFNRP.

The College was the lead organization, with Nick Chappell, David Briggs, Greg Ettl, and now Eric Turnblom serving as directors. Twenty-seven land management organizations are involved, including federal agencies; states and provinces; local governments; private corporations; private landowners; timber management investment
corporations; tribes; and universities (UW, WSU, OSU, UC Berkeley, and the University of British Columbia in Canada).

A database involving 527 installations in Douglas-fir, western hemlock, and mixed species stands is maintained by RFNRP, although only 166 are active. In total, there are nearly 7,800 plots containing almost 290,000 trees, which have been measured over 1.7 million times.

**Western Coniferous Forest Biome Program of the International Biological Program**

In 1965, the global biological science community, following the success of the physical scientists who participated in the International Geophysical Year (IGY; July 1, 1957–December 31, 1958), embarked on the IBP. At that time many scientists were interested in undertaking ecological studies on a large-scale level—that of the biome—a scale that had previously been unthinkable. Computers allowed for the collection, storage, and analysis of huge quantities of data, as well as the construction of ecological models. The major objective was to determine the biological basis for the productivity of the world’s ecosystems and biomes, both terrestrial and aquatic (Coleman 2010).

Altogether, 58 countries were involved, but the US was by far the dominant participant. NSF established a multimillion-dollar program to study the major biomes represented in the US (grasslands, tundra, desert, eastern deciduous forest, and western coniferous forest). Funding commenced in 1968 and continued to 1975.

The first research began with the Grasslands Biome program. The first planning for the Coniferous Forest Biome (CFB) program took place in 1968, but research did not commence until 1971. It ran for six years, until 1977, and involved more than 170 scientists and 30 graduate students from universities in Alaska, California, Idaho, Oregon, Utah, Washington, and Wyoming. UW and OSU were the lead institutions. Most of the research was conducted in the Cedar River Watershed and in Oregon at the H. J. Andrews Forest in the Oregon Cascades (Edmonds 1982). Faculty and students from four UW colleges participated (Forest Resources, Engineering, Ocean and Fishery Sciences, and, in Arts and Sciences, Botany). Large proposals—the size of telephone books in the 1960s—involving multiple investigators were submitted to NSF for peer review. At least 20 copies of each proposal were needed. The initial proposals in the late 1960s were reproduced using typed stencils and mimeograph machines. They were compiled by hand—pages were placed in stacks lined up around rooms in Anderson Hall and the copies were assembled by staff and students. Funding requests were large for the time—approximately $1–2 million per year.

The specific objectives of the CFB were to determine: (1) the productivity of terrestrial forests and associated stream systems across the biome; (2) linkages between terrestrial and aquatic ecosystems; (3) carbon; nutrient, and water cycles; (4) the long-term behavior of coniferous forests ecosystems, including succession; and (5) the effects of manipulations such as clearcutting, fertilization, and defoliation on terrestrial and aquatic ecosystems. An additional objective (6) was to develop conceptual and computer simulation models to integrate research data and increase the understanding of coniferous forests. Mathematical models were developed at the process, forest stand, water column, and watershed levels to explore questions about the effects of forest management. Teams of scientists studied species ecological niches, forest productivity, photosynthesis, water relations, tree growth, micrometeorology and hydrology, soils and nutrient cycling, forest and soil ecology, wildlife science, and stream and lake ecology.

The legacy of the CFB has been long-lasting. Ecosystem research has been introduced into forest management practices around the globe, the importance of retaining old-growth forests on the landscape was recognized, and the influence of forest management on streams and their fish populations—particularly salmon—was determined. Graduate students were educated in the integrated ecosystem approach, and those who went on to academic careers continue to use this approach in their research and teaching. Many theses and dissertations, peer-reviewed journal articles, internal reports, monographs, and synthesis volumes were produced. Based on the total funding of about $10 million, I calculated that each page in the synthesis book (Edmonds 1982) cost about $20,000. I think this was great value, although there are still people out there who say the biome programs were a waste of money.
**Snohomish Valley Environmental Network**

SVEN ran for four years in the 1970s, under the NSF-funded Research Applied to National Needs program (RANN). Dean James Bethel, Gerhard Schreuder, and Bruce Bare were the principal investigators. Faculty from other UW colleges (Engineering, Business, and Fisheries) participated along with CFR faculty, staff, and graduate students. The research was summarized in a series of reports published by the Institute of Forest Products in 1976.

**Pacific Northwest Cooperative Ecosystem Studies Unit**

The Pacific Northwest Cooperative Park Studies Unit (PNWCPSU), now PNWCESU, was founded in 2000. It is a cooperative venture dedicated to natural and cultural resource research, management, and education. It involves twelve federal agencies, eighteen leading academic institutions, one state agency, and one nongovernmental organization. It is a member of the National Cooperative Ecosystem Studies Units (CESU), which consists of seventeen regional programs, each of which represents a distinct biogeographic region of the US. All the regions are connected through a national network. Since 2001, the College and the NPS have been collaborating to host and administer the program. The first faculty director was Gordon Bradley, followed by Tom DeLuca and now, Dan Brown. Darryll Johnson was the first PNWCESU co-leader and NPS senior science advisor until he retired—Chris Lauver occupied the position until his recent retirement. More than $113 million has been awarded to 885 projects.

**Center for International Trade in Forest Products**

CINTRAFOR was established in 1980 to collect and distribute information on the rapidly changing foreign markets for forest products, such as wood and fiber. It is comprised of faculty, staff, and graduate students and has had several faculty directors—Tom Waggener, Bruce Lippke, Ivan Eastin, and currently Kent Wheiler. It focuses on forest economics and policy impacts; international marketing technology; value-added products; and standards and regulations. Recent emphasis has been on international economic conditions, housing policies in China, Japan’s imports and environmental concerns, and wood frame construction. High-rise buildings of wood have been constructed in Europe and the US, including a 12-story mixed-use building made primarily from timber in Portland, Oregon.

**The Water Center and Center for Streamside Studies**

The UW is a world-recognized leader in water-related research, and for more than 20 years the WC formed from the merging the Center for Streamside Studies (CSS) and the Center for Urban Water Resources Management (CUWRM), provided a focal point for water research. The WC involved the Colleges of Forest Resources, Engineering, and Ocean and Fishery Sciences, and the Evans School of Public Affairs. The office was in the College.

In 1987, the CSS was created to help resolve the conflicts concerning the management of forests, fish (particularly salmon), wildlife, and water resources in the Pacific Northwest. The CUWRM was established in 1990 with a focus on the consequences of urban land development on the region’s water resources, especially stormwater management. These centers merged in 2003 and named the Center for Water and Watershed Studies; in 2005, it was renamed the WC. The merge reflected the idea that water-related issues are best studied at the landscape level—i.e., snowcaps to whitecaps in Puget Sound. The WC maintained the goals of its predecessors, namely, scientific research on topics of water resources and watersheds; education of students to become the region’s and the nation’s practicing professionals; and outreach and technology transfer of results to the professional community and the public.

Affiliated faculty, students, and staff from across the UW campus represented forest resources, civil and environmental engineering, oceanography, fisheries, environmental health, the built environment, and social science. The director of CSS was Robert Naiman, and the directors of the WC were Clare Ryan, Susan Bolton,
and Anne Steineman (Civil and Environmental Engineering). I was the WC acting director in its last two years. Derek Booth (Civil and Environmental Engineering) directed CUWRM.

The WC provided a long-term legacy through: (1) sponsorship of courses (such as the WC seminar); (2) the annual review of faculty and student water-related research, which was typically presented to hundreds of members of the outreach community (government personnel, NGOs, consultants, etc.); and (3) sponsorship of more than 120 affiliated graduate students. Unfortunately, the WC was never well funded, despite initial promises from the state. In 2007, it found itself at a turning point. State support had been lost, other financial support was dwindling, and the high-quality research and education of the past did not remain visible. With the establishment of the College of the Environment (CoE), the new, well-funded Center for Urban Waters (CUW) at the UW’s Tacoma campus essentially replaced the WC. The CUW, in collaboration with the newly formed Puget Sound Partnership and the CoE, developed the Puget Sound Institute (PSI).

The WC helped to change forest practices with respect to streamside management, protection of riparian and fish habitats, and the practice of stormwater management both locally and nationally. Research on stream temperatures helped the National Marine Fisheries Service and the Environmental Protection Agency (EPA) establish water quality criteria across the Pacific Northwest.

The Precision Forestry Cooperative

The CFR, in collaboration with the College of Engineering, established the PFC in 2000. It is funded by the state legislature as a component of the state Advanced Technology Institute (ATT). Past directors were Jim Fridley (2000–2003), Dave Briggs (2005–2011), and Greg Ettl (2011–2012). Monica Moskal became the current director in 2012. Gerhard Schreuder served as acting director from 2003 to 2005. The PFC jointly operates a remote sensing laboratory along with the US Forest Service Pacific Northwest Research Station located in SEFS.

The mission of the PFC is to: (1) develop advanced technologies to improve the quality and reliability of information needed for planning, implementing, and monitoring of natural resource management; (2) ensure sustainable forest management; and (3) increase the competitiveness of Washington’s forestry sector. High-technology remote sensing and analytical tools are used to support site-specific economic, environmental, and sustainable decision-making for forest management.

Measurement and monitoring tools include GIS, LIDAR, and Interferometric Synthetic Aperture Radar (IFSAR). These tools are utilized to study forest canopy characteristics and to develop highly accurate digital elevation models that are useful in determining stream channel initiation points and topography under the forest canopy. GPS and inertial navigation systems are used for navigation under forest canopies and for electronically mapping and marking riparian trees. Drones are now being used. Radio Frequency identification (RFID) tagging systems are used to keep track of seedlings, trees, and logs, and to explore nondestructive testing methods for predicting stiffness and strength properties of wood in trees and logs to improve harvest planning and marketing of wood products.

The Center for Quantitative Science in Forestry, Fisheries, and Wildlife

The Center for Quantitative Science (CQS)—now the Center for Quantitative Science in Forestry, Fisheries, and Wildlife—was established in 1968. It is a collaborative effort in teaching and research between SEFS and the School of Aquatic and Fisheries Sciences, formerly CFR and the College of Ocean and Fishery Sciences. Many faculty have been involved in its history, including Bruce Bare, David Ford, Ben Jayne, Jay Johnson, Doug Chapman, and Loveday Conquest (adjunct faculty). The SEFS faculty currently involved are Beth Gardner and Patrick Tobin.

Research Funding

The first funding for research in the College came in 1948. Funding gradually increased, so that by 1979 it had reached $2.4 million annually, and since then it has varied from $2.5 to $22 million. Funding has come from a wide
array of sources, including federal, state and local government; industry; private foundations and organizations; foreign governments; the UW; other universities (mostly as sub-grants); and graduate student scholarships and teaching assistantships. (A list of sources from 2012–2018 is shown in Appendix C.) The federal government has been the largest source of funding—especially NSF, US Forest Service, USFWS, NPS, USGS, BLM, Bureau of Indian Affairs (BIA), Department of Defense (DOD), Department of Energy (DOE), and the McIntire-Stennis Federal Forestry Research Program. From 2006 to 2015, federal sources represented 58–94 percent of the grants awarded, followed by state governments (2–28 percent), local governments (1–2 percent), associations and nonprofits (1–10 percent), industry (1–5 percent), foundations (1–3 percent), and foreign governments (1–2 percent).

**Dissemination of Research Results**

Faculty and graduate students have passed on their findings to scientists in universities, private industry, the government, politicians, and the public. Dissemination of research results to users has involved many sources, including print media—theses and dissertations, peer-reviewed journals, reports, bulletins, newspapers, newsletters, and books, and online. Thousands of oral presentations have been given at annual meetings of scientific associations, seminars, and congressional testimonies. The annual SEFS graduate student symposium is well attended, and many SEFS undergrads present their research at the annual UW undergraduate research symposium. Research has been made available to professionals and the general public through seminars, short courses, workshops, TV, VCR tapes, DVDs, streaming videos, and websites. Many faculty have been interviewed by newspaper, magazine and TV reporters (see Chapter 9).
CHAPTER 9
OUTREACH AND CONTINUING EDUCATION

Introduction

In addition to teaching undergraduate and graduate courses and conducting research, faculty are expected to engage in outreach and continuing education activities. I have always enjoyed teaching outreach classes—generally the audience is small and attentive, since many of the classes are taken for career development. Forestry outreach at the UW started in 1904, when Professor Edmond Meany organized a special course in forestry for teachers so that they could introduce their students to the natural resources of Washington State. Special courses for teachers have been offered on and off ever since.

Faculty, graduate students, and staff have taught many outreach and continuing education classes to both professionals and the public through College programs, CUH, Pack Forest, ONRC, the UW Professional and Continuing Education program, and other outlets. Media exposure, formal outreach, continuing education offerings, campus open houses have been the major outlets for outreach. Print newsletters were used by CFR and SEFS now communicates online through newsletters such as the Straight Grain, the Alumni Newsletter, and Offshoots; and Instagram and blogs.

Media Exposure

Many faculty and staff have been interviewed by radio, TV, newspaper and magazine reporters, and have been featured in many TV documentaries.

Radio

Before the days of TV, Dean Winkenwerder used to conduct a weekly radio forum covering topics such as the log supply, the Olympic Park question, and integrated use of forests. Recently, faculty and staff have been interviewed on National Public Radio (NPR), including Ray Larson, curator of living collections at CUH, who was asked about vibrant fall colors in the Northwest.

Television Interviews, Documentaries, and Videos

A good many faculty have been interviewed for TV news reports and have been featured in documentaries shown on the Public Broadcasting System (PBS), especially concerning old-growth forests and animals and birds. Videos of presentations at meetings, lectures, and other sources can be accessed by googling faculty names—e.g., Jerry Franklin and YouTube videos. College lecture series such as the Denman Forestry Issues series and Sustaining Our World series are also available online (see later in this chapter). I once participated in a TV documentary on old-growth forests in the Pacific Northwest produced by KCTS 9. In the old-growth patch at Pack Forest, I spent several hours in front of the camera talking about old-growth structure and soil. In the documentary I appeared for just a few minutes. This is typical, of course.
Press Releases

The UW has issued numerous press releases on forest resources over the years. I am not sure when this started, but in 1987, Sandra Hines was appointed by the UW News Office to write press releases covering forestry, fisheries, and oceanography. She wrote many pieces about the College and received a number of awards in recognition of her work. After she retired, press releases have been provided by other authors.

More than one hundred releases were issued from 1997 to 2016, ranging from one to sixteen per year and averaging about five. They have covered a wide array of topics, including wildlife (large predators, birds, and sharks), salmon, the canopy crane, toxics cleanup using poplars, forest ecology, Garb Day, biofuels, the tribes, economics and global trade, tropical forestry, climate change, forest management, forest fire, urban horticulture, continuing education seminars, Arbor Day activities, appointments of deans and chairs, forest and fish rules, land zoning and land trusts, green certification, the College centennial, and more.

Newspaper Articles

Hundreds of articles about the College have appeared in the Seattle Times (see Appendix A). Thanks to a partnership between the Times and the Seattle Public Library (SPL), one can now easily search the library website each day, week, month, year, or decade from 1895 to the present, using search terms like “forestry” and “forest resources and the UW,” as well as the names of individual faculty members. (I believe one has to have a SPL account to do this, but it is easily obtained.) This is a treasure trove of information that tells the history of the College and chronicles the changes that have taken place. The most frequently covered subjects involved the deans (Miller, Winkenwerder, Marckworth, Bethel, Thorud, and Bare); UW President Schmitz; the Forestry Building of the Alaska-Yukon-Pacific (AYP) Exposition; the Washington Park Arboretum; the old-growth controversy; and Garb Day. Nearly forty faculty members have been featured. Jerry Franklin has had the most exposure, followed by Bob Lee and Bruce Lippke. The highest number of articles was written in the 1990s (more than 60)—most concerned old-growth preservation and management. The New York Times and National Geographic have also published articles about College research.

Since the College’s change in name and structure from CFR to SEFS, the number of Seattle Times articles has fallen. However, a number of faculty have appeared on the UW in the Media website, which includes local and national newspaper articles—most have been about fires and global climate change. The reduction in Seattle Times articles is probably due to the fact that print media have now been surpassed by electronic media. The print version is now so small that very few articles are published, especially about the UW—even the online version has few articles. The paper’s newsroom, which in the mid-1990s numbered more than 375 people, now employs about 145. This contrasts to the 1930s, when a whole section in the Sunday edition was devoted to the UW—with many of the stories being compiled and edited by students. Below are some of the highlights of each decade pertaining to the College.

In the period from 1907–1918, the focus was on Edmond Meany; Dean Miller; the appointment of faculty members; short courses offered to US Forest Service employees; the US Forest Service Timber Testing station; Forest Club student activities; enrollment of students from other states and countries; field courses in logging engineering; and the first mention of a “girl forester,” who enrolled in 1917. The Forestry Building at the 1909 AYP Exposition held a particular fascination (for photos of this building, see Chapter 10).

The 1920s saw many articles that covered Dean Winkenwerder’s radio programs and his participation in the annual meetings of the Washington State Forestry Conference, which he presided over from 1925–1945. Other topics included forest taxation; forest conservation; Pack Forest; concerns about forest fires and smoke palls in the Seattle area; the opening of Anderson Hall; foreign students from India and Australia; logging engineering; a pulp and paper conference; and University timberlands.

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Reporting on Dean Winkenwerder’s activities (including his appointment as acting UW President), the Forest Club, women forestry students, and forest taxes continued in the 1930s. Other articles were written about President Roosevelt’s reforestation camps, jobs in forestry, the arboretum, the state forest management plan, and a course in forestry for teachers.
Professor Grondal and his wood science colleagues Harvey Erickson, O. Harry Schrader, and Donald Clark were featured in a 1940 article headlined “Wood Detectives,” which focused on identification of wood samples and on the professors’ expert opinions in lawsuits on injuries caused by wood ladder failures and wood decay in buildings. Their expertise was even sought in a murder trial. Throughout the 1940s, familiar topics such as the Forest Club and Dean Winkenwerder’s thoughts on the future of forestry and the arboretum were covered. Student participation in annual Garb Day activities received particular attention after World War II, with articles written annually from 1945–1948. Additional stories were written on sustained-yield logging in the Cedar River watershed; faculty war efforts; trees versus politicians; formation of the State Forestry Board; ex-GIs in forestry; Keep Washington Green; and, interestingly, production of cork bark from Northwest tree species.

In the 1950s accounts were published on the activities of Professors Pearce, Grondal, and Markworth; Pack Forest; education of school kids in forestry; Garb Day (1953–1956 and 1958); coeds in forestry; the fiftieth anniversary of the College; and honors given to President Schmitz. The World Forestry Congress dominated the news in the 1960s, along with the Western Forestry Conference; Garb Day; the Peace Corps in Chile; the activities of Professor Brockman; and the forest fertilization research of Professor Gessel. There was more emphasis on research in the 1970s—e.g., the use of sewage sludge at Pack Forest by Dale Cole, and root disease research conducted by Charles Driver. Also included were recruiting ads for the Peace Corps in Chile; the arboretum; Dean Bethel’s thoughts on environmental impact statements; logging in South Vietnam; and the Washington Forest Practices plan. In addition, careers in forestry, participation of women students in Garb Day, and the first woman admitted to the Forest Club in 1972 received mention.

The appointment of Dean David Thorud, timber taxes, the establishment of CUH, budget cuts, and the end of the undergraduate degree program in wildlife science gleaned the most attention in the 1980s. By the 1990s nearly all of the old-growth forest in the Pacific Northwest had been logged—only about 10 percent remained, and even that was being targeted for logging. It was not surprising, then, that most of the stories in this decade concerned the preservation of the remaining old-growth forest; the spotted owl controversy; the US Forest Service Northwest Forest Plan and its social effects, including job losses; and the concept of “new forestry.” Conflicting views from Jerry Franklin (forest ecology), Chad Oliver (silviculture and forest management), and Bob Lee (social science) were presented. There was also considerable reporting on the contributions of individual faculty—Jim Agee (fire ecology, the good side of forest fires, and views on Smokey Bear); Jerry Franklin (old-growth characteristics and management; the canopy crane; new forestry; and research in Tierra Del Fuego, Chile); Dennis Harr and Bob Naiman (logging and flooding); Tom Waggener and Bruce Lippke (international trade in forest products); Bob Lee (social impacts of the Northwest Forest Plan on timber-dependent communities); Chad Oliver (long-rotation forestry and ecosystem recovery); Dave Manuwal (spotted owls); Jim Clark (Pacific madrone); and Reini Stettler (hybrid poplars). Stories were also written about solitude and relaxation at Pack Forest and the new arboretum master plan.

Reports on the ecoterrorism arson fire in 2001 at CUH led off the 2000s. There was also concern about the future of the College and management of the arboretum. Controversy about the formation of the College of the Environment, low enrollments in forestry, and reduction in the number of curricula offered were the dominant themes. Articles critical of the forestry program and dysfunctional faculty were written—to which Dean Bare responded with a number of letters. Many stories on faculty appeared in this decade as well: Jim Agee and Linda Brubaker (a tribute to Douglas-fir); Kathy Wolf (tree preservation in cities); Jerry Franklin (new forestry); Sharon Doty (soil toxic pollution cleaned up by plants); Soo-Hyung Kim (urban trees); and John Marzluff (owls). Interestingly, there was just a brief mention of the College centennial in 2007.

Since 2010, the focus has been almost solely on the contributions of individual faculty: Josh Lawler (climate change effects on the adaption and movement of mammal species); Tom Hinckley (spring field trips to the Cascades and warmer springs in Seattle); Phillip Levin (March for Science); John Marzluff (birds in the suburbs and crows); Kern Ewing (restoring Yesler Swamp), and Greg Ettl (making big leaf maple syrup at Pack Forest).

The UW Daily has also published many articles on the College, including Garb Day, the honor fraternity Sigma Xi, the relocation of the logging engine behind Winkenwerder Hall, and the Peace Corps.
Formal Outreach and Continuing Education

Until the 1970s, outreach and continuing education offerings were organized by individual faculty. For example, during the mid-1960s, Grant Sharpe, with assistance from the NPS, organized and led short courses for managers of national parks and forests in the US and Canada. In the 1970s, Dean Bethel established a division of continuing education in the Institute of Forest Products. Ian Morison was the first director, followed by Reid Kenady, Don Hanley, Beverly Gonyea, and the last director, Kelley Duffield. From 1978 to 1986, more than forty conferences, conventions, and short courses were offered (see Appendix A) on a broad array of topics, including forest fire, streamside management, management of Douglas-fir plantations, the urban/forest interface, silvicultural certification, sewage sludge application to forests, forest wildlife, forest measurements, forest genetics, dendroclimatology, forest taxation, mountain logging, wood drying, lumber grading, and pulp and paper science. Cooperation with WSU, OSU, and the University of British Columbia was common.

The College outreach program was closed in 2003. Currently, outreach services are offered through interdisciplinary centers and programs, the Center for International Trade in Forest Products, the Precision Forestry Cooperative, the Stand Management Cooperative, the UWBG, Pack Forest and the ONRC. Many events are accredited by professional organizations such as the SAF. Each center develops its own calendar of activities, but coordinates to sponsor school-wide events.

Examples of some of the College’s most notable outreach and continuing education efforts are described below. Cooperation with WSU Extension was common. The outreach and continuing education programs at UWBG are described in Chapter 11. Chapter 12 covers programs at Pack Forest and ONRC.

Fact Sheets

Many one- or two-page fact sheets and brochures have been issued by the College, especially by the Water Center, the Rural Technology Initiative (RTI), and UWBG (CUH and the Arboretum).

Keep Washington Green

Although not strictly a College outreach effort, the Keep Washington Green (KWG) office was located in Anderson Hall for many years. In the first half of the twentieth century, many acres of forest burned every year, and one of the forester’s main jobs was to fight summer fires. In 1940 a group of foresters and public-spirited citizens joined forces to create “Keep Washington Green” to educate the public about human-caused fires. As a result of these efforts, the acreage of Washington’s forest burned after the 1940s was reduced. KWG was disbanded in 1995.

Silviculture Institute

In the 1970s the management of federal forests was being questioned by the public, environmentalists, and the timber industry. Forests had changed from the legacy of old growth to faster-growing younger forests, and concerns about wildlife and recreational uses were increasing—timber was no longer king. Silviculturists possessing only classical forestry school training were not prepared to handle these new challenges. As a result, the US Forest Service developed nationwide educational programs. In the Pacific Northwest, this was the Silviculture Institute (SI) (Jensen 1989). It was a joint venture of the College, the College of Forestry at OSU, and the Forest Service. The format and contents of the institute modules were determined by the universities. Forest Service employees dominated the participants, but other federal agencies (Bureaus of Land Management and Indian Affairs), state agencies, private industry, and educational institutions were also represented. Tom Hinckley and Reini Stettler were directors. Hundreds of participants attended over the 15 years of its existence (1978–1993). For a short period after SI ended, it morphed into the Natural Resources Institute, and David Peterson functioned as the leader.
The SI consisted of six two-week modules taught at Pack Forest, the UW campus, and at OSU. Topics covered were: forest autecology and the physical and biological foundations of forests; integration of physical and biological components of forest ecosystems; statistics and forest measurements; economics and problem-solving; regeneration and stand management; and synthesis and application of the knowledge gained to solve real-world problems. Academic credit was offered by the College and some students went on to receive an MF—for which they had to take two or three more quarters of classes and write a professional paper.

The College faculty involved were Bruce Bare, Linda Brubaker, Dale Cole, Jim Clark, Leo Fritschen, Tom Hinckley, Chad Oliver, Dave Scott, Gerhard Schreuder, Doug Sprugel, Reini Stettler, Fio Ugolini, Darlene Zabowski, Bob Zasoski, and me—as well as Dick Walker (Botany). Instructors from Iowa State University, the University of Northern Arizona, OSU, University of California, Berkeley, WSU, the Forest Service, and Weyerhaeuser also participated.

**Elementary, High School, and Teacher Programs**

The idea of providing forestry information for school teachers for use in the classroom had its beginnings at the UW in 1904, with Professor Edmond Meany’s special forestry course. Summer courses for teachers have been offered on and off since then. In addition, elementary and high school students have been exposed to the field of forestry through career days and field trips.

One of the most notable achievements involving elementary students was the Arbor Day fair (Fig. 9.1), which occurred in the week of Arbor Day for more than a decade in the late 1990s and 2000s. This joint venture was held on campus by the College faculty and staff, WSU Agricultural Extension (Don Hanley), and volunteers from the Forestry Alumni Association. In 1997, for example, more than 1,600 students from kindergarten through fifth grade attended the Arbor Day Fair over two days, with another 650 Boy Scouts on the third day. They created dams, stream channels, and floods, examined live salamanders, toads, and frogs, learned how trees grow and how they clean the air, and made paper and compost. Each student was given a Douglas-fir seedling to take home and nurture.

![Fig. 9.1. Arbor Day activities in the UW forestry courtyard in the 1990s (Source: UW School of Environmental and Forest Sciences).](image)

Professor Emeritus Reini Stettler and volunteer faculty and staff from the College organized a seven-year outreach project for high school students, which ran from 1997–2004. He felt strongly that students in science classes needed to collect and analyze field data for their science literacy. Stettler had been studying riparian cottonwoods and willows at the confluence of the three forks of the Snoqualmie River and believed that this site would be excellent for this purpose. Thanks to its annual floods, the river showed dramatic changes in the dynamics of...
riparian flora and fauna and offered ideal conditions for an outdoor lab. An AP biology teacher at nearby Mt. Si High School in Snoqualmie agreed to add the project to her course. It was conducted with help from three faculty, graduate students, and staff, and continued for five years with Mt. Si High School before switching for the last two years to Bellevue International School.

Annual surveys by the students showed the year-to-year changes in the river’s path. Group projects focused on cottonwood stand dynamics, natural succession, and mapping of invasive species. At the end of the school year, posters were presented at an evening potluck to parents, teachers and College personnel.

**Open Houses**

The College participated in numerous University-wide open houses over the years involving many other colleges and departments. Exhibitions of research, lectures, and lab tours were typically presented. Events were usually conducted on Friday, Saturday, and Sunday.

**The Water Center**

For more than twenty years (1987–2010) the Water Center at the UW and its predecessors provided a focal point for water research, education, and outreach. (The research is described in more detail in Chapter 8.) The Water Center was formed in 2001 from the amalgamation of the Center for Streamside Studies and the Center for Urban Water Resources Management. It cosponsored many campus-wide lecture series and outreach events, including seminars and lectures. The annual review of aquatic research on campus was presented to members of the outreach community (government personnel, nongovernmental organizations, consultants, etc.); the typical audience was 200–400 people. A twice-yearly newsletter with a circulation of more than 3,000 was published by the center.

**Cooperation with Washington State University Extension**

In the 1970s an opportunity arose for the College to cooperate with soil scientist Dr. Paul Heilman at the WSU Puyallup Research and Extension Center. Heilman worked closely with the College soils faculty, particularly Stan Gessel and Dale Cole. He also teamed with Reini Stettler and Tom Hinckley to study the intensive culture of poplars. After Reini retired, Paul worked with Stuart Strand, Lee Newman, and Milton Gordon (biochemistry). In 2005 WSU Extension honored the College with its Partner Award. David Baumgartner, the WSU Extension Natural Resources Program Director, described the relationship as one of the most successful long-term “Cougar-Husky” partnerships. Specifically, it involved the hybrid poplar program, co-location of the WSU’s King County Master Gardener program at CUH, and collaboration in the development of the Rural Technology Initiative (see next section). He also mentioned the joint appointment of WSU Extension Forestry Specialist Dr. Donald P. Hanley in the College. Dean Glawe, a professor in the WSU Department of Plant Pathology, also held a joint appointment.

**Rural Technology Initiative**

In the 1980s and 1990s forestry communities in rural Washington were greatly affected by the rapidly changing economic, political, and environmental conditions of the time. With this in mind, faculty from the College and WSU Extension developed the Rural Technology Initiative (RTI) in 2000 to assist forest landowners, particularly those with small woodlots, to increase their forest management skills and provide jobs using new science and technology information. The program was officially terminated in 2011 and placed under the direction of the Precision Forestry Cooperative in SEFS.

The objective of RTI was to help rural communities sustain their incomes through harvesting of high-quality timber, while protecting other values such as habitat diversity, riparian areas and streams. Experts, instructors, training facilities, computer hardware, software, equipment, and other components were assembled. Technical tools
were developed to assist in forest regeneration, forest harvesting, riparian protection, timber processing, value-added marketing, systems modeling, wildlife enhancement, fire protection, monitoring and adaptive management, and the development of Habitat Conservation Plans. Education of students (both undergraduate and graduate) was also an important consideration.

The program was administered at the College in collaboration with WSU Extension and the WADNR. The State and Private Forestry organization of the US Forest Service was a cooperator. Guidance was provided by an advisory board consisting of representatives of both private and public forestry sectors, including nonindustrial private forests, community leaders, tribal forestry enterprises, and consultants.

The initial development was guided by Professors Bruce Lippke (the director), Chad Oliver (now at Yale University), and John Calhoun (director of the ONRC). They worked with a rural consortium that included the Washington Farm Forestry Association, Northwest Forestry Association, Independent Forest Products Association, and more. The WSU lead was Professor Edward DePuit, chair of the Department of Natural Resource Sciences. Upon the departure of DePuit, Don Hanley assumed the lead role. Extension Professor David Baumgartner facilitated and coordinated activities at WSU.

Funding for RTI was typically around $900,000 per year. The main source was the US Forest Service through CSREES (Cooperative States Research, Education and Extension Services). Other sources included the WADNR, Bureau of Indian Affairs, and the College. In-kind support was also provided by the College and WSU.

Sixty-seven College personnel (20 faculty members, 36 graduate students, 4 research scientists, and 7 staff members) and 30 participants from WSU were involved, as well as Forest Service and private forest sector personnel. Faculty expertise included forest ecology, forest economics, forest sociology, wood technology, marketing and international trade, engineering, entomology, forest biomass, forest soils, tree physiology, quantitative silviculture, wildlife ecology, and economic modeling. Faculty from WSU provided expertise in small woodlot management and other areas.

Output from the RTI was impressive. Numerous publications were produced, including fact sheets (43), working papers, reports, and journal articles. Five hundred and twenty streaming online videos were put together, and many are still available on the RTI website (www.ruraltech.org).

More than thirty-five projects were undertaken, including The Landscape Management System (LMS). LMS is a user-friendly software package developed by SEFS, Yale University, the US Forest Service, and the Cradle of Forestry in America in North Carolina (https://www.landscapemanagementsystem.org/). It includes growth and yield models; economic analyses; management of riparian zones; wildlife habitat; climate change impacts; carbon storage; forest health—especially fire; rural forest products; job creation; and landscape and stand visualization capabilities (Fig. 9.2). These values are best provided by coordinating the dynamic changes of forests across a landscape, rather than by trying to provide each or all values continuously on a single area. It has been used by small forest owners to manage their lands in Washington and in other states.

Fig. 9.2. Stand visualization in the Landscape Management System (Source: Robert McGaughey, US Forest Service).
RTI also contributed to the development of the nonprofit Consortium for Research in Renewable Industrial Materials (CORRIM), which was established in 1996 and administered by the College. CORRIM developed performance information on wood building materials consistent with International Organization for Standardization (ISO), standards for life-cycle inventory (LCI), and life-cycle assessment (LCA), which covers the environmental impacts of production, use, and disposal of forest products.

**Brockman Memorial Tree Tour**

The Brockman Memorial Tree tour is a project of the Washington State Arts Commission in partnership with the UW. It is dedicated to the memory of Professor C. Frank Brockman (1902–1985). He installed the original tree tour on campus in 1980, which featured 81 trees, both native and non-native. The current tour has 61 trees—25 conifers and 36 hardwoods. A location map and species description can be found on the web [depts.washington.edu/treetour/](http://depts.washington.edu/treetour/). Descriptions include features of tree crowns; leaves or needles; cones or flowers; pollen release times; wood; where they grow naturally; soil conditions; suitability for planting; and the derivation of the tree's name. Many of the descriptions wax poetic—e.g.; “Deodar cedars unite the relaxed, drooping postures of hemlocks and the massive horizontal sturdiness of certain pines.”

**Northwest Environmental Forum**

The state of the environment and natural resources and their protection are of great concern to all. However; views on how to use and protect them differ. In 2002, Dean Bare envisioned the construction of a 6,000-square-foot facility at CUH that would provide a forum for collaborative problem-solving related to a wide variety of environmental and natural resource issues. This big idea did not fly; but in its place the Northwest Environmental Forum was established in 2004, mostly through the efforts of Dean Bare and Brian Boyle (ex–Washington State Land Commissioner). It consists of an annual two-day meeting serving a wide range of public and private user groups involved in the restoration, enhancement, and sustainable use of our natural and environmental resources.

Stewardship of private land to protect ecosystem services—watershed protection, water supplies, fish and wildlife, biodiversity, carbon storage, and other desirable public services—is difficult. Sufficient return from timber harvesting is needed to fund it. To date, landowners have been given few incentives to provide ecosystem services outside of regulation. Financial markets currently do not exist for ecosystem services, although their loss is dramatic when the forests are converted to other uses. The forum has brought into focus their potential significant economic values.

Besides SEFS, other UW colleges and centers are involved—Ocean and Fisheries Sciences; Arts and Sciences; Public Policy; Architecture and Urban Planning; Engineering; Information Sciences; Atmosphere and Oceans; Law; Business; and Marine Affairs. Starting in 2004, forum topics have included the future of Washington’s working land base, enhancing biodiversity, restoring eastside forest health, forest watershed services, net pen aquaculture, regional open space, and Northwest nature and human health.

**Lecture Series**

**The Denman Forestry Issues Series.**

The Denman Forestry Issues series was produced from 2000–2012 with support from the Richard Denman Endowment for Student Excellence in Forest Resources. It presented information on timely forestry and natural resources issues to students, faculty, staff, natural resource professionals, and the public. The series was initiated by Dean Vogt and continued by Dean Bare. Presentations were given by faculty; graduate students and staff; representatives of local, state, and federal agencies; industry; consultants; and tribal members. They were given in front of a live audience, usually at CUH, and were recorded by UWTV for later showing on the UWTV channel,
where the talks received wide distribution. I remember once being at a Soil Science Society of America meeting in Indianapolis and turning on the TV in my hotel room. Lo and behold, there was the Denman series. I was honored to be the producer of the series, with help from CFR Continuing Education, ONRC, and an advisory committee. A total of 21 programs with various themes were produced over the 12 years. Programs covered specific themes and ran for 3–4 hours, with multiple speakers and a final discussion panel. More than 50 speakers were involved. A list of the programs is shown Table 9.1.

### Table 9.1. The Denman Forestry Issues series presented at the UW, 2000–2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Forest certification</td>
</tr>
<tr>
<td>2001</td>
<td>Calculation of the sustainable yield from Washington’s trust lands. Washington’s forest and their impact on the private landowner</td>
</tr>
<tr>
<td>2002</td>
<td>Conservation easements and land trusts. Programs in support of Washington’s private forest landowner. Seeking sustainability of natural resources</td>
</tr>
<tr>
<td>2003</td>
<td>Federal land management policy issues</td>
</tr>
<tr>
<td>2004</td>
<td>Wildfire in the west; Invasive species</td>
</tr>
<tr>
<td>2005</td>
<td>Global change— influence of increasing temperature and carbon dioxide or forests. The changing Northwest forest—keeping the landscape green. Water supply and stormwater issues in the Pacific Northwest.</td>
</tr>
<tr>
<td>2006</td>
<td>Sustainable urban ecosystems: physical and biological environment. Sustainable urban ecosystems: human dimensions and management.</td>
</tr>
<tr>
<td>2008</td>
<td>Restoration ecology</td>
</tr>
<tr>
<td>2009</td>
<td>The future of forestry in the Pacific Northwest.</td>
</tr>
<tr>
<td>2010</td>
<td>Forests and the health of Puget Sound</td>
</tr>
<tr>
<td>2011</td>
<td>Celebrating the international year of forests 2011</td>
</tr>
<tr>
<td>2012</td>
<td>Forests and carbon</td>
</tr>
</tbody>
</table>

### Sustaining Our (Northwest) World

The Sustaining Our Northwest World annual lecture series commenced in 2007 and was sponsored by the College and SEFS, the UW Alumni Association, and the Lockwood Endowment for Program Enhancement. It is currently titled Sustaining Our World. This series addresses one of the greatest challenges of our new century—how to ensure that forests, which sustain human, animal, and plant communities worldwide, thrive and support the livelihoods and spirits of future generations. Table 9.2 shows the lectures presented from 2007–2017.
### Table 9.2. Sustaining Our (Northwest) World lectures, 2007–2017

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linda Brubaker</td>
<td>Tales from the Forest: A Warmer Pacific Northwest: Lessons from the Past</td>
</tr>
<tr>
<td>Tom Hinkley</td>
<td>Climbing, Research and Teaching: Adventures, Accidents, Change, and Joy</td>
</tr>
<tr>
<td>Robert Gara</td>
<td>Insects and Forests of the Northwest</td>
</tr>
<tr>
<td>Steve Anderson</td>
<td>Creating Futures since 1907: Challenges to Forest Stewardship</td>
</tr>
<tr>
<td>Doug Sutherland</td>
<td>History of forestry in the United States</td>
</tr>
<tr>
<td>Bruce Bae</td>
<td>A View from the Commissioner of Public Lands</td>
</tr>
<tr>
<td></td>
<td>Natural Resource Issues Contrast in the Pacific Northwest: The Next Century</td>
</tr>
<tr>
<td>John Marzluff</td>
<td>When Humans and Nature Collide:</td>
</tr>
<tr>
<td>Steve West</td>
<td>Are Cities for the Birds</td>
</tr>
<tr>
<td>Jerry Franklin</td>
<td>Bats in managed forest</td>
</tr>
<tr>
<td></td>
<td>Challenges of Forest Stewardship</td>
</tr>
<tr>
<td>James Agee</td>
<td>From Fire to Flowers: Forests Aflame: Strategies and Challenges for Managing Fire in the West</td>
</tr>
<tr>
<td>Dan Hinkley</td>
<td>Form and Textural in Garden Design and Plant Selection</td>
</tr>
<tr>
<td>Gordon Bradley</td>
<td>Who Shapes the Visual Landscape, and Does It Matter?</td>
</tr>
<tr>
<td>David Peterson</td>
<td>Climate, Forests, and Future: A View from Tree Line</td>
</tr>
<tr>
<td>Nalini Nadkarni</td>
<td>Trees as Providers and Inspiration for Our Lives</td>
</tr>
<tr>
<td>Aaron Wirsing</td>
<td>Carnivore Conservation in the Pacific Northwest</td>
</tr>
<tr>
<td>Sarah Reichard</td>
<td>Rare Plant Conservation in the Pacific Northwest</td>
</tr>
<tr>
<td>Molly Steinwald</td>
<td>Human-Nature: Care for Our World Is Care for Ourselves</td>
</tr>
<tr>
<td>Lynda Mapes</td>
<td>Witness Tree: My Year with a Single Hundred-Year-Old Oak</td>
</tr>
<tr>
<td>Anthony R. E. Sinclair</td>
<td>The Future of Conservation: Lessons from the Past and the Need for Rewilding of Ecosystems</td>
</tr>
</tbody>
</table>

### Other Outreach Efforts

One unusual outreach effort involved Fred Hoyt (UWBG) and myself in the provision of input to the Seattle Art Museum in the installation of the Neukom vivarium (Fig. 9.3), a feature of the Seattle Art Museum’s Outdoor Sculpture Park located on the waterfront. It was designed by Mark Dion, a Massachusetts artist, and represents a hybrid work of sculpture, architecture, and environmental education designed to connect art and science. Completed in 2006, the vivarium features a 60-foot-long old-growth western hemlock “nurse log” set on a concrete slab located in an 80-foot-long custom-designed greenhouse. Its ongoing decay demonstrates ecological cycles and processes. Visitors can observe potential log inhabitants—plants, lichens, fungi, and insects—in the aboveground portion, and the soil through viewing windows. It is especially aimed at the education of children.

![Fig. 9.3. Left: Neukom vivarium greenhouse at Seattle Art Museum's Outdoor Sculpture Park. Right: Greenhouse interior showing the old-growth hemlock log covered with mosses and other plants. A soil-viewing window is at the lower left.](image)
CHAPTER 10
FORESTRY BUILDINGS ON THE CENTRAL CAMPUS

Introduction

When I first strolled through the UW campus, many of the older buildings, especially the Suzzallo Library and forestry’s Anderson Hall, caught my eye. I had attended Sydney University—established in 1850 and Australia’s oldest—where many of the first buildings, built between 1855 and 1862, were in Gothic Revival (neo-Gothic) style. This style creates the aura of a fine institution of learning, such as that found at Oxford and Cambridge. Collegiate Gothic, which is an early 20th-century adaptation of the 19th-century Gothic Revival style, was used for campus educational buildings mostly in the US and Canada. There are eighteen buildings of this design on the UW campus, constructed from 1915 to 1938 and designed by local architects Bebb and Gould. The characteristics of this style are Gothic arched window and door openings, buttresses, masonry walls, and large tracery windows that maximize natural light—appropriate for the generally overcast Seattle climate. Such buildings are usually rectangular and constructed of stone and brick with slate roofs.

Statues, gargoyles, and grotesques typically adorn the façades of Collegiate Gothic buildings. Any piece of architectural sculpture that depicts a carved animal or human face or figure is generally considered to be a gargoyle. Strictly speaking, however, gargoyles are figures that function as decorative water spouts. So, most are grotesques—fanciful depictions of humans or animals. The many grotesques found on Sydney University buildings include three Australian animals—kangaroos, crocodiles, and kookaburras. On the UW campus, grotesques are common. For example, Miller Hall, one of the buildings facing the upper campus quadrangle, is adorned with a total of 44 grotesques of famous scholars, teachers, and students, and even one wearing a gas mask (presumably evoking World War I).

The façade of Suzzallo Library (Fig. 10.1) showcases eighteen terracotta statues of great thinkers chosen by the faculty. Statues of Dante, Shakespeare, Plato, Benjamin Franklin, Justinian I, Isaac Newton, Leonardo da Vinci, Galileo Galilei, Johann Wolfgang von Goethe, Herodotus, Adam Smith, Homer, Johannes Gutenberg, and Ludwig van Beethoven are located on the long front side of the building. Figures of Moses and Louis Pasteur are located around the northwest corner (on the left in Fig. 10.1), while those of Charles Darwin and Hugo Grotius are around the southwest corner (on the right in Fig. 10.1).

Fig. 10.1. The façade of Suzzallo Library—statues are located on the columns below the roofline.
Darwin is the only one representing biology and he has a connection to Australia. Although we think of him as an observer of animals and birds, he also studied trees and forests on his journey to the southern hemisphere on the *HMS Beagle* (1831–1836). When the 26-year-old Darwin reached Sydney in January 1836, he traveled by horseback just a few miles from where I grew up. He wrote that eucalypts in the area had “the surface of their leaves placed in a vertical instead of as in Europe a nearly horizontal position . . . the bark of some kinds annually falls, or hangs in long shreds, which swing about in the wind” (Australian Science Teachers Association).

The UW campus is aesthetically pleasing with its extensive collection of conifer and deciduous trees—there are even a few eucalyptus trees (Johnston 1995). Rainier Vista, in particular, impressed me greatly on a sunny day in September 1966, soon after I first arrived on campus (Fig. 10.2). The view of Mount Rainier was awe-inspiring (there are no peaks like it in Australia). Edmond Meany waxed poetic in his later years about this magnificent view, writing that “No campus in all the world can equal Rainier vista. In those rare moments when mother nature in kindly mood pulls aside the vaporous curtains, we may gaze upon Mount Rainier, a flow sprinkled three-mile-high pile of rock and ice. A spectacle of unending fascination!” (Griffin 1995). I could not agree more.

Fig. 10.2. Rainier Vista and Frosh Pond.

Altogether, ten buildings on the central UW campus have been used in, or related to, the teaching of forestry: Parrington Hall; four buildings constructed for the 1909 Alaska-Yukon-Pacific (AYP) Exposition; the Forest Products Laboratory (1921); Anderson Hall (1925); Winkenwerder Hall (1962); Bloedel Hall (1969); and the Plant Lab Annex. All are described below. Additional buildings at CUH and the Arboretum, and those at Charles Lathrop Pack Demonstration Forest and ONRC, are described in Chapters 11 and 12, respectively.

**Parrington Hall**

In 1908, Science Hall (now Parrington Hall), which was built in 1902, provided housing for courses taught by the new School of Forestry. It was renamed after English professor Vernon L. Parrington in 1931. This striking building was constructed from red brick with sandstone trimmings in Romanesque Revival style (Fig. 10.3).
The Alaska-Yukon-Pacific (AYP) Exposition Buildings

The AYP Exposition was held on campus from June 1 to October 15, 1909, and was attended by three million people. The four buildings involving forestry were the Forestry Building, the Hoo-Hoo House, the Good Roads Building, and the Auditorium (Meany Hall). The majority of AYP buildings were constructed in the French Renaissance style, but because the Forestry Building and Hoo-Hoo House reflected the importance of the Pacific Northwest logging industry, wood construction was highlighted. Most of AYP buildings were designed to be demolished after the exposition. None of them exist today.

The Forestry Building

The AYP Forestry Building was an amazing structure (Fig. 10.4). It was constructed mostly of unhewn Douglas-fir logs and was the largest log building ever built—320 feet long, 46 feet wide, and 90 feet high. An extraordinary amount of timber was involved—2,016,000 board feet of logs and lumber, and 300,000 cedar shingles. The 80 main vertical log columns were about 5 feet in diameter and 40 feet long, with intact bark. A colonnade of 12 huge logs comprised the front of the building. The roof and two towers were supported by 124 debarked logs, placed as symmetrically as possible (https://pauldorpat.com/2013/10/19/seattle-now-then-ayps-forestry-building/).
The Northern Pacific Railway was used to deliver the logs, using a special railroad spur to the site from the main railroad track (now the Burke Gilman Trail). Each log required two flat railroad cars. The building represented a mix between the log-cabin style of early western pioneer buildings and a more formal European lodge. It had soaring interior spaces supported by large vertical logs with intact bark (Fig.10.5). Perhaps it felt a little like you were walking through a forest.

![Image of the Forestry Building interior showing the stairs and timber columns](Source: UW Libraries, Special Collections, Negative Number Nowell x 1147).

After the AYP Exposition, the Forestry Building served as a forest and botanical museum and also as the Washington State Museum (now the Burke Museum) until 1927, when the museum was moved. The building lasted only until 1931 (21 years), when it was torn down for safety reasons as a result of insect damage, decay, and the elements. The Husky Union Building (HUB) was built in 1949 on the former site of the Forestry Building.

The College of Forestry was slated to move into the Forestry Building after the AYP ended. However, it was not suitable for instructional purposes, and the College never used it. Instead, the College occupied the Good Roads Building, where it remained until moving into Anderson Hall in 1925.

**The Good Roads Building**

Most of Washington’s roads were still unpaved in the late 1800s. To promote the building of good roads—especially highways—the entrepreneur-philanthropist Samuel “Sam” Hill (1885–1931) and two of his associates formed the Washington State Good Roads Association in 1899 (https://www.historylink.org/File/5072). It still exists today as the Washington Good Roads and Transportation Association. Hill worked hard to advance the state’s road building, and in 1905 the legislature established a state highway department. However, there was little knowledge of how to surface roads for automobiles. In 1907, Hill persuaded the UW Board of Regents to establish the first chair of highway engineering in the nation. In 1909, at his Maryhill property overlooking the Columbia River in Klickitat County, he constructed 10 miles of demonstration road using seven different road-building techniques. That same year, as part of the AYP Exposition, Hill helped organize the first American Congress of Road Builders and constructed the Good Roads Building (Fig. 10.6), which then became home to the highway engineering program. The Good Roads Building was located where Loew Hall stands today.
In 1911, the College of Forestry moved into the Good Roads Building, which provided suitable classroom and lab space. After the College relocated to Anderson Hall in 1925, the building was occupied by the Reserve Officers Training Corps (ROTC) until it was demolished in 1961 after a fire.

In 1888, Sam Hill married Mary Francis (Mamie) Hill, the eldest daughter of James J. Hill (no relation), founder of the Great Northern Railway. By the end of the 19th century, Sam was a wealthy and accomplished railroad executive, financial manager, and investor, and was active in a wide range of civic groups and fraternal organizations. In 1905, Hill, who was a Quaker, planned the establishment of a Quaker farming community on the Columbia River in Klickitat County. He established the Maryhill Ranch (named after his wife and daughter) and the town of Maryhill. In 1914, he began construction of a mansion, though it was not completed until his death in 1931. The mansion now serves as an art museum and contains eighty works by Auguste Rodin. He also constructed two monuments—the Peace Arch at Blaine, Washington, at the US/Canadian border, dedicated in 1921; and a memorial to three Klickitat County men killed in World War I, in the form of a full-sized replica of Stonehenge in England, which was completed 1931.

The Hoo-Hoo House

The Hoo-Hoo House (Fig. 10.7) was built by the International Concatenated Order of Hoo-Hoo, a fraternal organization of the forest products industry. The Hoo-Hoo Club was formed in 1892 (https://www.hoohoo.org/) and is still going strong. It has 283 chapters in the USA, Canada, Australia, New Zealand, Papua New Guinea, Indonesia, South Africa, Malaysia, Philippines, and Singapore, mostly named after cities (https://www.hoohoo.org/club-map). Its Seattle chapter was organized specifically to promote the AYP, but no longer exists.
The Hoo-Hoo House was used during the exposition as a place for Hoo-Hoos and other lumbermen to relax, socialize, and entertain. Both the building and the furniture were designed by Ellsworth Storey, an architect originally from Chicago. He used local materials to create a building in harmony with its surroundings and designed rustic furniture. Motifs specific to the Hoo-Hoo House were incorporated such as their mascot—the black cat—and the number nine which is featured in many Hoo-Hoo traditions. The building was deeded to the UW by the Order and served for 50 years as the Faculty Club, when it was razed and replaced by the current UW Club.

**The Auditorium (Old Meany Hall)**

Old Meany Hall (Fig. 10.8) was known as Auditorium Hall during the AYP Exposition and was located across from Suzzallo Library. In 1909 a campaign was started by the UW student newspaper, *The Daily*, to rename Auditorium Hall Meany Hall, because of Edmond Meany's contributions to the University. Initially, the Board of Regents didn't like the idea of setting the precedent of naming a building after a living person. But they eventually reneged and it was renamed in 1914. Meany himself, however, wanted the building to be named Seward Hall, after the man who bought Alaska from Russia. The Meany Hotel (which later became the Hotel Deca and now the Graduate Hotel) and Mount Meany in the Olympic Mountains were also named after Meany.

In the 1960s, Meany Hall was the largest-capacity building on campus and was used for student assemblies and music and drama performances. However, it was very vulnerable to earthquakes and was extensively damaged in an earthquake on April 20, 1965, resulting in its demolition. The modern “boxy” New Meany Hall, completed in 1975, is in stark contrast to the Victorian-style façade of the old Meany.

**The Forest Products Laboratory**

The College of Forestry’s Forest Products Laboratory was built in 1921 at a cost of $88,000 (Fig. 10.9). It was later attached to Anderson Hall by an overhead walkway. I took only one class there (Microtechnique in 1967—well taught by Professor Larry Leney). The labs were old and tired by that time, and there was no doubt that the building needed to be replaced. It was demolished in 1968 to make way for Bloedel Hall, which accommodated the new forest products labs. The demolition, however, did not go easily. I can remember watching from the window of...
my lab in Winkenwerder as the wrecking ball was released—it bounced off the very well-constructed building. A larger ball had to be obtained.

![Image of the Forest Products Laboratory, between 1926 and 1936](Source: UW Libraries, Special Collections, Negative Number UW19793z)

**Anderson Hall**

Alfred H. Anderson Hall, on Stevens Way (Fig. 10.9), was constructed in 1925 just to the north of the already existing Forest Products Lab (Hoshida et al. 2014). Anderson was a prominent lumberman in Mason County, Washington, and represented that county in the state legislature in 1891. He was one of the original founders of the Simpson Timber (later Logging) Company and was successful, along with his colleague Edmond Meany, in advocating for the development of 350 acres for the new UW campus. After Anderson’s death, his wife Agnes presented a gift of $250,000 to the Board of Regents.

![Image of Alfred H. Anderson Hall and Forest Products Laboratory, ca. 1928](Source: UW Library, Special Collections, Negative Number UW28732z)

The three-story Anderson Hall, with a complete basement, totaled 33,543 square feet. Like the other Collegiate Gothic buildings on campus, it was designed by Bebb and Gould. Despite being built a year before the Suzzallo Library with its many statues and grotesques, its external ornamentation is relatively sparse (Fig. 10.11).
The original “Classroom” (now the Auditorium) and “Reading Room” (now the Forest Club room) are located at the west and east end, respectively (Fig. 10.12). These two rooms have retained their historic character, with large, leaded windows and elaborate woodwork, including a double-height timber ceiling. The Auditorium, which seats about 120, is used for seminars, forestry classes, and classes from other departments.

There are also several seminar rooms and three small classrooms. ADA-accessible limitations (i.e., no elevator or entrance ramp), curtail its broad use. In addition, many recent classes with in excess of 120 students cannot be accommodated in Anderson Hall and are now taught in Architecture Hall, Sieg Hall, Kane Hall, and Guggenheim Hall. Anderson Hall is the administrative center of the College, containing the offices of the dean (and now of the director), the college administrator, student services and other staff, and faculty and graduate students. The original library and research labs were also located here.
The Forest Products Lab and Anderson Hall stood as isolated structures in an open field until 1930, when the surrounding landscape work began. Butler Sturtevant, who was the University landscape architect, directed the landscaping around Anderson Hall, established the Medicinal Herb Garden, reconstructed Rainier Vista, renovated Drumheller Fountain, and planted deodar cedars along Stevens Way—hundreds of Works Progress Administration (WPA) workers were employed. The landscaping around Anderson Hall now consists of rhododendrons, other shrubs, and several trees, including a huge coast redwood on the Rainier Vista side. Across Stevens Way in the Medicinal Herb Garden is a grand giant Sequoia.

Winkenwerder Hall

Winkenwerder Hall (26,231 square feet), designed by Grant, Copeland, Jr., Chervenak and Associates, was completed in 1963 (Fig. 10.13), and is named in honor of Dean Hugo Winkenwerder. It is a dramatic demonstration of the potential for the extensive use of wood in public buildings. A building constructed almost entirely of wood seems very appropriate for a forestry building.

This building was originally referred to as the Winkenwerder Forest Sciences Laboratory, but in 1972 it was shortened to Winkenwerder Hall. In 1966 it won an award of merit from the American Institute of Architects (AIA), one of nine awarded that year. The wooden construction was thought to be able to handle earthquakes much better than stone and brick buildings such as Anderson Hall. This was demonstrated in the Nisqually earthquake in 2001—Anderson Hall had slight damage, but Winkenwerder had none due to its flexibility. The style of Winkenwerder Hall is unusual on campus, and architecture students can commonly be seen sitting in the courtyard sketching it.

The three-story rectangular building has a Glu-lam beam structural system. Diagonal struts are located on the exterior, providing lateral strength to resist wind and seismic forces, eliminating the need for interior shear walls and reinforcing the character of the building. The exterior expression of the upper two floors is wood frame and glass in-fill. Only at the lowest level, partly below grade, are the walls solid (concrete). The first floor had faculty and administrative offices and a small seminar room on the north side. Biological science faculty offices and the largest lecture room are on the north side of an atrium, while there are research labs, classrooms, and federal government cooperatives, such as the US Forest Service Fire and Mountain Ecology Laboratory, on the south side. For many years the basement was largely unfinished, but this was finally accomplished to provide graduate student space and faculty offices.
Bloedel Hall

The success of the wood-framed Winkenwerder Hall led to the construction of a second wooden structure, Bloedel Hall, which was completed in 1973 (Fig. 10.14). It is located in the space occupied by the demolished Forest Products Lab. Bloedel Hall consists of two squares joined at a corner of both squares. It is the largest of the forestry buildings (77,316 square feet)—three times larger than Winkenwerder. Like Winkenwerder, it was designed by Grant, Copeland and Chervenak. Originally named the Forest Sciences Building, it was renamed Bloedel Hall for Julius H. Bloedel (1864–1957), founder of the MacMillan Bloedel Limited Forest Products Company.

Fig. 10.14. Bloedel Hall and courtyard.

Bloedel Hall is similar to Winkenwerder in design. The upper two stories have Glu-lam wood beam construction, while the first floor and basement have solid concrete walls. The only other modern building constructed of wood on the central campus is the Intellectual House (wǝɫǝbʔaltxʷ), located west of the McMahon Hall dormitory. Built in longhouse style, it was completed in 2015 as a multi-service-learning center and gathering space for Native American students.

Bloedel Hall was designed as a research building with emphasis on the physical sciences—wood and fiber, pulp and paper, fire science, soils, hydrology, and micrometeorology. Other faculty in social sciences, forest management, and logging (forest) engineering have been housed there, as well as cooperatives such as CINTRAFOREST, SMC, the US Forest Service Vegetation Monitoring and Remote Sensing Team, and the Paper and Bioresource Center. It has just two small classrooms. The upper two floors are devoted primarily to faculty offices with adjacent research labs that house graduate students. On the ground floor there are more research labs and offices, electrical, metal,
and wood shops (all now closed), a genetics lab, and a large caged area used by the pulp and paper program. The Forest Resources Library originally occupied the north portion of the basement which is now used by University Human Resources. The south portion contains the Paper and Bioresource Science Lab.

Anderson, Winkenwerder, and Bloedel Halls surround a courtyard designed by Richard Haag and Associates, Landscape Architects. It provides a sheltered place for outdoor gatherings or solitary moments, and has also been used for special occasions such as Arbor Day events. The vegetation includes understory plants and trees representing low (vine maple) and high elevations (mountain hemlock) in Washington. When this garden was proposed, it was suggested that the large coast redwood tree that dominates the courtyard should be removed because it wasn’t a Northwest species. This suggestion was soon quashed, however.

**The Plant Laboratory and Annex**

The CUH officially opened in 1980, with the arrival of Dr. Harold B. Tukey as its founding director. Tukey was given an office in Anderson Hall, but when the first two CUH faculty—John Wott and James Clark—arrived in 1981, there was no lab for them. The University was able to allocate the unused buildings known as the Plant Laboratory and Annex to the College for their use. It was conveniently located close to Anderson Hall on Stevens Way. The lab and its annex were built originally for the Medical School to study plants for medicinal uses. The Medicinal Herb Garden still exists across Stevens Way from Anderson Hall ([https://botanicgardens.uw.edu/about/blog/2016/03/02/glimpse-into-the-past-the-uw-plant-laboratory-complex/](https://botanicgardens.uw.edu/about/blog/2016/03/02/glimpse-into-the-past-the-uw-plant-laboratory-complex/)).

As additional faculty and staff arrived, the dungeon-like basement labs began to be used. The adjacent Botany Greenhouse was also used for research. When CUH moved to its current location, the upper floor of the Plant Laboratory was used by the Botany Department and the basement lab was used as a soils laboratory by Professor Strand. The Annex was used by the College staff. In 2017, the greenhouse, Plant Lab, and Annex were demolished to make way for the new Biology Building and greenhouse.
CHAPTER 11
THE UNIVERSITY OF WASHINGTON BOTANIC GARDENS

Introduction

The educational value of arboreta is immeasurable, and their wide variety of beautiful trees feeds the soul. I have strolled in some of the most famous arboreta in the world, such as Kew Gardens in London, the Arnold Arboretum in Boston, and the National Arboretum in Washington, DC. Seattle's Washington Park Arboretum, whose tree collections belong to SEFS, compares favorably—it is a sparkling gem. Seattleites and visitors alike enjoy it as a welcome respite from our busy and noisy world. Few people are not calmed by trees, but perhaps I am biased.

Establishment of a botanic garden and arboretum was contemplated when the UW moved from its downtown location to its present site in 1895. This did not come to full fruition on campus, although one might argue that the campus today is an arboretum itself, with its impressive collection of conifer and hardwood trees. Over the years horticultural programs associated with the College were developed, including the Washington Park Arboretum in 1934, the Union Bay Natural Area (UBNA) in 1972, and CUH in 1980. Hinckley (2002) describes the history and programs at CUH and the arboretum. In 2005, all three entities were merged into the UW Botanic Gardens (UWBG). Dr. David Mabberley was the first UWBG director (2005–2008), followed by Sandra Leir (2008–2011), Sarah Reichard (2011–2016), and interim director Fred Hoyt (2016–). Unfortunately, Sarah Reichard passed away in late August 2016 at age 58, while on a field trip to South Africa sponsored by UWBG.

Mabberly believed that urban horticultural science at the UW would be better served by the formation of UWBG, and it is now considered to be one of the best university gardens in the nation. The three main components of UWBG are described below.

The Washington Park Arboretum

Tree and Plant Collections

The Washington Park Arboretum (Fig. 11.1) is located a mile southeast of the UW campus in Seattle's Washington Park. It is one of the oldest public gardens west of the Mississippi River and was declared the official State Arboretum in 1995. It was founded in 1934 (Ott 2013) and has been described by ex-Director John Wott as a “200-acre art museum” and a “symphony of plants.” About 40,000 specimens of trees, shrubs, vines, and other plants are present with an estimated value in excess of $83,000,000. Interactive maps of the collections can be accessed at (https://depts.washington.edu/uwbg/gardens/bgbase.php). In addition to the exotic collections, many native species are present—large Douglas-fir, hemlocks, and big leaf maples. The Japanese maple collection (M) is especially beautiful in the fall (Figure 11.2).
Fig. 11.1. Map of the Washington Park Arboretum. Notable collections include: A. Hollies; B. Witch hazels; C. Camellias; D. Giant sequoia; E. Centennial Garden; F. Larches; G. Rhododendrons; H. Legumes; J. Asiatic maples, K. Magnolias; L. Mountain ashes; M. Japanese maples; N. True ashes; O. Oaks; P. Lindens; Q. Walnuts; and R. Viburnums. There are two Ds and two Gs because those collections are located in two areas each, and there is no I (Source: UW Botanic Gardens).

Fig. 11.2. Japanese maple collection in fall (location M).

Special interest areas include, the Pacific Connections Garden (PCG), Pinetum, Rhododendron Glen, Meadow, Witt Winter Garden, Woodland Garden and Azalea Way. The PCG is the most recent to be added and opened in 2010 with the first plantings and it now contains trees and plants from five eco-geographic regions; Australia, Cascadia, Chile, China, and New Zealand.

It is estimated that a quarter to a third of a million people visit the Washington Park Arboretum each year, many from other states and countries. The Arboretum is widely used for educational purposes by the UW for courses in urban horticulture, urban plant protection, botany, forestry, and landscape architecture; by community colleges for horticulture programs; and by K-12 schools. It has had a number of directors: Dean Winkenwerder,
John Hanley, Brian Mulligan, Joseph Witt, and John Wott. After John Wott retired, the director of the UWBG became the director of both the CUH and the Arboretum.

Management of the Arboretum involves a partnership between the UW and the City of Seattle’s Department of Parks and Recreation. A third entity—the Arboretum Foundation—plays a critical role in raising funds that facilitate management of the property. It was founded in 1935 to engage in promotional activities to obtain funding and give the Arboretum worldwide exposure. By 1940 it had about a thousand members, not only from Washington State but from five other states as well. The Arboretum is overseen by the Arboretum and Botanical Garden Committee, which consists of members appointed by the mayor of Seattle, the president of the UW, the governor of Washington, and the Arboretum Foundation.

History

The history of the Washington Park Arboretum is rich—the University, government agencies, foundations, and individuals have all worked together to achieve what we have today. The road to get there, however, was not always smooth—there were many differences of opinion as to its location, management, and funding (Washington Park Arboretum Historic Review 2003).

When the University moved to its current location in 1895, the establishment of an arboretum was deemed to be of great importance. Professor Edmond Meany was the major proponent of an arboretum on the new site. In 1898 gifts of trees were accepted from the Seattle City Parks Department and planted on campus. Nearly 30 species were represented, including oaks and honey locusts. Many species of perennials were also donated, and seed contributions were received from California, Ohio, Pennsylvania and Canada. Meany lived near the present Graduate Hotel in the University District and dedicated his private garden to growing tree seedlings.

After 1906 the University lost enthusiasm for developing an arboretum and many of the trees that Professor Meany and others had planted were removed to make way for the Alaska-Yukon-Pacific (AYP) Exposition in 1909. Ten years later, interest rose again. Dean Winkenwerder, supported by Professor Meany, proposed that the area south of the railroad tracks on lower campus be set aside for an arboretum. Trees were planted by forestry students in silviculture classes, but pressure to develop a golf course (Fig. 11.3) in this area eventually won out—it was constructed in 1923.

![Fig. 11.3. Aerial view of the UW campus from the south, ca 1926-1935, showing the golf course where the arboretum was to be located. Anderson Hall, the Forest Products Laboratory, and Rainier Vista are in the left center, just north of the golf course (Source: UW Libraries, Special Collections, Order No. UWC2964).](image-url)
However, the idea of an arboretum was not lost. Dean Winkenwerder did not give up and began a search for a suitable off-campus site. President Suzzallo strongly supported him and suggested that the nearby undeveloped Washington Park, owned by the City of Seattle, would be an excellent location. The land at Washington Park was originally occupied by the coast Salish people, but in 1855 it was opened to settlers with the signing of the treaty of Point Elliott. The Puget Mill Company, a division of the Pope and Talbot Company, bought the land and logged it in the 1880s and looked to sell it for residential development. The economic depression of 1893 stopped much of the development in Seattle, but the economy was resuscitated in 1897 by the Klondike Gold Rush. In 1900, the Puget Mill Company moved to sell its land. However, in order to develop the land for residential use, city services needed to be extended. To accomplish this the company offered to transfer the western portion of the land to the city in exchange for services in the eastern portion, now known as Broadmoor. The city accepted the donation of 62 acres. About 100 acres were added in the next few years. Washington Park was established, and the land eventually became the arboretum.

The Olmsted Brothers (Frederick Law, Jr., and John Charles) Landscape Architecture firm of Brookline, Massachusetts, was responsible for much of the design of the arboretum and adjacent Lake Washington Boulevard. In 1903, the firm was hired by the Seattle Board of Park Commissioners to design new Seattle parks as well as 20 miles of landscaped parkways and boulevards linking existing and planned parks. The plan was prepared by John Charles Olmstead and his assistant Percy Jones. It included ideas for Lake Washington Boulevard, which was designed to be the west boundary of the park. It followed the contours of the land to minimize construction damage—thus the many curves on this section of road. The tract had not been completely clearcut, and a significant mix of evergreen and deciduous trees was left on the hillsides. A creek ran the length of the park through wetlands, eventually flowing into Lake Washington.

Altogether the Olmstead firm designed ninety-nine parks, boulevards, playfields and playgrounds, greenbelts, natural areas, parkways, and boulevards that now grace Seattle, including Coleman, Greenlake, Interlaken, Ravenna, Seward, and Volunteer parks. A planting plan for Arboretum Drive was proposed by James Frederick Dawson of the Olmstead firm. In 1906 John Charles Olmstead and Dawson developed a planting scheme for the AYP Exposition designed to feature corridors, particularly Mount Rainier vista. Washington Park remained largely undeveloped in the 1900s through the 1920s, but from 1907 to 1910 it was home to the “Speedway,” a 40-feet-wide, dirt-covered roadway built for harness horse racing that occupied the area of the present Azalea Way (Fig. 11.4). Horseback riding, riding lessons, and archery persisted in the park for some time after 1910.

Fig. 11.4. Azalea Way is located on the former site of the Speedway.
Washington Park was set aside for an arboretum in 1924. Looking for design ideas, Dean Winkenwerder made a trip at his own expense to visit arboreta and botanical gardens in continental Europe, Kew Gardens in England, and the Arnold Arboretum near Boston. He also recognized that the University and the city would need to develop a cooperative agreement setting forth the rights and duties of each entity, if things were to move forward.

Although Winkenwerder’s efforts were strongly supported by many organizations, there was little funding for his dream. Other arboreta around the world were funded by a combination of endowments, gifts, public funds, and the contributions of patrons. Thus, it seemed logical that Seattle should consider providing annual funding at least equivalent to that required to develop and manage the arboretum like a city park. The UW was unable to provide funds at the time, but did its best to encourage gifts to the Arboretum. Private donations seemed to be the best source of funds, but the stock market crash of 1929 and the ensuing Great Depression meant that private funding was not available.

As the Depression rolled on, more and more people were out of work. In 1931, funds became available from the Board of Park Commissioners to start work on the arboretum and engage the unemployed. In 1934, Roosevelt’s WPA approved funding for the arboretum. Funds totaling $296,910 were expended in 1935–1936—a considerable sum. Three hundred and twenty men were employed in 1935, and this increased in 1936. Dean Winkenwerder, who was the acting director, oversaw construction activities, including the clearing of old stumps, laying of water pipes, construction of a fence on the eastside of the Arboretum, and the creation of a plant propagation house. Lumber contributions were obtained from the Snoqualmie Lumber Company and the US Forest Service. Washington State nurserymen provided planting stock. The total WPA funding to the Arboretum was an impressive $1.5 million by the time it was terminated in 1941.

But all this work had been started without a planting plan. Once again, the Olmsted firm was employed. James F. Dawson, who had developed a planting plan for Arboretum Drive more than thirty years before, provided a preliminary plan in 1936. It featured Azalea Way with rhododendrons, flowering dogwoods, and cherries; ponds and waterfalls on Arboretum Creek; and taxonomically organized plantings. Elements of the plan were executed from 1936 to 1941.

Winkenwerder stepped down as acting director in 1938, and Dr. John Hanley was appointed in 1939. He was well qualified for the position, with an undergraduate degree in forestry from the University of Michigan and graduate degrees in botany from the University of Illinois. He was appointed a faculty member in both forestry and botany. By the 1940s, the Arboretum Foundation was contributing funds for employees, greenhouse and nursery supplies, and equipment and maintenance, but the University was still not providing any direct funding. Thousands of trees and shrubs had been planted following the general Olmsted plan, including many varieties of magnolia, oaks and heathers. Special interest areas were also created, such as the 9-acre Rhododendron Glen—one of the best collections of rhododendrons worldwide. Other areas were sponsored by local garden clubs: Azalea Way by the Seattle Garden Club; the 2-acre Woodland Garden by the West Seattle Garden Club; and the Maple Grove by the Tacoma Garden Club.

Dean Winkenwerder continued to chair the UW Arboretum Committee (later renamed the Arboretum Board) until his retirement in 1945. Hanley resigned in 1946, and Mr. Brian Mulligan was appointed director. Mulligan had horticultural experience with the Royal Botanical Society in England and was extremely interested in the development of collections of plants such as hollies, camellias, and pines. Further small land acquisitions were made at this time, but the city was being pressured to give up some Arboretum land for other purposes. For example, the Seattle Historical Society wanted land for the Museum of History and Industry, and the Toll Bridge Authority required a right of way for the freeway associated with the second Lake Washington floating bridge (SR-520). This included the R. H. Thomson Expressway, which was planned to cut directly through the west side of the Arboretum. Needless to say, these plans were strongly opposed. Eventually, however, the Seattle Historical Society won the battle for a museum building and a 400-car parking area, and the Toll Bridge Authority obtained a right of way at the north end of the Arboretum. In addition, the south end was made into a permanent public playfield.

The Thomson Expressway, however, was the greatest threat to the integrity of the Arboretum. It was planned to run the length of the Arboretum and connect I-5 to SR-520, to avoid downtown Seattle. Fortunately, the project was killed in the “freeway revolts” in the early 1970s—it would have required the removal of thousands of homes, in addition to destroying the natural environment in the Arboretum and resulting in the loss of 48 acres. The current size of the Arboretum is 230 acres.
Another distinctive feature of the Arboretum is the 3.5-acre Japanese Garden (Fig. 11.5), which opened to the public in 1960 and is one of Seattle’s major attractions. Japanese master designers Kiyoshi Inoshita and Juki Iida drew up the plans in the late 1950s, based on classical gardens in their homeland. Design influences included the Horai En Garden in Tokyo, built in the Edo period (1603–1863). Today, Seattle Parks and Recreation manages the plant collection and ticket booth, while the Arboretum Foundation manages fundraising, events, volunteer recruitment, and marketing.

![Fig. 11.5. The Japanese Garden at the Washington Park Arboretum.](image)

Maintenance of the 4,400 accessioned plants in the Arboretum collection has been a challenge because many are rare or endangered species. Efforts have been made to minimize abiotic and biotic stresses to protect these living collections.

**Buildings**

The original building on the site was a storage barn constructed by WPA workers in 1935. In 1937, a nursery, potting shed, and greenhouse were added. A visitor center and meeting facilities were completed much later (https://depts.washington.edu/uwbg/docs/arhistory.pdf). The Donald G. Graham Visitor Center (Fig. 11.6) was built in 1985 with funds from the Arboretum Foundation, and then donated to the city. It houses the offices of the Arboretum Foundation and the Arboretum director, a gift shop, and a meeting room. Other facilities include the Pat Calvert greenhouse, sun and shade house, growing beds, and curation and maintenance facilities.

![Fig. 11.6. The Graham Visitor Center.](image)
The Stone Cottage (Fig. 11.7) is an unusual structure. Built by the WPA in 1936–1937, it is located at the south end of the Arboretum on Lake Washington Boulevard. It was originally intended to serve as a gatekeeper’s residence and is built in English cottage style, perhaps from the Cotswolds. The original basalt stone structure included a kitchen, living room, bedroom, and bathroom. It has been lived in by Arboretum Director Brian Mulligan, Professor Clem Hamilton, and Dan Hinkley, a graduate student at the time and now a well-known horticulturalist in the Puget Sound area.

Fig. 11.7. The Stone Cottage at the south end of the Arboretum.

Master Plans

The original 1934 Washington Park Arboretum Master Plan has been modified several times over the years. A new master plan was adopted in 1978, and in the 1990s the Arboretum and Botanical Garden Committee was charged with the development of the next master plan. A final version, “Renewing the Washington Park Arboretum,” was approved in 2001 by the Seattle City Council, the UW’s Board of Regents, and the Arboretum Foundation, taking into account 5,000 written responses, hundreds of public sessions, and environmental impact statements.

The 2001 plan called for improvements and renovations totaling $50 million over the next 20 plus years and ensured that the Washington Park Arboretum would fulfill its three primary purposes—conservation, recreation and education—for decades to come. Key elements included renovation and creation of plant exhibits; a shift in the way plants were organized, from the traditional taxonomic approach to a geographical/ecological approach; reorientation of pedestrian trails; renovation and expansion of existing facilities in the vicinity of the Graham Visitors Center; construction of a new pavilion and entrance to the Japanese Gardens; and a 1.2-mile paved multi-use loop trail, completed in 2018.

The Union Bay Campus (CUH, UBNA, and Yesler Swamp)

The Union Bay campus (Fig. 11.8) consists of the CUH buildings, the UBNA, and Yesler Swamp. All campus wetlands and shorelines are managed by CUH.
The CUH was established in 1980, although there were no buildings on the site until 1984. It is located on Union Bay, on the very eastern edge of campus, adjacent to the Laurelhurst residential community. Its goal is to apply and share the most current knowledge about plants and plant populations to the solution of horticultural problems found in urban to wildland environments. It was designed to serve four functions—teaching, research, public service/display, and stewardship. Outreach programs and library facilities are available to horticultural scholars, landscape professionals, urban managers, horticultural societies and the gardening public.

The CUH has partnerships with the Northwest Horticultural Society, the Seattle Garden Club, the Puget Sound Mycological Society, and the northwest chapter of the Society for Ecological Restoration. From about 1996 until 2017, CUH was home for the Seattle Youth Garden Works, which was designed to engage teenagers and at-risk youth in an urban garden project that involved growing plants from seed to sale. Such partnerships support CUH programs, teaching, facilities, and gardens, while CUH, in turn, provides space and expertise to help community organizations achieve their goals. The WSU/King County Cooperative Extension master and urban food gardening program also has a cooperative relationship with CUH.

**History**

The history of CUH is strongly intertwined with that of the Washington Park Arboretum. During the 1970s, disagreements arose among the University, the city, and citizens in the Arboretum’s immediate neighborhood about the role of the Arboretum. It was argued that the city already had a zoo and an aquarium, and that a botanical garden and arboretum were needed as a companion to these attractions. Admission was charged at both the zoo and aquarium, so why not fence the Arboretum to protect the collections and gardens, advance research projects, and charge admission to provide needed funds? This proposal was fought by the local community and others who wanted to keep the Arboretum open to all. As a result, in 1974 the University and the city negotiated a more detailed working partnership than that in the 1934 agreement. However, this working arrangement limited the ability of the University to fully realize some of James Dawson’s original and broader visions for the Arboretum—i.e., establishing a library and an herbarium in the Arboretum and a greater research presence. As a consequence, the Northwest Horticultural Society, under the leadership of Elisabeth (Betty) Miller, donated $35,000 to the University to initiate a study of an alternative site at Union Bay, on University property on the north side of Lake Washington, to implement Dawson’s plan. The University appointed a committee, chaired by Professor Dale Cole of the College, to develop a plan for a
Union Bay teaching and research arboretum. A vision for an urban horticulture program at Union Bay emerged and was implemented in 1980. The area chosen was part of the old Union Bay Village, which was comprised of vacant housing units donated by the federal government. They had been brought in by barge and truck in 1946 from the Hanford Nuclear Reservation, the Bremerton Naval shipyard, and other sites to accommodate the thousands of married students returning from World War II. The last of these buildings, then aged and sagging, was torn down in 1981.

**Buildings and Facilities**

The CUH complex consists of New Merrill Hall (Fig. 11.9); Northwest Horticulture Hall; Isaacson Hall; the Douglas Research Conservatory, Greenhouse, and Nursery; the Otis Hyde herbarium; the Elisabeth C. Miller Horticultural Library; and demonstration and test gardens. The original Merrill Hall, which was constructed of wood, was opened in 1984. It was named after the Merrill Family. Richard Dwight Merrill was a timber magnate in Seattle. His daughter Virginia Merrill married Prentice Bloedel—the namesake of Bloedel Hall. A courtyard is enclosed by Merrill Hall, the Elisabeth Miller Library, and Northwest Horticulture and Isaacson Halls.

On May 21, 2001, an arson fire was started just after 3:00 a.m. in Merrill Hall. Unfortunately, there was no sprinkler system in the building or fire blocks in the space below the roof, so it burned quickly. A domestic “eco-terrorist” group called the Earth Liberation Front (ELF) took credit, stating that it had targeted the office and work of Research Professor H. D. “Toby” Bradshaw, who was studying the genetics of poplar trees. ELF named Bradshaw “the driving force in genetic engineering tree research” and claimed that he was unleashing mutant genes into the environment that were certain to cause irreversible harm to forest ecosystems. But only a very small portion of Bradshaw’s research actually involved studying gene-altered tissues—he worked mostly on traditional plant hybridization techniques. He had about a dozen transgenic poplars among the greenhouse tissue samples, but this paled in comparison to the approximately 15,000 poplar seedlings he bred traditionally. The “transgenic” samples were purely experimental and never left the lab. Ironically, they were not damaged in the firebombing, but were destroyed later.

Although Bradshaw’s office was destroyed, much of his research was saved. The fire destroyed or damaged most of Merrill Hall and the Elisabeth Miller Library. The five people who started the fire were eventually caught and prosecuted, and received jail sentences of 5–6 years. Particularly hard hit were the research programs of the faculty, the operation of the Miller Library, and the numerous programs of WSU/King County Cooperative Extension and the Master Gardeners Association. Water, smoke, and soot damaged almost all the books and journals in the Miller Library. The books and journals were removed within 36 hours of the fire and were processed by staff, students, and volunteers. It is estimated that about 15 percent of the collection, excluding the rare books, suffered
severe damage. Faculty, staff, and graduate students were forced to move into temporary trailers until Merrill Hall was rebuilt more than three years later—it opened in January 2005.

Considerable funding was required to rebuild Merrill Hall. The UW is self-insured for damage to buildings such as Merrill Hall, so no insurance funding was available. Great credit must be given to the CUH Director Tom Hinckley and others for their hard work in raising the needed funding from the University, Washington State Legislature, and private sources. The total cost was $7.1 million, with $4.1 million borne by the University. State Senator Ken Jacobsen and Dean Bare devoted considerable time and effort to the rebuilding effort. The new Merrill Hall (20,000 square feet) is slightly larger than the old one and has an impressive entry area that includes a glassed-in atrium used for meetings, celebrations, and displays. An area in front of the atrium sports many tiles bearing the names of donors. It was the first building on the Seattle campus to be recognized as LEED™ Certified Silver—a remarkable accomplishment.

The Otis Douglas Hyde Herbarium houses voucher specimens of all accessioned plants in the Washington Park Arboretum and on the Union Bay campus; horticulturally significant plants; plants that reflect the research and project efforts of faculty, staff, and students; and collections from the Bellevue Botanical Garden. It is also the depository for a collection of weeds and invasive plants of western Washington.

The Elisabeth C. Miller Library is the foremost horticultural library in the northwestern US and serves the academic community, the Washington Park Arboretum, horticultural professionals, and the public. It was founded in 1983 with a gift from Seattle attorney Pendleton Miller—the gift honored his wife, Elisabeth Carey Miller, who played a leading role in the creation of CUH. It opened in 1985. The core of the book collection came from the Arboretum. It includes books on horticultural science; landscape architecture and design; botany; plant taxonomy, including floras from many countries; plant pathology and entomology; urban plant management; and gardening. Also included are a rare book collection; journals; newsletters from other botanical gardens and arboreta; pamphlets provided by professional organizations in horticulture and landscape management, regional plant societies, and the gardening press; and seed, bulb, and nursery catalogues from around the world. In 2000, the Miller Library linked formally with the UW's Library System to provide online and automatic cataloging.

Administration

In 1980 Professor Harold B. Tukey, Jr. (Fig. 11.10) was hired to be the first director of CUH. He was responsible for setting program and facility directions, and did so by hiring faculty and staff and by vigorously seeking donor and broader community funding for the facilities. Through his leadership, over $5 million was raised between 1981 and 1985, and three buildings were built and opened in 1984—Merrill, Isaacson, and Northwest Horticulture Science Halls. Professor Tukey retired in 1992. Subsequent directors were Clem Hamilton (1992–1999); Tom Hinckley, acting director (1999–2000) and director (2000–2004); and John Wott, acting director (2004–2005). From 2005 on UWBG directors were the directors of CUH. Initially, CUH was administratively housed in the Provost's Office, but in 1988 it was transferred and became a CFR component, both administratively and academically.

![Fig. 11.10. Harold B. Tukey, Jr., the first director of the UW Center for Urban Horticulture (Source: UW School of Environmental and Forest Sciences).](image-url)
**Faculty, Staff, and Volunteers**

Many CFR faculty have been located on site from 1980 to the present: Linda Chalker-Scott; James Clark, Rico Gonzalez, Barbara Smit, and Harold B. Tukey, Jr. (plant physiology); Tom Hinckley and Soo Hyung Kim (ecophysiology); Clem Hamilton (plant taxonomy); John Wott (outreach and public gardens); Jonathon Bakker, Kern Ewing, and Dean Wang (plant ecology, and ecological restoration); and Sarah Reichard (plant ecology and taxonomy). Research faculty included Toby Bradshaw (genetics), Kathleen Wolf (social science/urban forestry) and J. Alan Wagar (recreation). Adjunct faculty located on the main campus were Gordon Bradley (urban planning), Rob Harrison (soils), Bob Gara (entomology), myself (pathology), Jim Fridley (environmental engineering), and Sharon Doty (restoration). Faculty from other departments included Iain Robertson (landscape design), Richard Horner (civil and environmental engineering/wetlands), and Warren Gold (UW Bothell/ecology and ecosystem restoration).

Key to the management and functioning of UWBG has been the many dedicated staff members. A core of professional horticulturalists and arborists provide the care and maintenance of the Washington Park Arboretum and the Union Bay campus. Help provided by volunteers has proved to be invaluable, especially following the Merrill Hall fire, with the recovery and cleaning of books and herbarium specimens.

**Academic Programs**

An undergraduate curriculum in urban forestry was initiated in the 1990s. It was later broadened to environmental horticulture and urban forestry (EHUF), with three options: environmental horticulture, public horticulture, and urban forestry. A specific EHUF curriculum was not offered after the CFR curricula were reduced to two in the early 2000s (environmental science and resource management, and paper science and engineering; see Chapter 7). But in 2010 an option in the ESRM curriculum was reintroduced (restoration ecology and environmental horticulture).

A graduate program has been an integral part of the CUH since its inception, concentrating on horticulture (plant selection, maintenance, physiology, etc.), urban ecology (including restoration ecology and conservation biology), and urban forestry. Considerable focus has been on wetlands or disturbed urban landscapes. More than 100 MFR, MEH, MS, and PhD degrees have been awarded.

**Research**

Research has been conducted on the physiology of plants in urban environments; restoration ecology; sustainable community landscapes; the planning and administration of landscapes along urban/wildland gradients; human perceptions of urban vegetative environments; the design, utilization, and management of public gardens; the conservation of biodiversity; and the ecology of native and introduced plant species. The contributions of the individual faculty are given in Chapter 8. Three research programs are formally linked to CUH: Rare Plant Care and Conservation, the Sustainable Community Landscapes Program, and Restoration Ecology.

**Outreach and Continuing Education**

Thousands of people have participated in seminars, courses, lectures, workshops, tours, and conferences in outreach and continuing education programs at the Arboretum and CUH. Examples are: Adult Education (Classes, Continuing Professional Education, Seminars and Conferences); Youth Programs (School Field Trips, Summer Camp, Family Nature Classes, Fiddleheads Forest School, and the Saplings School Program); Family Night Hikes and Story Time; and Birding and Boating activities. Many of the youth and family programs are conducted in the Arboretum. The Fiddleheads Forest School is aimed at providing three- to five-year-old children with a sense of wonder about the plant world, while the Saplings School Program serves 14 school districts in the greater Puget
Sound Area. Outreach to the general public is available through the Arboretum Foundation Bulletin, first issued in 1936.

Continuing education and outreach coordinators (Van Bobbitt, David Stockdale, Susan Nicol, and Jessica Farmer) have been critical to its success. They worked with the local horticultural community to develop the Pro-Hort series and assist with Seattle’s annual Northwest Flower and Garden Show, whose primary sponsor is the Arboretum Foundation. CUH is considered to have one of the most successful outreach and continuing education programs on campus.

**Partnerships**

Connections with other horticultural groups and programs continue to be an important part of the UWBG’s efforts. Courses are offered that meet the standards set by the State of Washington Pesticide Licensing program as well as the International Society for Arboriculture Certified Arborist program.

**Gardens and Grounds**

The CUH’s 16-acre Union Bay gardens and grounds include four named gardens—the Marilou Goodfellow Grove (featuring native northwest plant species); the Seattle Garden Club Entry Shade Garden; the McVay Courtyard (a matrix of Japanese maples and rock gardens; Fig. 11.11); and the Orin and Althea Soest Herbaceous Display Garden (perennials and bulbs representing typical urban conditions). It is also home to three test gardens—Blooms of Bressingham Evaluation Garden; the 2001 Suntory Annual Evaluation Garden; and the Vitex Evaluation Garden.

**Fig. 11.11.** The McVay courtyard and glass atrium at rear, at the UW Center for Urban Horticulture (Source: UW Center for Urban Horticulture).
Union Bay Natural Area (UBNA)

UBNA is noted for its diverse habitats, which include 74 acres of emergent wetlands, marshlands, permanent and seasonal ponds, e.g., Shoveler's pond (Fig. 11.12), upland woodland, prairie, and 4 miles of shoreline. It sits mostly atop a capped former City of Seattle landfill, and provides a living classroom as well as a wildlife sanctuary. In 1966, I could see the landfill’s many methane flares at night. UBNA includes a loop trail and is used for classes, including UW-REN. It is also a campus greenbelt and an excellent wildlife viewing area. Two hundred species of birds can be seen here during the year, so it is a favorite spot for bird watching (Sidles 2009).

![Fig. 11.12. Shoveler's pond and wetlands at the Union Bay Natural Area. Mount Rainier is in the background.](image)

Yesler Swamp

In the late 19th and early 20th centuries the Yesler Sawmill and two cedar shingle mills operated in this wetland area on the eastern edge of campus adjacent to the Laurelhurst community. After the mills stopped operating in 1920, the UW bought the land but it remained vacant and undeveloped for nearly 80 years. Restoration of Yesler Swamp commenced in 2000, with a series of student capstone projects carried out by the UW-REN led by Kern Ewing and others. Faculty and students established a trail, cleared invasive plants, and planted native flora. In 2010, through the Friends of Yesler Swamp and a grant from the Seattle Department of Neighborhoods, an all-season trail and boardwalk were constructed to provide community access to Yesler Swamp (Fig. 11.13).

![Fig. 11.13. Boardwalk traversing Yesler Swamp.](image)
Introduction

The first field exercises in the College of Forestry were conducted on campus, but as the University expanded and native trees were removed, they were moved to forest lands as close to campus as possible. It soon became clear that permanent sites—owned and managed by the College—would be needed to provide adequate field education. The first of these was the Charles Lathrop Pack Forest, established in 1926. Other College forests were added to the list in the 1930s—Lee Memorial Forest (the first section in 1934 and the second in 1938), and the Winnifred Denney Memorial Forest near Cle Elum in 1934. The last of the field sites, the Olympic Natural Resources Center (ONRC), was not established until 1989. These sites are described below. Figure 8.3 shows the location of these sites.

The Charles Lathrop Pack Demonstration Forest

The Charles Lathrop Pack Demonstration Forest is located in the foothills of the Cascades, 65 miles south of the UW near Eatonville, Washington, on State Route 7. It was established in 1926 as a demonstration forest, as a result of a gift from Charles Lathrop Pack, a lumberman-philanthropist from the eastern US. The original land base of Pack Forest was 343 acres—it now occupies 4,300 acres. Elevations range from 550 feet near the Mashel River to 2,040 feet. Average annual rainfall is a modest 40 inches, and snowfall is only 4 inches. The forest is mostly composed of second- and third-growth conifers, along with 180 acres of old growth (Fig. 12.1). Douglas-fir is the major species.

Fig. 12.1. The largest old-growth Douglas-fir tree at Pack Forest (Source: Center for Sustainable Forestry at Pack Forest).

I first visited Pack Forest in the summer of 1967, when I was conducting research for my MS degree. The style of the buildings in the camp area, with their shingled walls and shake roofs, greatly impressed me. In the 1960s there were only two forestry schools in Australia, and neither had a camp like this. In fact, they didn’t have permanent camps. We usually stayed in tents on our trips to forests in New South Wales, Queensland, and South Australia.
**History**

I could write a whole book on the history of Pack Forest, but can only provide an abridged version here. When I arrived at the UW, I didn’t know of its existence. I soon learned that it was established in the 1920s, named after Charles Lathrop Pack, used for classes for undergraduate forestry students who spent spring or summer quarter in camp, and had an active research program. It was only when I returned to the College and served as the Pack Forest Faculty Director in 1974–1976 that I began to thoroughly investigate its long and interesting history.

Before the 1850s, members of the Nisqually tribe occupied the region near Eatonville, which was established in 1889. They no doubt hunted in the area that is now Pack Forest. With the arrival of European settlers in the 1850s, tribal members were forced to move to the Nisqually Reservation to enable settlers to farm. This met with resistance from the tribe, resulting in the infamous Eatonville massacre at the confluence of the Mashel and Nisqually Rivers in 1856. Between 8 and 30 people are estimated to have died at the hands of the volunteer group Washington Mounted Rifles (historylink.org/File/8941). This was the last episode of the Indian Wars, which had started in 1855.

Today, Pack Forest maintains a relationship with the Nisqually tribe as a member of the Nisqually River Council, which was formed in 1987 to integrate the history, culture, environment, and economy of the watershed to provide a healthy and sustainable future. Stream stewardship is an extremely important part of its mission. Meetings have been held at Pack Forest, and tribal members have even been allowed to strip bark from its cedar trees.

In the 1850s railroads became a common feature in the development of the west, including freight, passenger, and logging railroads. The Northern Pacific Railway reached Tacoma from the east in 1883, and logging railroads began operation soon thereafter. Locally, the Tacoma Eastern Railway was established in 1887, and its logging operations expanded in 1890. In the early 1900s, Mount Rainier National Park was a popular tourist destination, and railroads were the primary way to get there. The Tacoma Eastern Railway reached La Grande, on the south side of Pack Forest, in 1902 and Ashford in 1904 (the end of the line). Passengers had to continue by road to reach Mount Rainier National Park. In 1907, car travel for the entire distance from Tacoma to Mount Rainier was made possible by the opening of the Mountain Highway (State Route 7). Travel was arduous and it took two days to drive to Mount Rainier on the unpaved road. Thus, trains still continued to operate. La Grande was a natural half-way stopping point for both train and car passengers. So, in 1912, the luxurious Canyada Lodge (Fig. 12.2) was built in La Grande to accommodate tourists who wished to stay overnight (Johnstone 2011). It burned down in 1927. A second less luxurious one was constructed in 1931 and lasted until 1966.

![Fig. 12.2. Canyada Lodge in La Grande, Washington. The photo was taken between 1912 and 1921 (Source: UW Libraries, Special Collections, Negative Number Barnes 201).](image-url)
Mount Rainier attracted prominent visitors from the eastern US, including President Taft, who arrived by train in 1911. In 1913, three passenger trains a day were destined for Mount Rainier. It took three hours to travel from Tacoma to Ashford. Passengers then had to travel the rest of the way by car. To reach Ashford trains had to travel through the land now occupied by Pack Forest (see the track location in Fig. 12.6). In 1943, the Tacoma Eastern Railway was rerouted and no longer ran through Pack Forest.

By the mid-1920s, train travel to Mount Rainier had faded and the automobile had become the preferred mode. In 1926 the Mountain Highway was paved all the way to the mountain, except for the Nisqually Canyon stretch. Seeing the influx of tourists traveling by road through La Grande in the 1920s, Dean Winkenwerder developed the idea of establishing a show-window forest to advertise the benefits of sustained-yield forest management to the general public. He began the search for funds to accomplish his goal. Out of the blue, he received a letter from Charles Lathrop Pack (Fig. 12.3), President of the American Tree Association. It included several newspaper clippings referencing Winkenwerder’s idea, which Pack called a window-dressing forest. It seemed that Pack and Winkenwerder’s ideas of selling forestry to the public matched. Pack had accumulated a considerable fortune as a lumberman that he was using to promote forestry, and was one of the richest men in America before World War I.

Charles Lathrop Pack was born in Lexington, Michigan in 1857 and died in 1937. His father was a lumberman in Michigan, and Charles also became a lumberman. However, he saw that the forests of the Lake States were not limitless, so he bought pine forest land in Arkansas and Louisiana, where he built his fortune. President Theodore Roosevelt appointed him one of the National Conservation Commissioners. In 1913, he was elected President of the National Conservation Congress, and from 1916–1922 he served as President of the American Forestry Association.

Pack and his son, Arthur Newton Pack, organized the American Tree Association to encourage people to plant trees and to popularize forestry on a national scale. It published many booklets, including the *Forestry Primer*, as well as magazines—*Forestry New Digest*, *Forestry Almanac*, and *Nature Magazine*. He had a strong conviction that if forestry was to make progress, forestry professionals needed skills in writing and public speaking. Thus, he made gifts of $1,000 to each of the important forestry schools in the nation, including the UW in 1923. Interest earned from this fund was to be awarded as a prize for the best upper-class essay on conservation. The prize is still awarded to SEFS students.

In a series of letters in 1925, Pack and Dean Winkenwerder exchanged their ideas on a demonstration forest. In one letter, Pack wrote:

Mr. Nelson C. Brown talked over with you the ideas for a demonstration forest, or rather a forest to demonstrate forestry to the public. This should be situated on one of the big highways that is much traveled. It would have a small amount of larger timber, some timber of various ages, and Douglas-fir

![Fig. 12.3. Charles Lathrop Pack (1857–1937) (Source: Wikimedia Commons).](image)
regeneration. After the forest is purchased it would not be just a forest to grow timber, but a forest to aid in selling the idea to the public—something of real educational value. We simply want to aid the foresters in selling their goods and to help dignify the profession. There should be some proper signs which would call attention to what you are trying to do, and showing this is a demonstration of forestry. A demonstration forest is a type of window dressing, something to help sell the goods, like a storekeeper puts his attractive goods in the window to entice people to come inside and buy.

Pack essentially conveyed the message that “you buy the area you want and we will pay the bill.” Winkenwerder informed Pack that he had found the ideal tract located on the Mount Rainier National Park Highway. The Pack Forest highway sign is shown in Fig. 12.4 left, along with the initial manager’s cabin in 1927 (Fig. 12.4 right).

Fig. 12.4. Left: Pack Forest Highway sign on the mountain highway (Route 7) (Source: Center for Sustainable Forestry at Pack Forest), 1927. Right: First manager’s cabin near La Grande, Washington, 1927 (Source: UW Libraries, Special Collections, Negative Number 9983).

In December 1925, Pack sent Winkenwerder a check for $9,222. The Board of Regents accepted the gift, and in January 1926, mostly cutover land near La Grande was purchased from the Northern Pacific Railway (174 acres) and the Cascade Timber Company (160 acres)—a total of 334 acres. Pack gave his permission for the land to be named the Charles Lathrop Pack Demonstration Forest. This was the second Charles Lathrop Pack Demonstration Forest. The first is in New York state near Warrensburg, and is operated by the College of Environmental Science and Forestry at the State University of New York at Syracuse University. Pack is buried there. He never visited the western Pack Forest. His son Arthur, however, visited it several times and was heavily involved in funding many of the projects. From 1926 to 1937, Charles Pack and the Pack Forestry Foundation made gifts of more than $150,000 to acquire and develop Pack Forest.

By the 1930s, the land base of Pack Forest had increased to 2,104 acres and the sawmill there was providing lumber and shingles for construction at Pack Forest and the UW campus. The Great Depression was in full swing, leading to the establishment of one of President Franklin Delano Roosevelt’s Civilian Conservation Corps (CCC) camps at Pack Forest. Corps members built the reservoir dam (an earth-filled cribbed type) at a junction between two branches of 27 Creek, felled snags, built roads, constructed trails, built Pack Hall, and started an arboretum. The WPA provided workers to build student and instructor residence cabins and houses, the dining hall, a classroom, the garage and machine shop, a warehouse, a shower house, and an insectary. WPA crews were also responsible for timber harvesting. Altogether, 160 men were employed on this project.

Also, in the 1930s, miles of road and trail and a water system were installed. More buildings, including the gatehouse, cabins, and a combined shingle and sawmill, were constructed. A forest nursery was established growing Douglas-fir,
western redcedar, Port Orford cedar, ponderosa pine, and western hemlock seedlings. The model of Pack Forest at the gatehouse and the fire lookout tower at Hugo Peak (named after Dean Hugo Winkenwerder) were also constructed.

During repairs to Pack Hall (Fig. 12.5) in 1988, a whiskey bottle was found embedded in the foundation. A message in the bottle told about the construction of the Pack Forest facility and listed the 17 members of the CCC team in Company 1622. All had labored, on August 2, 1933, to lay the cornerstone of Pack Hall. The message requested that, on discovery, word would be sent to the mayors of the towns from which the workers came. Only one worker came from Washington State; the others were from Illinois. Stan Humann, who was the Pack Forest manager at the time, did indeed contact the mayors of the towns in question. He also replaced the message in the bottle with a new message, hoping it would be rediscovered during the next renovation. Humann heard back from several of the former CCC workers, including one who came back later to be married in Pack Hall. Another wrote that “being in the CCC was one of the best years of my life.” He came into the camp weighing 150 lbs and left at 170 lbs.

Fig. 12.5. Left: Dining Hall and old Pack Hall (Source: Center for Sustainable Forestry at Pack Forest). Right: Renovated Pack Hall.

I have always been impressed by the high quality and quantity of the food served in the Dining Hall at Pack, thanks to the excellent local cooks. However, it seems this was not always the case. The students in the class of 1935 wrote a memo to Dean Winkenwerder with the following critique: not sufficient variety or quantity; quality of food poor (too much “bone stew”); eggs that were old, greasy, or “rock boiled”; no bacon, sausages, or breakfast meat; hotcakes only served once; milk of poor quality (watered down); lunches poor; and sloppy serving—25 percent of the students suggested a new cook be hired. Interestingly, they added that there was very little sickness and that nearly everyone gained weight during the quarter. The quality of food improved greatly in later years.

Pack Forest was greatly influenced by World War II, particularly because student enrollments plummeted from 454 in 1936 to just 15 in 1943. The manager, Duane Covington, entered World War II in 1943, and for a time his wife, Erma, became the acting manager. After the war, Mr. Covington resumed as manager. Student enrollment increased dramatically after 1945, with the return of the servicemen. It was 331 in 1946. This was a busy time for Pack Forest, but as always, funding continued to be a problem. A new sawmill and mill pond were constructed as a money-making venture, but the mill never operated for more than three weeks at a time. A large proportion of the forest was in young age classes (Douglas-fir 0–20 years old). In November 1955 a widespread freeze damaged many of the trees, reducing their timber value.

A long-range plan was put in place in the 1960s to expand Pack Forest to its “natural boundaries”—primarily rivers and highways—which would encompass 4,600 acres. In the 1970s three additional land acquisitions were made, including 1,046 acres from the Weyerhaeuser Company and the neighboring 607-acre “Flying M Ranch,” or simply Murphy’s Ranch. Don (Buffalo) Murphy hoped to turn the property into a dude ranch and attract tourists attending the 1962 World’s fair in Seattle. He began construction of a motel and excavated several fishing ponds. He was hardly an ideal neighbor. In the summer of 1970, he staged a rock concert—sort of a Woodstock West—that spilled over onto Pack Forest land. This was done in the guise of a political party convention and was termed the
“Buffalo People’s Party and Pig Roast.” He was actually renting the property, but the owner did not want to confront this oftentimes violent person. After Murphy’s life was prematurely ended in 1975, shot by his long-suffering wife (who received a deferred sentence), the University swiftly purchased the land from the owner. Pack Forest was now 2,880 acres. Continuing land purchases in the 1980s increased its size to 4,073 acres. Several small land acquisitions in the 1990s brought the total to 4,374 acres, approaching the area needed to reach its “natural boundaries.”

By the 1970s Pack Forest was in serious financial difficulty, and the buildings were beginning to deteriorate. Legislative cutbacks to the University meant the virtual end of financial support from Washington State. I remember seeing Carl Hupman, the resident manager, sitting forlornly on the office steps, wondering if anything could be done about the situation. During this period the sawmill closed, the equipment was auctioned, and the building was converted to a warehouse. To reverse this trend, the College embarked on a rejuvenation venture led by Associate Dean Dale Cole.

As a result of lobbying to the Washington State Legislature, state funds were obtained for new classrooms, dormitories, restrooms, and improved water and sewer systems. New research funding provided further stimulus, including funds from the City of Seattle to study the effects of applying reclaimed solid waste—sewage sludge, or biosolids—to forests. A permanent weather station was installed, a greenhouse was constructed to provide seedlings, and the summer academic field study program was reinstated. A forest management plan was also introduced to guide forest harvesting and regeneration.

By the 1980s, Pack Forest was forced to become self-supporting. Through timber sales, increased research funding, and infusion of state funds for new buildings and the renovation of old buildings, Pack Forest received a new lease on life. But financial support to operate the facilities continued to be needed. Income from the main source of funding—timber harvesting—was not stable, since lumber demands and prices typically went up and down. The management plan guided harvesting activities to ensure that the forest was not overcut. An additional source of funds was an educational outreach center. Some funding was also generated from phone companies that rented space on a cell phone tower placed on the highest point of the forest, Hugo Peak.

In the 1990s, some thought was given to selling Pack Forest and using the revenue for other College activities. Urbanization was fast approaching from the north, and it was argued that in the long run, this would change Pack Forest from a managed demonstration forest to a forest park surrounded by houses. Besides, what was unique about Pack Forest? It was basically a lowland Douglas-fir forest typical of many in the Puget Sound area, even though it did contain a small patch of spectacular old growth. Also, the faculty did not seem to be very interested in conducting research here. But luckily, this idea was rejected.

Through the 1980s and 1990s, new activities started, such as an educational outreach center to administer programs conducted at Pack Forest. But as the College changed its focus from traditional forestry to a broader scope, the use of Pack Forest began to decline. Fewer students were enrolling in forest management and forest engineering classes that required a quarter in residence at Pack Forest, and this resulted in the discontinuation of these classes.

In the 2000s the main uses of the forest were short courses, outreach, hiking, continuing education, and general use by the UW as well as other organizations. It was utilized by the SAF for leadership meetings, for College retreats, and for other UW Seattle and Tacoma classes. Research use had declined, and the College was no longer offering academic classes there to our undergraduate students. Spring Quarter Field Studies ended at Pack Forest in 2006. Some summer courses were offered, but they generally had low enrollments and were offered only once or twice. A new management plan was needed. Dean Bare renamed Pack Forest the Center of Sustainable Forestry at Pack Forest to better advertise the role of Pack Forest as a research and demonstration forest for sustainable forestry. To manage the forest he adopted the Landscape Management System (LMS)—computer software developed by College’s Silviculture Laboratory (see Chapter 9).

Timber harvest provided the majority of the budget. Pack Forest became third-party certified under the Sustainable Forestry Initiative (® SFI) program in June 2004. It continues to be an important adjunct to SEFS, but its activities are in almost constant need of adjustment. Timber harvesting continues to generate funding, and the LMS model is used to calculate annual harvests, taking into account wildlife values and other factors. The Conference Center continues to be successful, and the Continuing Education and Outreach Programs reach many adults and children. The forest is also heavily used for recreational purposes.
Administration

Pack Forest was administered through the CFR deans’ office (now the SEFS director’s office). However, because of its distance from the main UW campus, a resident manager was needed to operate the forest on a day-to-day basis. Housing was provided for him and his family in one of the six houses in the camp area. Until 2005 managers were required to live on the site.


Starting in 1974, a faculty or staff director based in Seattle was appointed. I served in this position from 1974 to 1976, and Steve Archie, the College administrator, served after this. I also served as acting director from 2001 to 2003, until John Calhoun was appointed director from 2003 to 2006. John was not based in Seattle. He was the director of the ONRC in Forks and would commute regularly to Pack Forest—a long drive. Since 2006, Professor Gregory Ettl has served as the director of the Center for Sustainable Forestry at Pack Forest.

Facilities

The Pack Forest campus area today (Fig. 12.6) includes the administrative building, the workshop, the dining hall and the social hall (Pack Hall; see Fig. 12.5), student cabins (Fig. 12.7), houses (Fig. 12.8), classrooms (Scott Hall and MacBride Hall), new dormitories, apartments, community bathrooms, greenhouses, the sawmill (converted to storage space and a laboratory), a baseball field, and volleyball courts. The large Upper Classroom (Fig. 12.9 left) was renamed Scott Hall in honor of Professor David Scott’s contributions to the teaching and research programs at Pack Forest. A Lower Classroom was located just below the campus area (Fig. 12.9 right), but razed in the 1960s. It had an apartment on one of the floors used by the faculty, as well as a classroom. Professor Dave Thomas and his family lived in the apartment while he taught surveying at Pack Forest. The story goes that the Lower Classroom had been a roadhouse (perhaps even a house of ill repute) on the road to Mount Rainier before being dragged up the road from the gatehouse as far as it could go.

Fig. 12.6. Pack Forest camp area in 2018. Highway 7 and the gatehouse are at far left. Just to the north of the baseball field are, from left to right, the Dining Hall, Pack Hall, new dormitories, and MacBride Hall. Farther north, in the trees, are student cabins, Scott Hall, and faculty houses. At the right center are the office, workshop, and the location of the old sawmill. The white line is the location of the old Tacoma Eastern Railway (Source: Google Earth).
Fig. 12.7. Left: Historic student cabins (Source: UW Libraries, Special Collections, Order Number UWC 3813). Right: Renovated cabins.

Fig. 12.8. The faculty house used by Professor Dave Scott from 1956–1987.

Fig. 12.9. Left: The large Upper Classroom (Scott Hall). Right: The historic Lower Classroom (Source: UW School of Environmental and Forest Sciences).
The ten historic student cabins were built where the CCC workers’ tents were located. They were refurbished in the 1960s. Bathroom facilities were located in a separate building, and still are. In contrast, the new dorms have restrooms and showers located within the buildings. Six apartments and five houses (once six) offer private or shared rooms. As the number of female students increased in the 1960s arrangements were made to house them. The first students were accommodated above the Dining Hall—it was like an attic and very hot, they said.

The gatehouse on Highway 7 (Fig. 12.10) was established as a gateway to the forest and acted as a source of information on the use of Pack Forest, as well as on its function as a demonstration forest. An arboretum was established near the gatehouse, along with a small-scale model of the forest to orient visitors. The model forest still exists, but is now greatly out of scale because the trees are so large. During World War II, activity at Pack Forest was reduced and permanent gatehouse staffing was discontinued. For many years it was staffed during the summer, but now it is not open.

Fig. 12.10. The gatehouse in 2000. The model forest is located in the trees directly behind the gatehouse.

Today, Pack Forest has accommodations for up to 136 overnight guests. Dean Bare sought to improve the quality of the retreat facilities, thinking that this might attract more groups to use the facility, especially for University retreats—the camp was a bit rustic for some guests. Plans were produced for a comfortable lodge, but funding could not be obtained and this idea was abandoned.

**Academic Programs and Conferences**

From 1930 to 2006, the College required that forestry students live and take classes at Pack Forest for one quarter—whether in the summer after their freshman year, the summer or spring of their sophomore year, or the spring of their junior year. In 1930, 32 sophomores spent the summer quarter at Pack Forest.

When enrollments were high, courses were taught in both the spring and summer quarters. Hours spent in the field, time in the classroom (Fig. 12.11), and evenings studying after dinner made for a long day. Silviculture, mensuration (later forest measurements), and surveying were the basic courses. Forest Ecology was added after Professor Scott arrived.
By 2005 the academic program only included silviculture and natural resources measurements, and in 2006 the summer quarter program was discontinued. Pack Forest is now used for field trips, and for case study classes over a day or more at a time (Fig. 12.12). Courses such as ecology and wildlife science have also been offered to non-forestry students through the summer quarter program, but have never attracted large numbers of students and have generally been offered only once or a few times.

Research and Demonstration

Research has a long history at Pack Forest. The first research project, in the 1930s, involved the planting of native and non-native trees to test survival, growth, adaptability to the western Washington climate, and their potential use as timber species. The species tested were: western redcedar, Port Orford cedar, oriental cedar (Thuja orientalis), coast redwood, Japanese red pine, and Douglas-fir. Other research conducted by faculty and students over the years has involved silviculture; growth and yield; soils; forest fertilization; mycorrhizal fungi; ecology; canopy and tree physiology; genetics (Douglas-fir and ponderosa pine provenance trails and hybrid poplars); forest fire (controlled burning and burning of logging slash); micrometeorology; forest pathology; entomology; biosolids and wastewater; wildlife science; whole-tree harvesting; forest harvesting methods (small log removal by horses and pewee yarders); ozone pollution; ecological forestry (green tree retention, sustainable forestry, forest carbon sequestration, and
ecosystem services); bioenergy; and social science. Some of the forest treatments have been used for demonstration purposes. Below are descriptions of three research projects that I found to be particularly interesting.

**Sewage sludge (biosolids) disposal.** Disposal of untreated sewage sludge from Seattle’s West Point treatment plant into Puget Sound ceased in the early 1970s after passage of the Federal Water Pollution Control Act. How was the city going to handle the sludge? Attempts at disposal on the beach at West Point were unsuccessful. The College came to the rescue. Associate Dean Dale saw that it had potential as a forest soil amendment and could boost tree growth. Cole offered to dispose of the dewatered sludge at Pack Forest if the city would fund research. The proposal was accepted and research was started in 1974, but it was not without controversy. Local residents were alarmed that Seattle was disposing of its waste in their backyard. Open sewage-laden trucks driving through Eatonville were dropping sludge on the road. Worries were voiced about pathogens and toxic chemicals polluting streams, unacceptable odor, and flies being attracted. Needless to say, considerable time was spent appeasing the community. Eventually, nearby residents were convinced that they weren’t at risk. There were no flies. Well, maybe a few.

Initially, the sludge was delivered in tanker trucks and applied to clearcuts (Fig. 12.13). Some was dumped in a sinkhole, produced after glacial retreat, where a whole year of Seattle sludge could be stored. From there it was pumped out and sprayed in forest stands. The good news was that the research demonstrated that sewage sludge—now called biosolids—could safely be applied to forests and could increase tree growth and productivity (see Fig. 8.13 right). Application of biosolids to forests is now widely practiced.

**Slash burning.** In the 1960s, logging slash resulting from clearcutting was typically burned. However, this led to air pollution and unhealthy breathing conditions, particularly in the Puget Sound area, where the pollution was trapped under a temperature inversion. Meteorologists Leo Fritschen and his colleague Konrad Buettner from the Department of Atmospheric Sciences, collaborated with fire scientists Stew Pickford and Jim Murphy to determine whether slash burns could be made hot enough to create updrafts that would burst through the temperature inversion layer and be carried away. The research was conducted in the late 1960s, during the Vietnam era, when surplus napalm seems to have been available. Napalm (or “fuel booster,” as it was called) was ignited in a recent clearcut with lots of slash—the resulting smoke cloud was spectacular. The updraft was so strong that I can remember having to hold on to a tree in the adjacent forest to avoid being sucked in—at least it felt that way. There was no doubt that it worked. Slash was burned and smoke was blown upwards through the inversion; but, of course, it was impractical to use that particular method. Further details are found in Fritschen et al. (1970).
Canine conservation training. In the late 1990s, the UW Center for Conservation Biology established the canine conservation training and kennel program at Pack Forest, under the direction of Biology Department Professor Samuel Wasser. Wasser knew that dogs could be trained to sniff out narcotics, so he reasoned that perhaps they could also be trained to locate scat from different wildlife species for research. Scat provides information on an animal’s diet, stress level, and reproductive health. Individual animals within a population can be identified with precision using scat DNA. Instead of searching in confined spaces, as narcotics dogs do, conservation dogs were taught to search in large areas of wilderness. Amazingly, dogs can locate pocket mouse droppings no larger than a grain of rice in an area the size of a football field. Moose, caribou, and wolf scat can even be located through two feet of snow. The scat from aquatic animals, such as killer whales, can be detected in the water a kilometer away. The facility can hold up to 30 detection dogs, and Pack Forest provides permanent housing for the dog handlers.

Educational Programs and Public Use

Educational outreach and public use were central to the original establishment of Pack Forest. In 1938, 6,000 visitors from the US and foreign countries visited the gatehouse. Numerous conferences, short courses, meetings, and retreats have been offered or coordinated by the Conference Center, involving the College and University, state and federal agencies, other colleges and universities, private companies, and community and not-for-profit groups, such as the SAF. Pack Forest also provides opportunities to hike on its 40 miles of permanent road and 15 miles of self-guided trails, take nature walks, bike, horseback ride, or hunt.

The general public, schoolchildren, and professionals can learn about forest management, forest ecology, new ideas in forestry, and what is currently happening at Pack Forest. Each year, thousands of children are exposed to the wonders of the natural world through outreach and educational programs. The Mount Rainier Institute (directed by John Hayes) located at Pack Forest, provides hands-on field science investigations in an outdoor “classroom.” Over a thousand students per year participate (from first graders all the way to AP environmental high school students). They come from all over the state and even from Portland, Oregon. Most are in the upper middle school range and participate in a four-day three-night program. Day 1 is an introduction to Pack Forest and sustainable forestry, day 2 is science day, day 3 is a field trip to Mount Rainier National Park, and day 4 is student presentations. Fig. 12.14 shows middle-school students measuring the diameter of a large-old-growth Douglas-fir at Mount Rainier. Part of its mission is to illuminate career paths in natural resource management to kids (potential UW students) who would normally not consider this profession. Pack Forest educators work closely with teachers to develop ways that best fit a school’s curriculum.

Fig. 12.14. Students from Jason Lee Middle school in Tacoma measuring the diameter of an old-growth Douglas-fir tree in Mount Rainier National Park (Source: Mount Rainier Institute).
Other College Forests

Lee Memorial Forest

The 158-acre Lee Memorial Forest (Fig. 12.15) is located in Snohomish County, near Maltby, about 22 miles northeast of the UW’s main campus in Seattle. Vegetation is mostly second- and third-growth Douglas-fir and red alder. The elevation is 615 feet at the highest point, and average rainfall is 43 inches. George O. Lee and his sisters deeded the property in two portions to the College of Forestry in memory of their parents, Mr. and Mrs. O. H. Lee, who were Snohomish County pioneers. The first portion (80 acres) was accepted in 1934, and the second portion (78 acres) in 1938. The old-growth forest in the area was logged in the early 1890s. The accessibility, stocking, age, and location of Lee Forest made it exceptionally valuable for demonstrations of forestry practices in western Washington. It was used for teaching and research involving mensuration, silviculture, thinning, pruning, portable sawmill operation, ecology, forest soils, pathology, genetics, and wildlife such as urban birds. A small bioenergy plantation featuring poplars was also created.

![Fig. 12.15. Aerial view of the 158-acre Lee Forest in 2001. Note the patchwork of experimental treatments (Source: UW School of Environmental and Forest Sciences).](image)

The gift agreement specified that Lee Forest was to be used strictly to conduct research and not for teaching. If teaching was conducted, it was to be returned to the Lee family. Despite this, the College used it for class field trips. In the 1980s, the Lee family discovered that it was being used as a teaching laboratory for students at the neighboring Cathcart elementary school and sued the University. However, the College successfully demonstrated that Lee Forest was still an active research site and the reversion did not occur.

Winnifred Denney Moore Forest

The Winnifred Denney Moore Memorial Forest was a gift in 1958 and 1959 to the College from Raymond C. Moore, Professor of Geology at the University of Kansas. The 450-acre tract was located on the east slope of
the Cascade Mountains, near Salmon La Sac in the Boulder Creek area of the Wenatchee National Forest. Site elevation is about 2,500 feet and the dominant form of precipitation is snow. The forest represented the vegetation of eastern Washington and contained ponderosa pine, lodgepole pine, fir, and spruce. It was especially useful for ecological studies as well as land management studies applicable to the high-elevation areas of eastern Washington. For a variety of reasons, however, the Denney Moore Forest was never extensively used and was eventually sold.

**The Olympic Natural Resources Center**

The ONRC (Fig. 12.16) was founded in 1989 in Forks, Washington, to address conflicts over natural resources management, especially on the western Olympic Peninsula (see www.onrc.washington.edu). The ONRC was designed so that government agencies (Forest Service, NPS, and WADNR), universities, the timber and fishing industries, environmental groups, and native tribes (Fig. 12.16) on the western Olympic Peninsula—the Lower Elwha and Klallam, Quinault, Hoh, Quileute, and Makah—would benefit from its presence. It represents a neutral forum where parties with diverse interests are encouraged to address and resolve their conflicts.

Extremely productive forests and abundant marine resources are features of the area, which includes much of the remaining temperate old-growth forest outside of Alaska. The locale is very wet—at Forks, the annual average rainfall is 121 inches, with 7 inches of snow. Major species are Douglas-fir, western hemlock, western redcedar, Sitka spruce, and Pacific silver fir at higher elevations. The ONRC is located in a 180-acre patch of young-growth forest, but potential research sites are available on nearby federal, state, private and tribal lands.

The ONRC was initiated under the guidance of CFR and the College of Ocean and Fishery Sciences. Its purpose was to demonstrate innovative management methods that could successfully integrate environmental and economic interests into the pragmatic management of forest and ocean resources. Research and education concerned with forest and ocean resources were to be combined with traditional knowledge from local native tribes.

Programs developed by the ONRC include research and education on: (1) aquatic resources: estuarine processes, ocean and coastal management, offshore development, and fisheries and shellfish enhancement; (2) forest resources management at the landscape, ecosystem, and regional levels, including issues that cross legal and administrative boundaries; (3) interactions of marine, freshwater, and terrestrial ecosystems; (4) integration of
R E M O T E  I N N O V A T I O N  O N  T H E  O L Y M P I C  P E N I S U L A

commodity production with the preservation of ecological values; and (5) alternative economic and social bases for sustainable, healthy, resource-based communities, such as tourism, and recreation. Workshops, short courses, and continuing education for resource professionals, policy forums, conferences, student research, and public education are fostered. Collaboration with coastal educational institutions (Grays Harbor and Peninsula Community Colleges) is encouraged.

History

Conflicts about forest management on the Olympic Peninsula have gone on for decades, but they increased dramatically in the 1980s, especially about fishery practices and the harvesting of old-growth forests. Old-growth forests had almost disappeared in western Washington, especially in the lowlands, and the environmental community was determined to preserve whatever old growth remained. Harvesting of old growth on federal lands was a controversial subject, yet it was the economic livelihood of towns such as Aberdeen, Hoquiam, and Forks. The conflict became known as the “Timber Wars.” In June 1988, Washington State Land Commissioner Brian Boyle established a group (known as the Old-Growth Commission) to study old-growth alternatives for Washington’s forest trust lands, and make recommendations to resolve this conflict. The commission consisted of 32 members representing academia, timber companies, tribes, conservation and wildlife groups, schools and other trust beneficiaries, Olympic Peninsula community leaders, state legislators, and financial, legal, and forestry experts.

A report was issued in June 1989 with the following recommendations: (1) create the ONRC; (2) create the Olympic Experimental State Forest (OESF) on western Olympic state trust lands, to produce a level of timber harvest comparable with contemporary forest practices, while simultaneously ensuring ecological values and sustainable yields; (3) defer harvest on 15,000 acres in natural mature forests to enable research in critical spotted-owl habitat; (4) acquire up to 3,000 acres where timber harvest would not be conducted; (5) undertake a comprehensive economic study; and (6) create an advisory committee.

Old-growth-dependent species such as the northern spotted owl and the marbled murrelet were listed as threatened in 1990 and 1992, respectively, further affecting old-growth harvesting. In 1994 the Northwest Forest Plan (described in Chapter 3) permitted harvesting on some Forest Service land, not only to provide timber but also to provide jobs, especially for local timber-dependent communities. However, this aspect of the plan never came to fruition, and the economic and social health of Forks and other timber-dependent communities continues to suffer.

Administration and Staff

The ONRC operated originally under the authority of the Board of Regents of the UW. It was administered by a director from either CFR or the College of Ocean and Fishery Sciences, appointed jointly by the deans of both colleges. At the time, the deans were David Thorud and Arthur Nowell. The ONRC director was advised by scientific and technical committees and other committees. A policy advisory board was appointed by the governor of Washington State, consisting of eleven members to advise the deans and the director on policies. Membership on the policy advisory board broadly represented the various interests concerned with the center, including the state and federal governments, environmental organizations, local communities, the timber industry, and native tribes.

There have been four directors, all from CFR or SEFS: Professor Jerry Franklin (1989–1992), Mr. John Calhoun (1994–2010), Professor David Ford (acting director, 2011–2015), and Professor Bernard Bormann (2015–). The initial years of ONRC were rocky. Local residents were suspicious, and UW scientists were not warmly welcomed. Professor Franklin was seen as an enemy, largely because of his role in devising the Northwest Forest Plan. One of his goals was to establish a construction crane on the west side of the Olympic Peninsula to study old-growth forest canopies. Several sites were considered in the Olympic National Forest and Olympic National Park. Many locals did not want him to study old growth and suggested that the crane be located in a young managed forest. This
impasse was never resolved. Franklin received death threats and promises to blow up the crane if it was placed in old growth. After two years it became apparent that the canopy crane was never going to be built on the Olympic Peninsula. Franklin stepped down as director and decided to place the crane in the Gifford Pinchot National Forest just north of the Columbia River (see Chapter 8). The crane received a warmer welcome there.

Perhaps having a faculty director based in Seattle was not the best idea—a local director might be better received by the local community. As a result, John Calhoun, who was employed by the WADNR at Forks, retired to become the ONRC’s second director in 1994. Calhoun was able to obtain the support of the local community. Understandably, his initial focus was on outreach. After Calhoun retired as director in 2010, the idea of a faculty director resurfaced. Professor David Ford served as acting director from 2011–2015 and was replaced by a permanent director—Professor Bernard Bormann—in 2015. In addition to the director, the ONRC staff consists of outreach personnel, an administrative assistant, a site manager, GIS specialists, cooks, and cleaners.

Permanent funding has always been a problem at ONRC. The state legislature provided funding to construct the buildings, but only $300,000 per year was allocated for operations and maintenance—far from enough. Additional funding has been provided by the WADNR, conferences, and research.

**Facilities**

The ONRC initially operated out of the WADNR office in Forks until permanent facilities on the current site were constructed in 1992. The campus (Fig. 12.17) consists of the main building (which includes a conference room and other small meeting rooms), offices, library, research lab, GIS/computer lab, and a workshop. A second building has a commons area, dining room, and kitchen, while a third provides lodging in apartments and dormitories. High-speed internet connections are available throughout. A manager’s house was to be built on-site, but was never constructed; managers have typically lived in a trailer where the house was to have been located.

![Aerial view of the Olympic Natural Resources Center (ONRC). Bottom left: Manager’s trailer. Middle lower: Conference and meeting rooms, offices, library, research and GIS/computer labs. Middle: Commons area, and dining area. Middle upper: Apartments and dormitories](Source: Olympic Natural Resources Center).

**Academic Programs**

College faculty members have taken classes on field trips to the Olympic Peninsula, but no full classes have been taught at ONRC. Class field trips have mostly been on extended weekends, and students have usually camped out rather than stay at the ONRC, largely because of the cost.
Research

The ONRC was initially envisaged as a world-class research center that would attract not only faculty, postdocs, and graduate students from the UW, but also researchers from around the US and internationally. It was hoped that it would function like the world-renowned Harvard Forest in Massachusetts or the US Forest Service’s H. J. Andrews Research Forest in the Oregon Cascades. Researchers would be attracted by the opportunity to study the nearby old-growth temperate rain forests, as well as some of the most productive young-growth forests in the world. Freshwater and marine ecosystems are also close to ONRC. The ONRC research program has yet to meet these lofty expectations, however, due to some extent to its rather remote location.

Only a small area (180 acres) is occupied by ONRC, but large research areas are available in the OESF, Olympic National Forest, Olympic National Park, and private and tribal lands. Below are some examples of ONRC Forest and forest/aquatic interactions and marine research.

Forest and forest/aquatic interactions research. Research on forest ecology, forest productivity, tree canopies, soils, forest/stream interactions, wildlife and social science has been conducted by College faculty and their graduate students and postdocs. These studies have involved Jerry Franklin (old-growth ecology and canopy structure); David Ford (canopy physiology); Bernard Bormann (forest productivity); Darlene Zabowski and Daniel Vogt (canopy soils); Robert Naiman and Rick Edwards (riparian ecology and nutrient cycling); David Manuwal (marbled murrelets); Bob Lee (social science), and me (old-growth forest and stream ecology, carbon storage, forest productivity, and soil ecology); Few scientists outside of the UW were attracted to conduct research at ONRC, and the research facilities have not been heavily used. Most of the research funding has come from the US Forest Service, the USGS, the NPS, the WADNR, McIntire Stennis, and small grants from ONRC.

Director Bernard Bormann helped establish the Sappho Long-Term Ecosystem Productivity (LTEP) study when he was with the US Forest Service. The LTEP study represents the implementation of “New Forestry” practices, especially the influence of thinning methods in second-growth Douglas-fir forests in the OESF. Treatments include early succession, mid succession, and late succession stands, each with high and low organic matter retention (Fig. 12.18).

Marine Research. ONRC’s Aquatic Program has focused on fostering research and outreach on understanding estuaries, marine/terrestrial interactions, and shellfish enhancement. One of the major issues in estuaries is Spartina, a cordgrass introduced from the eastern US, which is spreading rapidly in intertidal areas and threatening habitats...
for migratory wildfowl, fish and shellfish, including oysters and clams in Grays Harbor and Willapa Bay (Fig. 12.19). For years, the UW Sea Grant Program has sponsored research on shellfish-related issues to help growers meet challenges.

![Invasive Spartina grass in wetlands in Willapa Bay](Source: Washington State Department of Agriculture)

**Outreach and Continuing Education**

Although research and teaching efforts have not developed as desired, the Outreach and Continuing Education (OCE) program at ONRC has been a great success, largely due to efforts of the OCE coordinators, like Ellen Matheny. It has involved community meetings, the professional development of regional educators, public forums, conferences, a newsletter, and a website that provides current information and an archive of research results. Staff members typically attend weekly community meetings where business people and professionals in Forks gather to discuss issues of importance to Forks and the regional community. Some education funds have been provided by local citizens, such as the Rosmond Forestry Education Fund provided by Fred Rosmond, a local forester.

ONRC shares its research in forestry and marine science with local and regional citizens. For example, it has offered courses to regional educators that involve training in mathematics applied to natural resources, forest mensuration, global warming, renewable energy resources, stream environments, and fish populations. The instruction was provided by a collaborative UW faculty team from CFR, the College of Education, and the Department of Mathematics. Graduate students from SEFS have also given presentations on their research.

Public forums have also been held periodically at which professionals have presented information on issues of concern. Local and regional media were used to publicize them. One of the forums concerned the management of the populations and health of Pacific razor clams along the Washington coast. Participants talked directly with the professionals about how decisions were made to open or close harvesting periods. Many workshops and conferences have been held exploring the details of current issues about natural resources and the environment. For example, in 2007 the ONRC and the Olympic Forest Coalition cohosted a conference entitled Climate Change: Implications for Olympic Peninsula Forest Ecosystems. The same year, the GIS Lab at ONRC hosted a day-long workshop on GIS issues and technologies for regional GIS professionals.

The bi-monthly newsletter, *ONRC Update*, features in-depth information such as biocontrol solutions for invasive Japanese knotweed, use of mathematical modeling to explore forest management plans that will provide habitat for the northern spotted owl, and GIS work being carried out for the City of Forks.
CHAPTER 13
INTERNATIONAL CONNECTIONS

Introduction

I was first exposed to international students when I was a student at the Australian Forestry School in Canberra in the early 1960s, where I studied with students from India, Africa, Malaysia, and New Zealand as well as Australia. I got to know them well, and this started my interest in mentoring foreign students, sharing information with foreign scientists, and traveling internationally.

The CFR has benefited from international connections. Many students and faculty have come from other countries and faculty and their graduate students have conducted research around the world. In addition, alumni have worked in many foreign countries in silviculture, forest management, forest engineering, social science, natural resource policy, ecological restoration, conservation biology, wildlife management, forest products, paper science, and other areas. Below I recount the international liaisons of the faculty and students—their research, teaching, consulting, and participation in international meetings.

The Faculty

Faculty have conducted research in many foreign countries, given presentations at international meetings, taught courses in other countries, and belonged to international associations. Some were active in the Peace Corps and the Organization for Tropical Studies (OTS). Others provided their expertise to organizations such as the Forest Research Institute in Bogor, Indonesia (Bethel, Schreuder, Bare, and Briggs). Social science professors Bradley and Ryan and their associates had connections with Humboldt University in Berlin through the Urban Ecology IGERT. Many have spent sabbatical leaves in countries such as Australia (West, Wirsing, and myself), Austria (Hinckley), Brazil (Harrison), Chile (Gara), and New Zealand (Bare).

Some faculty have been the recipients of Fulbright Fellowships—e.g., Ivan Eastin with the Forestry Research Institute of Ghana in Kumasi, and Dorothy Paun in Alberta, Canada. The UW also has a faculty international exchange program with foreign universities—for instance, Kevin Hodgson participated in a faculty exchange with the University of Waikato in New Zealand in 2004. Reciprocally, visiting scientists from a number of countries have spent time at the College, and Fulbright fellows from foreign countries have been sponsored by College faculty. I sponsored three Fulbright fellows—an Albanian and two Indians. The Albanian stayed on and received an MS in 2000 under my supervision. Susan Bolton sponsored fellows with an interest in hydrology. She also participated in the Engineers Without Borders program, assisting small communities in Bolivia improve their water quality and use stoves and chimneys in their homes rather than open fires with little ventilation. A formal course in international forestry was offered by the College and taught by Professors Gara and Greulich.

The Students

International graduate students have hailed from 54 countries (listed in Chapter 6). A smaller number of foreign students received undergraduate degrees. Taiwanese and mainland Chinese students dominate. Latin America is also well represented, but not so for Europe and the UK. From 1965 to 1994, twenty-three Australians completed master’s or PhD degrees working with Professors David Scott (ecology and silviculture); Dale Cole, Stan Gessel, Rob Harrison, and me (soils); Bob Martin (fire science); Bob Lee (social science); Charlie Driver (forest pathology); Bruce Bare (operations research); and Steve West (wildlife science). Many graduate students came to the College
because no graduate programs were offered in their specialties in their home countries. This was certainly true for Australians in the 1950s, 1960s, and 1970s.

One of the Australian students was Dr. Wilfred J. B. Crane, who earned a PhD in 1972 studying with Professor Gessel in forest soils. He contributed greatly to forestry in Australia as a CSIRO (Commonwealth Scientific and Industrial Research Organisation) scientist, until his untimely death in 1992 in a light plane accident. Few people notice the memorial to him mounted on the wall across from Bloedel Room 290. It is a planting spade (called a Sylvaspade), accompanied by a dedication and poem (Fig. 13.1). Wilf created the Sylvaspade— which is silver-colored as well as representing silviculture—as a way of symbolizing the importance of planting trees in Australia at the time of its bicentennial in 1988. In typical “Australianese,” the poem mounted below the spade reads (with a final line reference to the game of cricket):

So, you bought a bloody tree spade and the neighbors say you’re mad
and you plant a line of trees or two then you’re not feeling so bad
In the centennial of the future one hundred years from now
they will look upon you kindly for by gum you showed them how
For now, those little seedlings are sixty meters tall
and their massive trunks are wickets for your great grandson’s bat and ball.

Fig. 13.1. The Australian Bicentennial Sylvaspade dedicated to the memory of Dr. Wilfred J. B. Crane (1939–1992) in the UW's Bloedel Hall.

Our students have participated in international exchange programs and field studies in Africa, Canada, Latin America, South America, Europe, New Zealand, and Asia. Many graduate students were supported by the College’s IGERTs—bioresource-based energy, multinational collaborations on challenges to the environment, and urban ecology. Students have also been members of the International Forestry Students’ Association.

International students at the UW adjusted to their new experience in the US with the help of the Foundation for International Understanding Through Students (FIUTS), a community nonprofit organization established on campus in 1948. The founders’ mission was to enhance international understanding and promote cultural exchanges between international students and Americans. They created an environment where ideas, issues, and
the spirit of internationalism could be fostered. Today, FIUTS continues this tradition through programs that stimulate discussion and build international awareness and cross-cultural communication. International students like me were assigned to a volunteer host family, who met them at the airport a week or so before classes started in fall quarter; students lived in their homes for a week.

**International Research, Teaching, and Consulting**

The faculty have conducted research and consulting in Australia, Austria, Bhutan, Brazil, Chile, China, Finland, Germany, Indonesia, New Zealand, South Africa, Turkey, Uruguay, Venezuela, and countries in Africa and southeast Asia. In addition, the College has signed memoranda of understanding with many foreign universities and agencies: Canada—the Faculty of Forestry, University of British Columbia, Vancouver; Chile—Facultad Ciencias Forestales, Universidad Austral de Chile, Valdivia; China—the Chengdu Institute of Biology, Chinese Academy of Sciences, Chengdu; Finland—University of Helsinki; Indonesia—Institut Pertanian Bogor; Japan—College of Bioresource Sciences, Nihon University, Fujisawa, and Kochi University, Kochi; Mexico—Departamento de Ecología y Recursos Naturales del Centro, Universitario de Costa Sur de la Universidad de Guadalajara, Jalisco; New Zealand—City Council of Christchurch; South Korea—College of Agriculture and Life Sciences, Seoul National University; Taiwan—the Department of Forestry, National Chung-Hsing University, Taichung; and Suriname—the Center for Technical Excellence, Paramaribo. The College was regularly visited by scientists from these and other institutions. Faculty have also visited research sites in countries where former graduate students reside.

As well as regular faculty, many instructors were hired by the College. The story of Floyd W. Schmoe (1895–2001), who was an instructor from 1935 to 1941 (Fig. 13.2), is a particularly interesting one. In December 2017, I was watching a documentary on the bombing of Hiroshima on the NHK World (Japan Broadcasting Corporation) TV channel when Mr. Schmoe’s name popped up. The name sounded familiar so I checked my faculty and instructor list, and there he was. Schmoe wore many hats in the course of his life—he was a forest ecologist, marine biologist, college professor, volunteer leader, humanitarian, and peace activist. He was the first official naturalist at Mount Rainier National Park from 1924 to 1928, and climbed to the summit 14 times. While at the College, he taught forest recreation, wildlife management, characteristics of trees, and forest protection. He also wrote more than a dozen books, including *A Year in Paradise*, about his experiences at Mount Rainier. He died at the remarkable age of 105.

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**Fig. 13.2. Floyd Schmoe (1895–2001) in 1983 with photo of Hiroshima, Japan taken ca. 1950 (Source: Museum of History and Industry, Seattle).**
Schmoe left the College in 1941 for World War II work with the Society of Friends—the Quakers. As a sixth-generation Quaker and hence a conscientious objector, he had driven an ambulance carrying wounded soldiers off the battlefields of France in World War I. In World War II he helped evacuate European Jews and also assisted Seattle's Japanese Americans who were relocated to internment camps in Idaho. In 1948, he helped rebuild homes in Hiroshima and Nagasaki that had been destroyed by the atomic bombs. For his work he was awarded the Order of the Sacred Treasure, Japan's highest civilian honor. He also helped build orphanages and hospitals in South Korea, Africa, and the Middle East, and was nominated three times for the Nobel Peace Prize.

On a small wedge of green at the north end of Seattle's University Bridge, overlooking Lake Union, is the tiny Seattle Peace Park (Fig. 13.3), which Schmoe helped create in 1990 at the age of 95. In the park stands a bronze statue of a 12-year-old Japanese girl named Sadako holding a folded paper crane. She died of leukemia after the atomic bomb was dropped on Hiroshima and is a stark reminder of the horrors of nuclear war. A recent PBS documentary told the story of Schmoe's life.

Fig. 13.3. Seattle Peace Park and statue of Sadako.

The Peace Corps

President John F. Kennedy established the Peace Corps in 1961 to provide technical assistance to developing countries, thereby helping people from other countries understand American culture and helping Americans understand the cultures of other countries. Peace Corps Volunteers are American citizens, usually with college degrees, who work abroad for a period of two years after three months of training. Their work is mostly related to social and economic development. They work with governments, schools, and nonprofit and nongovernmental organizations, in the fields of education, business, agriculture, forestry, and the environment. The UW has been very active in providing Peace Corps volunteers. Since 1961 nearly 3,000 Huskies have served, placing the UW third on the list of all-time volunteer-producing schools. In the last few years, the UW has produced more volunteers than any other large university. A number of faculty from the College served in the Peace Corps in Brazil, Chile, Malaysia, Morocco, and other countries. Many graduate students served before attending the UW. The influence of the Peace Corps on the students was reflected in their creativity, work ethic, and independence in developing their research projects.

In 1986, a new Peace Corps program, the Peace Corps Masters International (PCMI), was established to allow graduate students at US academic institutions to count volunteer service abroad toward their degrees. More than 90 universities were involved, including the UW. PCMI was a professional degree program in which a rigorous
program of academic study was combined with hands-on experience during an overseas Peace Corps assignment. In 2002, a PCMI program was initiated in the College, with Professor Ivan Eastin as faculty leader. Students completed one year of academic coursework prior to beginning their 27-month Peace Corps assignment. At the end of their duty, PCMI students returned to the UW to complete their degree requirements. Twenty-three students graduated from this program, including five women. Unfortunately, the entire national PCMI program was closed down in 2016. The countries our students served in were Cameroon, Ethiopia, Ghana, Jamaica, Paraguay, the Philippines, Senegal, Tanzania, and Zambia. Their volunteer contributions involved sustainable forest management, agroforestry, soil surveying, soil and water conservation, erosion control, deforestation, improvement of cook stoves, home construction, fencing, growing nuts such as shea and cashews, and countering Ebola risk associated with bushmeat consumption.

Jake Grossman, who served in Paraguay, provided a wonderful description of his Peace Corps service:

I served as a volunteer in the environment sector in Paraguay from 2009 to 2011. After 11 weeks of training in a suburb of the capital, Asunción, I lived for two years in an agrarian community of about 500 people in the rural department of Caazapá. When I arrived in the country, I was trained as part of the agroforestry extension group. I had already taken a year of coursework in forestry and horticulture as part of the UW-SEFS International Forestry PCMI program. My undergraduate degree was in biology and environmental studies. So, I was well prepared to work with farmers and farming families on managing agroforestry systems and woodlots, applying green manures to maintain soils, and cultivating sustainable perennial crops such as yerba mate, grafted citrus, and timber species. I ended up spending about half of my time working on these projects, either with individuals, families, or comités de productores (farmers’ committees).

One big surprise to me was that most of my efforts went into promoting tree horticulture and establishing agroforestry systems. Since few farmers had little experience with silviculture or agroforestry, and deforestation had eliminated most natural forest, there was less of a focus on management and more of a focus on establishment. Another surprise was that I ended up spending about half my time engaging in and loving something I swore I would not do as a volunteer: work with kids. Along with agroforestry extension, environmental education was the other main goal of the environment sector. There were great teachers in the primary and secondary school of my community, and slowly but surely, I ended up teaching K-12 biology and environmental science, organizing school-wide Earth Day celebrations, running summer camps out of my house, teaching English, and holding teacher trainings on environmental topics. My journey from swearing that I wouldn't work with kids ended up with me directing 4th graders in a play about deforestation. This was emblematic of the importance of open-mindedness and flexibility to Peace Corps work. All this work was very satisfying.

More stories from the PCMI students can be read at http://depts.washington.edu/sefspcmi.

**Organization for Tropical Studies**

The Organization for Tropical Studies (OTS) is the world’s leading institution in the study of tropical biology (http://tropicalstudies.org). The College and the UW have been affiliated with OTS since it was established in 1963. Costa Rica has been the main tropical country involved. Here research stations are located in three ecologically diverse ecosystems—La Selva in the Caribbean lowlands, Palo Verde in the northwestern Pacific lowlands, and Las Cruces on the southern Pacific slope. The Wilson Botanical Garden is also located at Las Cruces.

Structured as an international nonprofit consortium, OTS is headquartered at Duke University in Durham, North Carolina. It is comprised of universities, government research stations, museums, and private research
institutions. Sixty-three consortium members are currently involved from the US, Costa Rica, Australia, Mexico, Peru, and South Africa. Each entity in the consortium contributes financially to OTS, but the major funding comes from the US National Science Foundation (NSF).

In the late 1950s, Drs. Theodore Hubbell and Stephen Spurr in the Botany Department at the University of Michigan and Dr. Donald Stone at Duke recognized that education and research on tropical biology were desperately needed. They envisaged OTS, but funding was needed to fulfill the dream. Jim Bethel, who was later dean of the College (1963–1981), had a large influence on the early funding. He was a program director at NSF at the time, and while attending the Fifth World Forestry Conference in Seattle in 1960, he was approached about obtaining funding for OTS. The NSF was able to provide support, and the program was underway. Bethel continued to be a big supporter of OTS after he became dean of the College, and served as its third president from 1966–1967. Other faculty members also contributed—William Hatheway and Ken Turnbull were executive directors.

Many of my fellow graduate students, particularly in soils and plant ecology, took the basic OTS course in tropical ecology at La Selva Biological Station in Costa Rica in the late 1960s and 1970s, and conducted research in the country. Gary Hartshorn (PhD 1972) was an OTS student, and became one of the best-known tropical biologists in the world. He was the executive director of OTS based at Duke from 1996 to 2003. After his time at OTS, he became CEO and president of the World Forestry Center in Portland, Oregon, from 2003 to 2013. Hartshorn had an extraordinary career fostering tropical forest research and received many awards, including the honored alumnus award by the UW Forestry Alumni Association in 2009.

Courses at OTS are taught by faculty with outstanding knowledge of tropical ecosystems. The initial focus on education and research has now been broadened to encompass learning options for natural history visitors and local schoolchildren, who come to the OTS stations for short visits. Overall, more than 350 graduate-level courses in the ecology and management of natural resources have been offered, and since its inception thousands of students have participated in OTS programs and conducted research. The UW is still involved in OTS, but is now represented by delegates from the Department of Biology and from UW Bothell, not SEFS.

International Meetings Conducted on Campus

The Fifth World Forestry Conference in 1960

Many international scientific meetings involving forestry faculty have been held on campus. Perhaps the most notable was the Fifth World Forestry Congress, held at the UW from August 29 to October 10, 1960. The first congress was held in 1926, under the auspices of the Food and Agriculture Organization (FAO) of the United Nations. It was the largest and most significant gathering of the world’s forestry sector. The congress is a forum for sharing knowledge and experience concerning the conservation, management, and use of the world’s forests at global, national, and regional levels. Each congress is organized by the government of the host country.

The Seattle congress was held in the Husky Union Building. Participants numbered an impressive 1,857 (1,489 regular and 368 associate) representing 65 nations. The official host was the US government. In June 1957, the US Secretary of State informed the FAO director-general that the US government was prepared to host the congress. The 45-member organizing committee was chaired by the new chief of the Forest Service and included the UW College of Forestry’s Dean Gordon Marckworth and former UW President Henry Schmitz. Forestry faculty participated in most of the organizing committees, including Brian Mulligan, Dave Thomas, and Stan Gessel (tours), Frank Brockman and Donald Clark (educational exhibits), J. Kenneth Pearce (machinery and equipment), Walt Schaeffer (local arrangements), George Stenzel (housing), and Dave Scott (transportation). Field trips to Pack Forest, Lee Forest, and other sites were organized.

The educational exhibits in Anderson Hall were very popular. Forestry schools, the lumber industry, professional and trade organizations, and various government agencies provided 100 exhibits. In addition, 75 forestry films from many countries were shown. Logging and other equipment was on display in the football stadium.
One of the most memorable events of the fifth congress was the planting of the International Friendship Grove, located in the center island of NE Campus Parkway, west of Brooklyn Ave NE. Preceded by a band, representatives from the 65 nations marched down the parkway to the site. Each delegate stepped forward to place the first shovel of soil around their tree when the name of his native country was called.

University President Charles Odegaard provided remarks about “planting” the spirit of international friendship and the value of trees. He went on to add that “as the monumental entrance to the University takes further shape in the years ahead, it will be greatly enhanced by this stately grove of trees.” Dr. Eino Saari of Finland, who had been the President of the Third World Forestry Congress in Helsinki, concluded the ceremony by asking, “Would it be too much to hope that during the next 100 or 150 years, when the trees in the grove have reached vigorous middle life, some other peaceful occasion may bring together, on the University of Washington campus, representatives from every nation in the world, and that these men may visit the International Friendship Grove and reflect on the hopes and aspirations of the generations before them?”

Unfortunately, the grove did not turn out to be as stately as imagined. Only 22 of the original 65 trees survive today. (A list of countries, tree species common names and scientific names, and survival can be accessed through Appendix A.) The University grounds and maintenance department has a webpage showing the location and information about campus trees (https://depts.washington.edu/ceogis/Public/Trees/), including the surviving trees on Campus Parkway. Few people know that the grove exists, and there are no signs describing its origin. A few small identification (ID) tags are left at the base of some of the surviving trees, showing the logo of the Fifth World Forestry Congress. The most impressive specimen remaining is the 60-foot-tall *Pinus patula* (Fig. 13.4 left) with its ID tag intact (Fig.13.4 right).

![Fig. 13.4. Left: The tallest surviving tree, *Pinus patula*, representing Mexico in the International Friendship Grove on NE Campus Parkway, Seattle, Washington in 2017. Right: ID tag at the base of the tree.](image)

**Other Meetings**


Professor Richard B. Walker (Botany Department) was tendered an invitation in 1963 for the University to host the International Botanical Congress in 1969. The host committee was comprised of James Bethel (Chairman), C. Frank Brockman, Charles Driver, Stanley Gessel, David Scott, and Reinhart Stettler—from Forestry—and, from
the Botany Department, Lynn Brady, Robert Cleland, C. Leo Hitchcock, Arthur Kruckeberg, Bastiaan Meusse, Herschel Roman, Richard Walker, and Howard Whistler. About 3,300 full members, 500 student members, and 600 associate members were registered. Numerous full- and half-day field trips were conducted during the conference, as well as fifteen pre- and post-conference field trips. Commemorative stamps were produced, such as one featuring Douglas-fir (Fig. 13.5).

Fig. 13.5. Commemorative stamp for the Eleventh International Botanical Congress, held at the University of Washington in 1969 (Source: US Postal Service).
CHAPTER 14
THE FUTURE

Introduction

How will the forests of the world fare in the future, particularly in the face of global climate change? A preview might be the Australian forest fires in late 2019 and early 2020. Australia is the hottest and driest (with the exception of Antarctica) continent. Drought conditions have been widespread for years, and temperatures are soaring. In the 2019 Southern Hemisphere winter, large bushfires burned in Queensland. By spring and summer, more than a hundred fires were burning out of control in all the other states, especially the most populous—New South Wales and Victoria, as well as in the Australian Capital Territory. It is well recognized that temperatures in Australia will continue to increase. By 2050, high temperatures in Sydney are predicted to reach 50 degrees Celsius (122 degrees Fahrenheit). Alarmingly, maximum temperatures of this magnitude were almost reached in the outskirts of western Sydney in December 2019 and January 2020. Across the continent, a record average maximum temperature of 107.4° F was recorded on December 19, 2019.

Smoke from the fires reached New Zealand, 1,400 miles to the east, and then circled the globe. As of mid-January 2020, 3,000 homes had been destroyed, 33 people were killed, and evacuees had to be rescued from beaches by the Australian Navy. Millions of acres were burned, although estimates vary widely—from 46 million acres (the size of Washington State) by Wikipedia (https://en.wikipedia.org/wiki/Bushfires_in_Australia) to 27.2 million acres (more than the 22 million acre forest area of Washington) by the BBC (https://www.bbc.com/news/world-australia-50951043). The Australian economy has been damaged, and the tourist trade has been much reduced. The air quality was among the poorest in the world.

Sadly, the initial response of the conservative federal government was one of inaction—just wait it out. It was argued that bushfires have always been common in Australia, and one politician even argued that similar high temperatures had been recorded back in 1896. The climate-change deniers concluded that human-caused climate change was not involved (https://www.nbcnews.com/science/environment/australia-fire-literally-so-are-its-climate-politics-n1104351). The Australian states employed volunteer firefighters until help arrived from overseas, including air tankers from the US. Only then did the federal government assist. Tragically, three Americans died when one of the air tankers crashed.

Ecological damage has been immense—forests were destroyed; more than a billion birds and animals were estimated to be lost, including koalas and other endangered species; and vast amounts of carbon dioxide (CO2) were released into the atmosphere. An estimated 30,000 koalas were killed and some have suggested that they may become extinct by 2050. Even if animals and birds survived, their habitats were gone. Species that were not on the endangered species list before the fires now are. Recovery will be slow, and some ecosystems may never fully recover. To add salt to the wound, rain from thunderstorms, although putting out the fires, caused massive flooding, soil erosion, and water pollution.

If Australia represents the canary in the coal mine with respect to the effects of human-caused global climate change, then the future for the US and the world does not look rosy. Forest fire frequency and magnitude are increasing in western North America and Europe. In the last few years, California fires have been historically large, intense, and a great threat to property, lives, and ecosystems; this summer (2020) the fires have been devastating. Most were caused by dry lightning strikes; hot, dry weather; low fuel moisture; and high winds. Interestingly, firefighters from Australia have been asked to help. Tropical forests, which are considered to be the lungs of the earth, are being threatened by their rapid conversion to agriculture. The widespread use of fire in this conversion has resulted in flames spreading to adjacent forests—witness what has happened in the Amazon, Africa, and southeast Asia.
**Threats to Forest Ecosystems**

**Global**

Wildfires are not the only threat to forests. All of Earth’s ecosystems, including forests, are in peril from a myriad of causes, as is the fate of humankind. The list is long, and includes global warming from increasing atmospheric emissions of CO2—produced largely by fossil-fuel burning—and from other greenhouse gases, such as methane; stronger storms and hurricanes (cyclones and typhoons); fires; flooding; drought; population growth; and land conversion. Rising temperatures are causing rapid melting of ice sheets in polar regions, resulting in sea-level rise, thawing of permafrost, and increased organic matter decomposition, which adds even more CO2 to the atmosphere. Marine ecosystems are being threatened by ocean acidification, rising temperatures, and pollution—including the presence of nonrecyclable plastics. Most scientists agree that these threats will result in losses of plant and animal species; changes in species movements; habitat loss; tree mortality; and greater impacts of introduced and native insects and diseases.

The rapidly increasing global human population, particularly in tropical countries, is also a threat. Attempts to conserve tropical forests are difficult in the face of poverty (Nambiar 2019).

**The Pacific Northwest**

The future of Pacific Northwest forest ecosystems is uncertain. Climate scientists believe that the region will have hotter-drier summers, warmer-wetter winters, more rain, less snow, more flooding, greater stresses on domestic and agricultural water supplies, longer growing seasons, and more fires. Summer drought will negatively affect tree species that typically grow in moist environments, such as western redcedar, western hemlock, and Sitka spruce. Deaths of western redcedars in the Puget Sound area and on Vancouver Island in British Columbia are already increasing. Douglas-fir will also be affected. Thompson et al. (1998) predicted that its range will decrease in a 2 x CO2 climate in the inland Pacific Northwest and Canada, although there will be less change in coastal areas. Through density management and assisted migration, forest compositions can be adjusted to reduce competition and to select plant and tree species—or specific geographical sources of species such as Douglas-fir—to adapt to climate change. However, to accomplish this, good climate prediction for the next 40 to 60 years is required.

Healthy fast-growing plantations will help counter increasing CO2 levels through carbon sequestration, but will they stay healthy? The remaining old-growth forests and their soils are still capable of sequestering and storing carbon (Gray and Whittier 2017), but will global warming hasten their demise? National parks are under increasing pressure from climate change and increasing human visitation. High elevation ecosystems are particularly susceptible. Glacier National Park could lose all its ice by 2030. Can you imagine iconic Mount Rainier without its icy wrap?

Forest land will continue to be lost as a result of urbanization and development, but the value of urban trees and forests is now well recognized in cities, where they provide shade, reduce heat-island effects and urban runoff, ameliorate air pollution, beautify neighborhoods, furnish walking trails, and provide human therapy. However, trees in urban areas are also under threat and maintaining urban forest cover is a continuing challenge.

Aquatic animals and birds continue to be threatened. Pacific salmon populations have been reduced by loss of spawning habitat in forest streams and by hydroelectric dams; orcas are dying because of lack of food sources, primarily chinook salmon; and old-growth-dependent birds—such as spotted owls and marbled murrelets—continue to decline. Spotted owls are also being outcompeted by introduced barred owls.

**Reducing the Threats**

Reducing threats to forests, particularly warming temperatures, requires global cooperation. To reduce CO2 emissions, the international community produced the Kyoto Protocol (signed in 1997, but not effective until 2005),
and the Paris agreement of 2016. The long-term goal is to keep the increase in global average temperature less than 2°C above preindustrial levels. Unfortunately, these agreements are not supported by the US. In fact, under the current polarized political philosophies, environmental regulations on CO2 emissions are being loosened by the Trump administration. Unless the US takes a lead on reducing carbon emissions, global reductions are unlikely to happen.

Carbon taxes and cap-and-trade systems are the most commonly promoted ways to reduce emissions and promote cleaner fuels. Carbon taxes represent surcharges on carbon-based fuels, while cap-and-trade systems involve governments putting a cap on industrial pollution. The cap is reduced year after year until a set pollution target is reached. As the cap decreases, polluters that exceed their emissions quotas are forced to buy unused quotas from other companies. Many countries, such as Sweden, have successfully adopted one or both of these systems, along with lifestyle changes. Critics, especially in the US, argue that these measures will “ruin” the economy. What incredibly short-term thinking!

At the state level, however, activities aimed at reducing carbon emissions are continuing. Washington Governor Jay Inslee recently signed a law requiring that 100 percent of the state’s electricity come from clean energy sources by 2045. Washington has now joined Hawai‘i, California, New Mexico, and the territory of Puerto Rico in committing to 100 percent clean electricity—hydro, solar, wind, geothermal—and at least six other states are considering similar legislation. Coal energy production has already declined, and conversion to more efficient and less polluting natural gas is occurring, although natural gas still emits CO2 on burning. Reduction of carbon emissions from transportation will be more difficult, and conversion to electric cars will take considerable time. Carbon-neutral biofuels are becoming more available.

The best hope for carbon capture involves trees and agricultural plants. Technology for directly removing CO2 from the atmosphere is also underway, but is in its infancy. Increased recycling of wood and paper products will reduce the need to use virgin fiber, thus saving trees.

In the Pacific Northwest the value of healthy forests in providing ecosystem services such as carbon sequestration, purification of water and air, and forest products is immense. Increasing the health of forests can be achieved through thinning, fuel reduction, and controlled burning to reduce the risk of wildfires; encouragement of biodiversity; and monitoring of exotic insects and diseases. Forest treatments require significant investment, however.

Unfortunately, forest-conservation gains made through the adoption of sustainable forestry practices, continue to be challenged. For example, fourteen counties in Oregon recently won a billion-dollar lawsuit against the state to compensate for lost timber revenues since 2001, and for future damages through 2069. It focused on “greatest permanent value,” a phrase in a law passed 70 years ago. The counties claimed that this phrase means that trees are a commodity to be exploited, whereas a 1998 Oregon State ruling assumed it meant healthy, productive, and sustainable forest ecosystems that provide social, economic and environmental benefits. Lawsuits have also been filed in Washington State. Despite progress on this score, the old conflicts between the industry, the environmental community, and the public concerning the management of natural resources seem destined to continue.

How Should SEFS Prepare for the Future?

Forestry education across the nation is at a crossroads with respect to addressing the future needs of the forest industry, government agencies, the environmental community, and the public in a rapidly changing world. In the past, CFR responded to changes by broadening its curricula; expanding research; hiring new faculty, especially in areas beyond traditional forestry, such as urban horticulture, social sciences, and bioresources; increasing student and faculty diversity; and expanding outreach and continuing education offerings. Will SEFS be able to respond in the same way?

To ponder the future of forestry education a meeting of experts was held in 2015 at the University of California, Berkeley (Gilless 2015). Topics considered were faculty hiring, research, curricula, distance learning, professional master’s degrees, accreditation, student and faculty diversity, and employment. SEFS will need to consider all of these.
Today, SEFS’s main priorities are to determine what faculty expertise will be needed, what curricula and courses should be taught, and how to prepare students for jobs that will be available in the green economy of the future. This will not be an easy task.

**Faculty Hiring**

There are now fewer faculty than there were in the past, and fewer research areas are covered. New faculty allocations to SEFS will be scarce. The retirements of most of the old faculty have resulted in a younger faculty overall. Since faculty generally stay for many years, this means that new retirements will be a long way off. Also, other departments and schools in the College of the Environment will compete for all open faculty positions. Hopefully, SEFS will be flexible and adaptable enough to respond to future needs. The selection of new faculty in the “right” areas will be critical.

**Curricula, Teaching and Outreach**

The environmental emphasis adopted by SEFS will remain its selling point. The two current undergraduate curricula: (1) Environmental Science and Resource Management (ESRM), with options in landscape ecology and conservation, restoration ecology and environmental horticulture, sustainable forest management, and wildlife conservation; and (2) Bioresource Science and Engineering (BSE)—have served SEFS well, particularly in terms of attracting students. But new ESRM options involving forests and climate change need to be added. The interdisciplinary UW Program on Climate Change is currently offering a certificate program in Climate Science, which mostly focuses on atmospheric science, oceanography, and earth and space sciences, although other units, including SEFS, participate. At the graduate level, SEFS faculty are now teaching seminars on forest resilience to disturbance in a warming climate, and approaches for reducing atmospheric carbon across the Pacific Northwest. Other universities are offering specific graduate certificate programs—e.g., programs in forest carbon science, policy, and management, and in forests and climate change. International education should be encouraged. English is now the language of many institutions outside the US, allowing courses in foreign countries to be taken for credit. Joint master’s programs could be offered with universities in other countries.

Reliance on tenure-track faculty may not meet teaching needs, so more temporary and non-tenure-track faculty or instructors should be considered. The vast majority of the faculty are products of doctoral programs with little connection to the professional dimensions of forestry. This trend will probably continue to erode the connections of SEFS to the forest industry unless efforts are made to bridge the gap. The bioresources group, however, will continue their strong relationships with industry.

Before the current (2020) COVID-19 pandemic distance learning was slowly being implemented. Many universities had begun to offer online courses, but the UW had not adopted a consistent plan for offering online degrees, although many certificates were provided in this mode. Only one online class was consistently offered by SEFS—introduction to environmental science—and its future is uncertain. Most distance learning in forestry was directed at assisting community college transfer students.

However, as a result of the COVID-19 pandemic, the UW had to suddenly switch to online teaching for most of its courses—in-person courses could not be held because of the need for social distancing. Delivering high-quality online courses usually requires significant upfront faculty time. But time was not available and online teaching had to be employed in just a few weeks. Remarkably, this was accomplished, but not easily. Most of the SEFS courses in spring quarter 2020, with the exception of those that are field based, were taught using tools such as Zoom (a tool that combines video conferencing, online meetings, chat, and mobile collaboration); Panopto (a UW-IT lecture capture solution that allows for recording and reviewing of videos from courses, lectures, and presentations); and Canvas for lecture posting. More than 90 percent of UW courses in Autumn quarter will be taught online. A major issue is the loss of class field trips, involving experiential learning. Virtual field trips are possible, and some faculty have taken videos to incorporate into their online classes. Faculty are working on how to conduct virtual labs. All
this poses an uncertain future. No doubt, many courses will continue to be taught online after the pandemic is over. Typically, forestry schools have their particular areas of expertise. One idea that has emerged is that schools like the College of Forestry at OSU and SEFS could offer shared online classes.

Although global climate change continues to be a major threat, COVID-19 is an immediate threat to forestry education—and, indeed, to all education. Because of the current national and global economic situation, university budgets will decline, student support will be less, students will make decisions not to go to college, and job opportunities will be fewer. It is likely that the pandemic will have a long-lasting impact on the world economies.

Accreditation of forest management options in SEFS undergraduate and MSF programs by the SAF has been in place for many decades. It is not of utmost importance that current and future SEFS programs be accredited by SAF, but accreditation does represent a connection to the forestry community. In contrast, accreditation of the BSE curriculum by the Accreditation Board for Engineering and Technology (ABET) is crucial.

An expanded outreach and continuing education program will continue to be needed, and through campus extended learning and UWBG, including online learning, connections to the forest industry, small woodlot owners, government agencies, environmental and horticultural communities, and the public can be nurtured. Life-long learning must be fostered.

Research

SEFS’s research emphasis on social science, sustainable resource management, wildlife science, bioresource, and engineering, forest ecology, forest soils, and restoration and environmental horticulture is broad in scope and should be adaptable to new challenges, including research on the impacts of climate change. But research will be dramatically affected by COVID-19. Funding will become even more competitive and students may decide not to enroll until this is all over.

Employment

Employment opportunities for undergraduate and graduate students in the new green economy will be more diverse and complex. More interaction among faculty, students, and prospective employers will be needed to identify positions. These days, many graduates seek careers not characterized by a single employer. Movement among industry, government, nongovernmental organizations, and self-employment is common. National boundaries no longer loom as boundaries for employment. COVID-19 will influence these predictions.

Diversity and Inclusion

Student populations should reflect the diversity of the population at large if possible. SEFS has already achieved student gender parity, and efforts to increase underrepresented minorities are underway. However, parity has not been reached in the faculty, although many of the new hires have been female. Only three faculty are minorities (Asian, Black, and Hispanic). Parity will be difficult to achieve if few positions are made available.
APPENDIX A

College of Forestry/CFR/SEFS data files available on UW ResearchWorks.

https://digital.lib.washington.edu/researchworks/handle/1773/3774/browse?authority=a7b619e5-90a5-4e11-8cb2-e542c67de620&type=author
APPENDIX B

Faculty Books


## APPENDIX C

Sources of SEFS Research Funds from 2015-2018.

<table>
<thead>
<tr>
<th>FEDERAL</th>
<th>STATE</th>
<th>COUNTY</th>
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<td>The Whale Museum</td>
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206


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Forest Products Laboratory 142, 146, 147, 149, 150, 154

Forestry Building 27, 132, 143, 144

Forestry education ix, 6, 8, 10, 23, 24, 26, 37, 38, 43, 74, 87, 182, 193, 195

Forests and fish 28

Forests of Washington State 2

Forest Stewardship Council (FSC) 37

Foundation for International Understanding through Students (FIUTS) 184, 185

Franklin, Jerry F. 32, 37, 51, 55, 60, 61, 95, 102, 105, 109, 114, 115, 125, 131, 132, 133, 179, 180, 181, 198, 200

Friberg, Thomas 85

Fridley, James 110, 124, 129, 162

Friendship Grove 9, 189

G

Ganguly, Indroneil 54, 111

Garb Day 73, 74, 132, 133

Gara, Robert I. xi, 52, 54, 55, 59, 65, 95, 105, 109, 115, 118, 162, 183, 197

Gardner, Beth 121, 129

Gardner, Howard S. 109

Garry oak 4, 124

Genetics 4, 45, 46, 51, 52, 63, 92, 106, 114, 118, 134, 151, 160, 162, 174, 177

Gessel, Stanley P. ix, 48, 53, 55, 56, 57, 62, 67, 68, 80, 98, 100, 109, 112, 113, 126, 133, 136, 174, 183, 188, 189

Giant sequoia 4, 149, 153

GI Bill 65, 72, 79, 88

Gifford Pinchot National Forest 25, 60, 61, 102, 103, 104, 180

Glawe, Dean 136

Global warming 5, 15, 28, 113, 125, 182, 192

Good Roads Building 27, 73, 143, 144, 145

Graduation 44, 56, 63, 64, 66, 67, 79, 80, 82, 83, 84, 85

Grand fir 4, 102

Graumlich, Lisa 8, 77, 117

Great Depression 14, 53, 54, 56, 72, 156, 168

Great Northern Railway 17, 145

Grier, Charles C. 105, 112, 113, 114

Grondal, Bror L. 52, 109, 133

Gullickson, James 79

Gustafson, Richard 125, 126

H

Habitat(s) 1, 5, 15, 28, 31, 32, 33, 34, 35, 46, 77, 80, 85, 89, 99, 101, 110, 111, 112, 114, 115, 116, 117, 120, 124, 125, 129, 136, 137, 164, 179, 181, 182, 191, 192

Haddock, Phillip O. 110

Halpern, Charles 114, 115

Hammons, John 80

Hanley, Donald P. xi, 58, 134, 135, 136, 137

Hanley, John 154, 156

Harrison, Benjamin xi, 81

Harrison, Robert 112, 113, 162, 183, 201

Harr, R. Dennis 119, 133

Hatch Act 99

Hatheway, William H. 118, 188

Hendee, John C. 83, 200

Henry, Charles 113, 114

Hinckley, Thomas M. xi, xiii, 38, 47, 48, 55, 63, 64, 105, 107, 109, 116, 133, 135, 136, 161, 174, 183, 198, 201

H. J. Andrews Forest 60, 127

Hodgson, Kevin 125, 183

Hoh rainforest 3

Homestead Act 16

Hoo-hoo House 27, 143, 145, 146

Hotes, C. M. 79

Hoyt, Fred 68, 140, 152

Hudson's Bay Company 11

Humann, Stanley xi, 68, 79, 169, 171

Hupman, Carl B. Jr. 170, 171

Hybrid poplar(2) 63, 107, 116, 118, 125, 126, 133, 136, 174

Hydrology 46, 119

I

Indigenous peoples 3, 5, 64, 122, 198

Institute of Forest Products 45, 57, 98, 99, 128, 134

Integrative Graduate Education and Research Traineeship (IGERT) 64, 67, 96, 125, 183

J

Jayne, Benjamin A. 75, 109, 129

Jeffers, Dwight S. 47

Johnson, Brittany 112, 113, 114

Johnson, Darryll 128

Johnson, Jay A. 129, 198

Jorgensen, Jens E. 67, 110

K

Keep Washington Green 45, 133, 134

Kenady, Reid M. 56, 134

Kim, Soo-Hyung 109, 116, 124, 133, 162

Kyoto protocol 192

L

Labor in the forest and mills 15

Land-grant institutions 98

Land Ordinance Act 16
Landscape Management System (LMS) 60, 110, 137, 170
Lassoie, James P. 59, 84
Lawler, Joshua 115, 133
Lee Memorial Forest 27, 99, 100, 165, 177
Lee, Robert G. 55, 66, 67, 109, 122, 132, 133, 181, 183
Leopold, Estella 66, 67, 117
Lippke, Bruce R. 111, 128, 132, 133, 137
Lodgepole pine 4, 116, 178
Log flumes 20
Logging engineering 6, 27, 45, 52, 62, 69, 79, 88, 89, 91, 92, 94, 96, 110, 132
Logging locomotive 22
Logging railroads 22, 23, 166
Logging technology 19
Logging trucks 23, 31, 79
Long-Term Ecological Research (LTER) program 60
Loyal Legion of Loggers and Lumbermen 16
Lumber 2, 5, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 24, 26, 28, 32, 44, 45, 58, 63, 65, 73, 88, 89, 111, 134, 143, 156, 168, 170, 188
Lumbermen 16, 18, 24, 146

M
Maclearnsberry, Mathew C. 79
Magna Carta 1
Maguire, Douglas A. 110
Mallon, Angela 83
Manuwal, David A. 120, 133, 181
Marbled murrelets 29, 30, 33, 120, 121, 179, 181, 192
Marckworth Experimental Forest 45, 99, 100, 102
Marckworth, Gordon D. 22, 27, 45, 75, 132, 133, 188
Marzluff, John 55, 67, 95, 108, 120, 133, 199
McCarthy, Joseph L. 67
McIntire-Stennis Act 99
McIntire-Stennis program 99, 126, 130, 181
McKean, William 125
Meany, Edmond Stephen xiii, 42, 43, 44, 87, 88, 131, 132, 135, 142, 146, 147, 154
Meany Hall (Auditorium) 143, 146, 147
Media 28, 84, 130, 131, 132, 182
Mensuration and measurements 6, 27, 44, 47, 52, 56, 62, 91, 92, 106, 111, 134, 135, 173, 177, 182
Micrometeorology 106
Miller, Elisabeth 159, 159, 160, 161
Miller, Francis G. 27, 44, 52, 132
Miller Hall 141
Mobley, Melody 77, 82
Molecular biology 106, 118
Morison, Ian G. 54, 134
Morrill Acts 26, 98
Moskal, L. Monika 54, 112, 125, 129
Mountain hemlock 4, 101, 116, 151
Mountains to Sound Greenway 35, 67
Mount Baker–Snoqualmie National Forest 35, 82
Mount Rainier Act 19
Mount Rainier National Park 19, 65, 78, 95, 108, 121, 166, 168, 176, 185
Mount Saint Helens 99, 100, 101, 104, 105, 106, 113, 116, 120, 121
Muir, John 23, 26, 89
Mulligan, Brian O. 154, 156, 158, 188
Multiple-use management 1
Multiple Use–Sustained Yield Act 15, 18, 29
Murphy, James L. 118

N
Nadkarni, Nalini 77, 97, 98
National Ecological Observatory Network (NEON) 60, 103
National Environmental Policy Act 122
National Forest Management Act 84, 122
National Park Service (NPS) 5, 19, 46, 52, 64, 67, 69, 80, 107, 121, 122, 126, 128, 130, 134, 178, 181
Native American tribes 11, 28, 39, 62, 117, 123
Natural regeneration 5, 29
Nature Conservancy 28, 34, 85, 117
North Cascades National Park 31
Northern Pacific Railway 5, 17, 19, 144, 166, 168
Northern spotted owls 29, 30, 31, 47, 179, 182
Northey, Robert 125
Northwest Environmental Forum 47, 138
Northwest Forest Plan 32, 61, 67, 80, 111, 115, 122, 133, 179
Northwest Horticultural Society 159
Norway spruce 87

O
Old-growth forests (old growth) 2, 3, 4, 5, 10, 12, 15, 24, 28, 29, 31, 32, 34, 35, 46, 60, 78, 100, 101, 102, 113, 114, 116, 117, 119, 124, 127, 131, 133, 165, 176, 177, 178, 179, 181, 192
Oliver, Chadwick D. 37, 55, 59, 60, 109, 110, 114, 133, 135, 137, 198, 199
Olympic National Forest 16, 32, 179, 181
Olympic National Park 3, 19, 31, 34, 65, 97, 112, 117, 121, 179, 181
Olympic Natural Resources Center (ONRC) 8, 9, 39, 46, 47, 67, 68, 78, 80, 99, 100, 123, 126, 131, 134, 137, 139, 142, 165, 171, 178, 179, 180, 181, 182
Organic Administration Act 18
Organization for Tropical Studies (OTS) 46, 57, 62, 183, 187, 188
Outdoor recreation 29, 30, 45, 52, 62, 65, 66, 67, 84, 90, 99, 121
Outreach and continuing education 51, 60, 131, 134, 162, 163, 182, 195
Ozone 102, 123, 174

P
Pacific madrone 4, 124, 133
Pacific Northwest Cooperative Ecosystem Studies Unit (PNWCESU) 128
Pacific silver fir 4, 101, 102, 114, 116, 178
Paleoecology 61, 106, 114, 116, 117
Parrington Hall 142, 143
Pathology ix, 45, 89, 92, 102, 118, 174, 177, 183
Paun, Dorothy A. 123, 183
Peace Corps 58, 83, 133, 186, 187
Peace Corps Masters International 186
Pearce, J. Kenneth 110, 133, 188
Perez-Garcia, John 111, 125
Peterson, David L. 51, 64, 115, 134
Pfeiffer, Christina 85
Phenocam 103
Pickford, Stewart G. 118, 175
Pinchot, Gifford xiii, 18, 23, 24, 25, 26, 60, 61, 89, 102, 103, 104, 180
Ponderosa pine 4, 56, 114, 169, 174, 178
Pope and Talbot 12, 13, 62, 79, 155
Port Gamble 12, 13
Precision Forestry Cooperative (PFC) 126, 129, 134, 136
Prugh, Laura 95, 118
Program on Climate Change 51, 194
Pulp and paper science xiii, 8, 38, 52, 85, 93, 106, 125, 134
Pyle, Robert Michael 84

R
Rabotyagov, Sergey 54, 105
Radiata pine 14, 80
Raeke, Kenneth J. 105, 120
Red alder 4, 63, 101, 102, 110, 116, 125, 177
Regional Forest Nutrition Research Project (RFNRP) 46, 56, 62, 68, 126, 127
Reichard, Sarah 64, 124, 152, 162, 200
Remote sensing 52, 77, 111, 112, 129, 150
Research 97
Resende, Fernando 54, 125, 126
Richey, Jeffrey 67, 117
Riekerk, Hans 54
Riparian zones 28, 34, 35, 36, 63, 115, 118, 137
Robertson, James C.H. 54, 55, 56, 109, 110, 111
Roosevelt, Franklin D. 14, 19, 25, 72, 132, 156, 167, 168
Roosevelt, Theodore 19, 24, 25, 167
Rural Technology Initiative (RTI) 134, 136, 137, 138
Rustagi, Krishna P. 54, 110
Ryan, Clare 67, 123, 128, 183, 199
Salmon 2, 5, 29, 30, 32, 33, 66, 86, 117, 119, 123, 127, 128, 132, 178, 192
Salvage logging 32, 33, 198
Sarkinen, Kyosti V. 54, 125, 200
Sawmills 5, 6, 11, 12, 13, 15, 21, 32, 45, 67, 164, 168, 169, 170, 171, 177, 205
Schenck, Carl 23, 25, 26, 87, 89
Schiess, Peter 54, 110
Schlich Memorial Award 25
Schlich, Wilhelm 23, 25
Schnitzius, Henry 10, 70, 132, 133, 188
Schnoe, Floyd W. 185, 186
Schrader, O. Harry, Jr. 133
Schreuder, Gerard F. 45, 54, 111, 128, 129, 135, 183, 200
Scots pine 87
Scott, David R. M. xi, 54, 55, 58, 59, 64, 66, 80, 81, 82, 83, 84, 109, 110, 114, 116, 135, 171, 172, 173, 183, 188, 189
Secondary forest products 1, 2, 5
Settlement of the Pacific Northwest 11
Sharpe, Grant W. 55, 65, 66, 84, 85, 105, 109, 121, 134, 197, 200
Sierra Club 26, 30
Silviculture 2, 6, 27, 28, 35, 45, 46, 52, 58, 59, 60, 63, 66, 87, 89, 91, 92, 98, 106, 109, 110, 126, 133, 134, 137, 154, 170, 173, 174, 177, 183, 184, 187, 198, 205
Silviculture Institute 46, 60, 63, 89, 134
Sitka spruce 4, 16, 19, 66, 97, 118, 178, 192
Skid road 20
Smith, W. Ramsay 109, 198
Smit-Spinks, Barbara 63, 123
Snohomish Valley Environmental Network (SVEN) 46, 126
Society of American Foresters (SAF) 1, 8, 10, 24, 25, 47, 58, 65, 73, 76, 79, 80, 82, 95, 96, 97, 134, 170, 176, 195
Soils and nutrient cycling 5, 34, 38, 45, 46, 56, 57, 100, 102, 106, 109, 110, 112, 137, 175, 177, 184, 195
Species conservation 2, 85, 120, 121, 123, 124
Stand Management Cooperative (SMC) 46, 83, 126, 134, 150
Stand structure 3, 4, 115
State forest lands 33
Stenzel, George 110, 188
Stettler, Reinhard F. 51, 54, 55, 63, 64, 82, 75, 109, 118, 133, 134, 135, 136, 189, 201
Strand, Stuart E. 113, 114, 136, 151
Stream and lake ecology 102, 127
Winkenwerder Hall ix, 22, 39, 45, 59, 66, 68, 69, 106, 133, 142, 147, 149, 150, 151
Winkenwerder, Hugo T. ix, 27, 40, 42, 44, 47, 131, 132, 149, 153, 154, 155, 156, 167, 168, 169
Wirsing, Aaron 95, 120, 121, 183
Witt, Joseph A. 153, 154
Wolf, Kathleen 123, 133, 162
Wood science 52, 58, 90, 92, 106, 109, 133
Wooldridge, David D. 119
Works Progress Administration (WPA) 14, 149, 156, 157, 158, 168
Wott, John 124, 151, 152, 154, 161, 162

X

Xi Sigma Pi 27, 44, 69, 73, 74, 75

Y

Yellowstone National Park 95, 108
Yesler, Henry 12
Yesler swamp 133, 158, 159, 164
Yosemite National Park 19, 26, 64

Z

Zabowski, Darlene 112, 113, 114, 135, 181
Zasoski, Robert J. 112, 113, 135
After the first Euro-American settlers arrived in Seattle in the 1850s, the surrounding old-growth forests were rapidly harvested for lumber, causing environmental degradation and displacing native peoples.

Conflicts about the future of Pacific Northwest forests have continued since then. Only recently have academics, government agencies, industry, small private landowners, tribes, and environmental organizations come together to develop plans to protect the remaining old-growth forests, wildlife, streams, and fish, as well as providing environmentally friendly forest products.

Practicing sustainable forestry, maintaining healthy forests that are less susceptible to fire, insects and diseases; and fostering public enjoyment are now the main goals of forest management. However, conflicts still exist—and with climate change a looming threat, it is important to realize that forests give us much more than lumber.

Robert L. Edmonds, professor emeritus at the School of Environmental and Forest Sciences, University of Washington (UW), wrote this book to bring attention to the sustainability of natural resources. He describes how Washington State’s forests and the practice of forestry have changed through time and how these changes relate to the long history of research and teaching at the UW. Its scope extends beyond Washington—many of the principles of sustainable forestry developed by faculty have been adopted worldwide.

Robert L. Edmonds was born in Sydney, Australia. He earned a Bachelor of Science from Sydney University, and Master of Science and Ph.D. degrees from the University of Washington (UW). He held a faculty position in the UW College of Forest Resources (now the School of Environmental and Forest Sciences) for thirty-eight years. He taught many courses, including forests in the life of man, forest ecosystems, urban and forest pathology, soil ecology, and microclimatology to hundreds of students. He retired in 2012 and is now an emeritus professor.