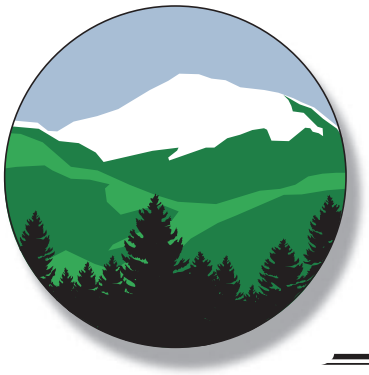

Past, Present, and Future Role of Silviculture in Forest Management

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Silviculture

In general, silviculture can be defined as the art and science of controlling the establishment, growth, competition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis (Helms 1998). This definition or variations of it have existed since the late 1800s. Gifford (1902), an Assistant Professor of Forestry at Cornell University in New York, used the term arboriculture to describe the growing of trees for any purpose and in any way whatever – singly, in groups, or in the form of forests. He went on to define silviculture as a part of the broader art of arboriculture. Schlich (1904), Professor of Forestry at the Royal Indian Engineering College, Coopers Hill, India, stated that "the culture of forests with the objective for which a particular forest is maintained depends on the will and pleasure of the owner, in so far as his freedom of action is not limited by rights of third persons or legal enactments." He went on to say "silviculture, in its narrowest sense, is understanding the formation, regeneration and tending of forests until they become ripe for the axe." Therefore, the beginning of silviculture in the United States was closely aligned with forest management, and the general theme of most silvicultural practices was to produce forest crops.

Silviculture and Timber Management Relations

As the foundations of silviculture were being developed in the late 1800s, the concept that forests should be reserved and managed for the good of society was also developing. Laws such as the Timber Culture Act of 1873 and the Timber and Stone Act of 1878 were passed allowing settlers on homesteads to switch from growing grain crops to trees as part of the residency requirements (Steen 1976). The acts authorized the sale of non-tillable public timberlands for personal use. By 1873 the American Association for the Advancement of Science (AAAS), through the leadership of Franklin Hough, a physician, began lobbying Congress to pass a resolution promoting the cultivation of timber and the preservation of forests. Hough continued his efforts to get a bill through Congress in 1874 and 1875 but was unsuccessful. He supported these efforts by studying and writing papers on forestry and distributing them through the AAAS. Congressman Dunnell from Minnesota championed the cause but all attempts to get the bill

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through the Public Lands Committee failed. In August of 1876, Dunnell made a motion to transfer the substance of the bill to the general appropriations bill authorizing the Department of Agriculture to appoint a man of "approved attainment" to report on forest supplies and conditions. With the passing of this law and through this parliamentary tactic began the long tradition of having the forestry agency in the Department of Agriculture with Hough becoming its first chief (Steen 1976). This was called the Department of Forestry with close ties to the American Forestry Association.

The majority of the information Hough used for his self-taught forestry education was based on European models of forestry, in particular forest management in Germany. This strong connection to German forestry was exemplified by the appointment of Bernhard Fernow as the third Chief of the Division of Forestry in 1886. (Nathaniel Egleston succeeded Hough as Chief in 1883 and served with uncertainty until replaced by Fernow.) Fernow started his forestry apprenticeship in the Prussian Forestry Department and also received advanced training in Prussia. He immigrated to the United States in 1876 and brought with him the German penchant for "slick and clean" forests regularly divided into blocks (Miller 1992).

Through fraud, timber companies used the Timber and Stone Act to acquire and harvest large quantities of timber on lands in the western United States. Some of the most blatant fraud occurred in northern California. As the price of timber rose, fraudulent practices increased causing agents in the Department of Interior to investigate thousands of fraud and trespass cases every year. But the practice continued to escalate and became a way of life in the western United States. In 1889, the American Forestry Association, with Fernow chairing the law committee, lobbied both Congress and the Administration for legislation creating reserved parcels of land and providing a commission to administer them. No action by either branch of government towards reserving forests occurred until Fernow and his associates, in 1891, convinced Interior Secretary Noble that it was his responsibility to protect the public domain. During this period a bill, The Creative Act, was being prepared in Congress to revise a series of land laws including the Timber and Stone Act. Noble was able to convince the conference committee at the eleventh hour to add Section 24 to this bill. This section authorized the President to create forest reserves and was not referred back to the originating committees for their consideration. Therefore, when the bill passed, section 24 became the law of the land by default. President Harrison wasted no time in using what became known as the Forest Reserve Act of 1891to create 15 forest reserves containing 13 million acres in the newly established western states. President Cleveland continued to add more acres but stopped until Congress provided a means to protect the reserves within the Department of Interior (Steen 1976).

Not only did Fernow and his associates influence forest legislation; they also framed the forestry education in the United States, controlled the early professional organizations (American Forestry Association), and produced most of the forestry publications (Forestry Quarterly). By 1897, 20 institutions, of which most were land grant colleges, offered some instruction in forestry with silviculture a part of the curriculum. In 1898, the New York State College of Forestry was organized and a year later the Pinchot family (a well-to-do upstate New York family, of which Gifford was a member and advocated conservation of Adirondack forests) endowed a forestry school at Yale (Ise 1920). Graduates of these schools formed the core of the Division of Forestry and later the Forest Service (Steen 1992).

Era of Gifford Pinchot

Figure 1—Gifford Pinchot succeeded Bernhard Fernow as Chief of the Division of Forestry in 1898. He graduated from Yale in 1889 and furthered his education in Europe, refining his views and philosophy of forestry.

Gifford Pinchot succeeded Fernow as Chief of the Division of Forestry in 1898. He had a tremendous impact on the forests of the United States both in their acquisition and their management (figure 1). He graduated from Yale in 1889, but he also studied formally in Europe and spent over a year touring and learning the forestry profession there. He returned to the United States and spurned Fernow's offers to become his assistant; instead, he went to work on the Biltmore Estate in western North Carolina to develop a forested estate worthy of Vanderbilt's wealth (Steen 1976). The Vanderbilt estate offered Pinchot the opportunity to put into practice the European systems he learned. This work allowed him to determine that forestry in North America could be a profitable venture, and helped solidify his views on forest management.

As the chief of the Division of Forestry, Pinchot, much like Fernow, mostly influenced forestry activities through publications and technical assistance to companies and private citizens. If Pinchot was to influence the management of the forest reserves, he had to work cooperatively with the Department of Interior because the forests were under its domain. By 1901 he was able to have the foresters in the Department of Agriculture make all technical decisions associated with the reserves and develop management plans while Interior personnel would patrol the reserves enforcing the land-use laws. In 1902 the Department of Interior issued the first manual on administration of the reserves outlining when grazing could occur in the reserves. But the bulk of the manual dealt with timber management. Even though other people were credited for drafting the text, most people credit Pinchot for the substance of the policies.

Theodore Roosevelt frequented upper New York State before he became Governor of New York and during this time he became acquainted with Pinchot. Roosevelt nominated Pinchot for membership in the Boone and Crockett Club, an elite hunter's club that Roosevelt helped to found. The two became best friends, even having wrestling and boxing matches and, after Roosevelt became President in 1901, they were frequent companions riding horses and playing tennis. So it was no surprise that after only three months in office Roosevelt told Congress that the forest reserves belonged not within the Department of Interior but in the Department of Agriculture, under Pinchot's Bureau of Forestry.

In addition to Pinchot, Roosevelt had strong views on how the forests of the United States should be managed and in March of 1903 he presented them to the Society of American Foresters. The essence of his views was captured as follows: "And now, first and foremost, you can never afford to forget for one moment what is the object of our forest policy. That object is not to preserve the forests because they are beautiful, though that is good in itself, nor because they are the refuges for the wild creatures of the wilderness, though that, too, is good in itself; but the primary object of our forest

policy, as of the land policy of the United States, is the making of prosperous homes… Every other consideration is secondary" (Roosevelt 1905).

In 1905, again with considerable lobbying by the American Forestry Association, Pinchot's political savvy, some last minute political bargaining, and the argument that forests were crops, the forest reserves were transferred to the Department of Agriculture to be administered by the Bureau of Forestry. The Bureau of Forestry was then renamed the United States Forest Service. Two years later the reserves were renamed national forests, because the term reserve suggested they were to be held inviolate. They were not. Under Pinchot's vision, forests' use was not contrary to conservation, an important distinction from previous thought. When conflicting interests arose, the question would always be decided from the standpoint of the greatest good of the greatest number in the long run. During Pinchot's tenure as Chief, he gave a high priority to boundary survey, and men working alone on horseback often added up to 3 million acres per day per man to the national forests. For example, Pinchot and his Chief of Boundaries in one evening on a hotel room floor prepared 17 proclamations creating or adding to national forests in Arizona, California, New Mexico, Nevada, and Utah (Steen 1976).

During Pinchot's tenure, Yale was the foremost training ground for foresters joining the Forest Service. Building on the legacy Fernow initiated, the concept of forest management to produce timber crops was central to the education the schools offered. Therefore, the central theorem to the approach of producing timber crops was protecting forests from damaging animals, insects, and diseases and, most importantly, fire.

Timber Production and Forest Protection

By 1910 the forests of the United States were being utilized at a high rate to fuel the expanding economy. The Midwest was expanding rapidly and the forests of the West were ripe for providing raw materials. The western United States was also being settled and, as cities and towns were being developed, forest industries were quickly expanding to provide building materials locally to the cities and railroads while continuing to ship products to the Midwest. Western white pine and ponderosa pine were the primary species with Douglas-fir and western larch also of value; many other species were considered weeds and were often burned. Land clearing, railroads, and a nonchalant view of fires allowed fires to often burn freely throughout the Northern Rocky Mountains. In the spring of 1910, fires were ignited and continued to burn throughout the summer and, by August, 1,700 fires were burning throughout western Montana and northern Idaho. On August 20 and 21, dry Palouse winds blew causing these fires to erupt which resulted in over 3.1 million acres of often very valuable timberlands to burn. This loss created a sense of urgency to protect these valuable resources and to provide direction for the fledgling Forest Service by establishing a mission of protecting forests for human use (figure 2).

In 1864, because of the westward settlement movement, Congress conditionally granted the Northern Pacific Railroad Company nearly 40 million acres to aid in the construction and maintenance of a rail line from Lake Superior to the Puget Sound. The land was given as every other square mile in a checkerboard pattern in a 40-mile band through Wisconsin, Minnesota, and Oregon and an 80-mile band through North Dakota, Montana, Idaho, and Washington. These lands not only provided raw

materials to the railroads in the western United States but also became important components of the timber industries in the region (Jensen and others 1995). With the combination of public and private lands producing raw materials along with the foundations of silviculture rooted in the German model, nearly all of the silvicultural methods and their supporting mensurational techniques being used were aimed at producing timber crops. The practice of silviculture was closely intertwined with timber management (Toumey 1916, Ise 1920).

Fernow (1916) expressly stated, "Silviculture, the production of wood crops, is pivot of the whole forestry business." This close association of silviculture and timber management was evident even though Schlich (1904) and Gifford (1902) both indicated that forests, and the silvicultural practices used to maintain them, could be used for purposes other than timber production such as "protection and adornment." The necessity to cultivate timber was being expressed by the amount of timber being consumed by the developing nation. And, for the United States to hold its position as a producer of timber or even ensure its future needs for forest products, a persistent effort to grow timber would be needed by the nation, states, and individuals. Public forests were to be managed by the Forest Service so they would ultimately attain their maximum production and retain it for all time (Toumey and Korstian 1947). This concept that wood supplies would diminish prevailed through the management plans and the policies affecting both private and public forests.

Contrary to western reserves, forests in the East were largely cut over and in private ownership or tax delinquent status. The Weeks Law of 1911 authorized the purchase of lands as national forests in the East, and by 1920 more than 2 million acres of land had been purchased (Steen 1976). The Clark-McNary Act of 1924 expanded the scope of the Weeks Law, and led to the establishment of agreements with states for purposes of fire protection on private lands. And finally, the McSweeney-McNary Act of 1928 laid the groundwork for a nationwide system of Forest Experiment Stations, which has evolved into the largest organization for the conduct of forestry research in the world.

Figure 2—Early wildfire prevention posters exemplified the urgency to protect forests from wildfires.

Intensive Forest Management

By the 1930s, with the available work force from the Civilian Conservation Corp (CCC), forests were being rapidly developed for human use, including recreation and water, but disease control, road building, and fire fighting activities were also undertaken. This workforce was cheap and, most importantly, enabled rigorous planting, cleaning, weedings, and thinnings to be accomplished, bringing intensive forest practices to many regions. The CCC also helped facilitate the large expansion of the research capabilities of the Forest Service. For example, a full 200-man CCC camp F-127 was established on the Priest River Experimental Forest and camp F-137 was allocated to the Deception Creek Experimental Forest, both in northern

Idaho (Graham 2004). During this period a wide range of experimental forests and ranges was established to provide information for intensively managing both public and private forests. These experimental areas were outdoor laboratories used for developing intensive silvicultural practices, fire danger rating systems, and insect and disease control strategies.

The CCC provided a work force for protecting forests from disease and fire. This work force pulled Ribes (the alternate host of white pine blister rust) on thousands of acres of public lands in the northern Rocky Mountains. In addition, they were readily available to fight fires throughout the United States. Both of these activities were key to bringing the national forests under management. Wildfire destroyed valuable timber resources, as did white pine blister rust. Because blister rust needed to be controlled on public lands to protect private lands from the disease, it made these practices of national significance. The legacy of this desire to protect the forests from insects, diseases and fire continues to impact forest development yet today (2004).

Projections of future wood consumption in the United States, along with estimates of wood production, indicated an increase in wood supply would be needed. This was the case during Pinchot's time and prevailed into the 1980s (USDA 1984). For example, in 1936 it was estimated that the United States used 48 billion board feet of timber but was only growing 32 billion board feet. The offered solution was to invest millions of dollars in acquiring additional areas as public forest, in fire protection, and in bringing denuded lands of the country into better condition for later crops (Toumey and Korstian 1947). The perception of a wood shortage in the United States was reinforced after World War II with the increased demand for home construction. The Forest Service was asked to meet this demand, especially by the timber industry. This was demonstrated by the passing of the Multiple Use and Sustained-Yield Act of 1960, which called for national forests to be used for recreation, watershed, and wildlife purposes and for harvest to be in balance with growth (Steen 1976). The view of a timber shortage continued as the annual net growth on commercial timberlands in 1984 was estimated at 21.7 billion cubic feet in the United States; but it was estimated that these lands could produce 32.8 billion cubic feet by 2030 (USDA 1984). Again, it was suggested that to meet the nation's growing demands for timber and timber products, large investments in silvicultural activities would be needed. Therefore, the management plans developed for the national forests throughout this period were generally timber management plans but often included a domestic livestock-grazing component, both critical elements of utilizing forests rather than preserving them. These management plans utilized concepts presented by Fernow in 1900 as the forests were divided into working circles, compartments, and sub-compartments. In each of these units timber resources were inventoried, timber growth estimated, and an allowable cut calculated to support a sustained yield of timber. Some of these plans went as far as to suggest that all lands within a working circle, both public and private, be regulated together to support the annual cut (USDA 1941).

During this period of expansion, 1910-1960, the Forest Service developed a tremendous work ethic and a "can do" attitude. Fires were vigorously suppressed and forest insect and disease epidemics were being addressed. Silvicultural practices and mensurational techniques to support these management plans rose to the challenge by developing planting, cleaning, thinning, fertilization, and harvesting methods to support high yield forestry (Baker 1934; Steen 1976; Smith and others 1997).

Forest Management Changes

Beginning in the 1960s and continuing in earnest in the 1970s, the public's perceptions and uses of the forests started to change. These changing views were supported by more and more knowledge that forests were more than crops to be grown and harvested (Spurr 1964). Forests provide an array of goods and services of which one of the most important is the protection and production of clean water. This fact was recognized by Theodore Roosevelt as one of the original reasons given for expanding the forest reserves (Gifford 1902). In the 1970s, these changing attitudes and beliefs of the role of forests in society were marked by the celebration of the first Earth Day in 1977. Also, this was a time in which significant laws were enacted such as the National Environmental Policy Act of 1969, the National Forest Management Act of 1976, and the Endangered Species Act of 1979 that impacted forest management. Individually and in combination these laws began to alter how the national forests were perceived and managed. In addition to these laws, air travel became more common during this era, which allowed the public to view forests from the air, disclosing the fragmented and artificial look that forests took on with the application of square harvest blocks and clearcutting used with high yield forestry (figure 3).

With these changing attitudes toward public forests and their use, silvicultural methods and concepts started to acknowledge other forest uses, in particular the production and maintenance of wildlife habitat. In 1981 the Society of American Foresters, in cooperation with the Wildlife Society,

Figure 3—View of clearcuts from the air showing the patchwork and fragmentation of forests.

published its monograph describing *Choices in Silviculture for American Forests* (Society of American Foresters 1981). Even though this text exemplified the benefits produced by forests including water production, wildlife habitat forage for livestock, aesthetic appeal, and recreation potential, the silvicultural systems described were very traditional and differed little from those described by Schlich in 1904. Similarly, *Silvicultural Systems for the Major Forest Types of the United States* (Burns 1983) approached silviculture in very traditional ways, producing traditional stand structures most often designed to produce timber products.

In 1988 guidelines were established for managing spotted owl habitat in the Pacific Northwest. These guidelines, and the listing of the spotted owl as threatened under the Endangered Species Act in 1990, changed the emphasis of forest management either directly or indirectly on nearly all lands administered by both the Forest Service and Bureau of Land Management (FEMAT 1993). Also during this time the prediction of timber shortfalls that had dictated forest management policies for decades was not materializing. From 1960 to 1985, the national forests met about 25 percent of America's softwood timber needs. This gave state and private stocks time to recover and it is estimated that 50 years from now, timber growing in the United States will be nearly double the levels in 1960 (Bosworth 2002).

Silviculture and Wildlife

Even though the conservation of spotted owl habitat was a novel forest management objective in many circles, the production and maintenance of wildlife habitat was not new to forestry. In addition to producing clean water, some of the original reasons for preserving and managing forests were the production of game animals for the aristocracies of Western Europe (Smith and others 1997). What became apparent in the desired forest conditions for wildlife was what remained was more important than what was removed in forest treatments. Instead of sustaining a flow of wood products from forests, the sustaining of forest processes, structures, and functions became more prominent as a reason to manage forests, even though much was not understood about these concepts and less was understood about how they could be sustained. From a silvicultural perspective a component of these concepts could be identified; that is stand and forest structures could be described as desirable for wildlife and possibly contain some other advantageous forest properties.

Thomas and others (1979) described successional stages of forests that played various roles in the life histories of wildlife species. These stages ranged from grass-forb to old growth and included composition, decadence, horizontal structure, vertical structure, and other elements important for wildlife. Oliver and Larson (1990) also described the development of forests using structural stages including stand initiation, stem exclusion, understory reinitiation, and old growth. Both of these classification systems concentrated on describing stands and forests and in particular what was left not what was being removed.

Reynolds and others (1992) used structural stage classifications to describe stand and forest habitat for the northern goshawk and its prey species for the forests of the southwestern United States. What were not included in the desired conditions for the goshawk were the preferred silvicultural methods to create and maintain these desired conditions. These desired

Figure 4—Ponderosa pine stand located in the southwestern United States illustrating the clumpy and irregular stand structure that is preferred goshawk habitat.

conditions were to be maintained over multiple spatial and temporal scales ranging form groups of trees to landscapes and over time periods exceeding 200 years (figure 4). "While superficially the recommendations by Reynolds and others 1992 were another example of narrow, single species focus, is in fact a coarse filter approach that includes a mosaic of age and structural classes to provide habitats and food chains for a broad spectrum of wildlife species including goshawk prey species… approximating the composition, structure, and landscape patterns existing in southwestern ponderosa pine forests before fundamental changes in natural disturbance regimes and forest structure"(Long and Smith 2000). The challenge for the art and science of silviculture was to use the knowledge gained over 100 years on treating forests to produce timber to use this to create and maintain desired conditions for goshawks and their prey. Some of the silvicultural concepts appropriate for goshawk habitat management include area regulation of desired conditions over large landscape units, free selection silvicultural systems (combining group and individual tree selection systems with reserve trees left in all structural stages), variable cleaning and weeding prescriptions, variable spacing in thinnings, coarse woody debris recruitment, and snag retention to name a few. This is far different from the "slick and clean" forestry advocated by Fernow in 1900.

Even though the public attitudes toward the value of forests and their management have changed, there continues to be a strong ethic "that the most important product of forest management is timber" resulting in timber

management and silviculture being synonymous. Because the production and harvest of timber crops has been the primary objective of American silviculture for over 100 years, the association was inevitable. In addition, foresters felt comfortable with this objective and felt "good forestry" would result in strong, viable wildlife populations, clean water supplies, and ample recreational opportunities as a side benefit. Concerns about wildlife and aesthetics were reduced to constraints on timber management, such as the size and location of cutting areas and the minimum age of trees at the time of harvesting (Smith and others 1997). For the practitioners of silviculture or applied ecology to remain leaders in designing, prescribing, and implementing management systems, they need to be innovative, adaptable, open minded, and willing to partner with a range of other disciplines to sustain forests

Silviculture and Wildfire

Nowhere is this leadership and commitment of innovative silviculturists needed more than in designing forest management systems aimed at reducing the occurrence, intensity, and severity of wildfires (Graham 2003). Similar to creating and maintaining structures to produce wildlife habitats some of the same concepts apply to designing structures for affecting wildfire behavior and severity. In our desire to protect forests for human use, society has modified the structure, composition, and native processes occurring in many of our forests. Most evidence suggests, the dry forests dominated by ponderosa pine and Douglas-fir have undergone the most changes because of successful fire exclusion while the moist forests (western redcedar, western hemlock) and cold forests (lodgepole pine, Engelmann spruce, subalpine fire) were minimally impacted (Hann and others 1997). Like the methods used for producing wildlife habitat, what is left and its characteristics after treatment are important elements in designing stand and forest structures aimed at modifying wildfire behavior and severity.

Crown base height, number of fuel strata, surface fuels, fine fuels, coarse woody debris, hydrophobic soils, lower duff moisture, ladder fuels, crown bulk density, and fuel models are only some of the elements needed when designing vegetative treatments to modify the wildfire condition class of forests (Graham and others 1999; Scott and Reinhardt 2001; Robichaud and others 2000; Graham 2003). These elements are different than culmination of mean annual increment, normal stocking, yield capability, rotation age, net present value, rings per inch, Keen's tree classes, or site index that were common elements of many timber production silvicultural prescriptions (Smith and others 1997). However, the same basic understanding of climate, soil, forest development, silvics, succession, silvicultural methods (e.g., planting, tending, pruning, thinning), and so on used for the development of both timber and wildlife habitat prescriptions can be used to develop these critical fuel modification prescriptions. Most importantly, wildland fuels are composed of live and dead vegetation of which silviculture is the art and science of managing.

Change Is Often Difficult But Exciting

Silviculturists cannot be experts in all disciplines required for successful forest management. However, they need to have a basic understanding of

these other disciplines. Not only is an understanding beneficial but also willingness and collaborative attitude are helpful when venturing into different and new management directions. Because of the long tradition of timber management and silvicultural systems associated with this management objective, it is easy to repackage the "tried and true" silvicultural methods and prescriptions into fuel management or wildlife emphasis prescriptions. For example, prescribe evenly spaced plantings, cleanings, and thinnings even though a clumpy or groupy nature of a forest may be desired. Similarly, through tradition, prescribe the removal of disease or insect susceptible trees even though they may be important elements of a functioning forest or desirable attributes for wildlife.

Nowhere on the landscape is innovation and imagination needed more from silviculturists than designing systems for managing stands within the urban interface. Most often people have a tremendous attachment to forests in these settings even though their very nature may threaten people's homes and lives if they burn (Kent and others 2003) (figure 5). Prescriptions in the urban interface usually necessitate the balancing of people's desires to live in a forest yet maintain conditions that reduce the risks of unwanted fire. Rarely will traditional silvicultural methods (e.g., seed tree, shelterwood) used for timber production produce and maintain the desired conditions in the urban interface.

Figure 5—In recent years management objectives aimed at reducing the intensity and severity of wildfires have become more common, especially in the urban interface.

The size of wildfires and the number of acres burned by wildfires has been increasing in recent years after declining for several decades (Agee 1993, Graham 2003). These areas (Bitterroot-Montana, Hayman-Colorado, Biscuit-Oregon, Rodeo-Chediski-Arizona) provide tremendous challenges for silviculturists in prescribing treatments to restore these forests. Many of these fires burned large areas destroying native seed sources, which makes planting of site-adapted seedlings challenging but imperative. The introduction of exotic plants (e.g., cheatgrass) can alter successional pathways and make the restoration of native vegetation uncertain. Similarly, because of uncharacteristically severe fires, soil properties can be altered to increase soil erosion and reduce site productivity, again increasing the challenges silviculturists face in addressing the conditions left after wildfires (Robichaud and others 2000). Depending on the type of forest burned, large amounts of standing and down woody material is often left after wildfires (Brown and others 2003, Graham 2003). In some circumstances this material has commercial value that can help pay for fire restoration efforts, but silvicultural systems need to be designed to ensure the integrity and long-term future of the forest. The above are only some of the issues in which the silviculture and fire disciplines must work collaboratively to address.

Silvicultural Legacy

Silviculturists can be extremely proud of what the discipline accomplished in the last 100 years. Through their leadership and innovation the timber famine projected for many decades never materialized. Within the Forest Service, silviculturists set the standard for continuing education and the application of science-based practices in land management, a standard which other disciplines try to emulate. Beginning with the aristocracies of Europe, the importance of forests in maintaining wildlife and water along with timber resources was recognized, and silviculturists such as Schlich (1904) provided silvicultural methods and principles applicable for meeting these management objectives. These same principles can be applied to present management objectives such as reducing the risk of severe and intense wildfires, or future unknown objectives. Most importantly, silviculturists need to be the champions of maintaining forest integrity and resiliency no matter the forest setting or the management objectives presented. No other discipline has the understanding, legacy, or long-term view necessary to design and prescribe forest management activities in the 21st century.

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