Threats to Western Private Forests

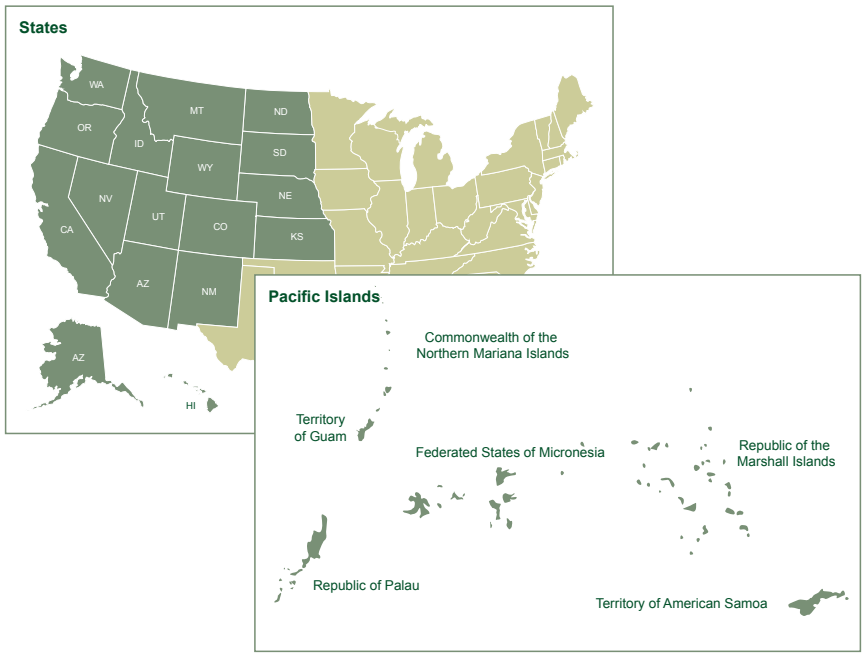
A Framework for Conserving and Enhancing the Benefits from Private Working Forests in the Western U.S.

Promoting science-based forest management that serves the values of society and ensures the health and sustainability of western forests.

Publication date: April, 2010

WESTERN FORESTRY LEADERSHIP COALITION

Table of Contents



States and Islands within the Western Forestry Leadership Coalition

ABOUT THE WESTERN FORESTRY LEADERSHIP COALITION

The Western Forestry Leadership Coalition (WFLC) is a State and Federal government partnership. The members of the coalition include: the 23 State and Pacific Island Foresters of the West and the 7 western Regional Foresters, 3 western Research Station Directors, and Forest Products Lab Director of the USDA Forest Service. This partnership creates a clear voice on western forestry, strengthening our ability to address pertinent issues and help meet the needs of society.

The mission of the WFLC is to promote science-based forest management that serves the values of society and ensures the health and sustainability of western forests.

ABOUT THE THREATS TO WESTERN PRIVATE FORESTS REPORT

This report was created for the WFLC through a collaborative process. It reflects the ideas expressed by over 100 experts and stakeholders in the forestry community through six exploratory workshops across the Western U.S. as synthesized by a drafting committee. Drafting committee members were selected to represent diverse western geographies, interests and expertise, as well as for their demonstrated leadership in private forestry.


Wellington Grey


Juan Orozco

Executive Summary

Private working forests and the benefits they provide are at risk.

There are over 109 million acres[1] of private forest land owned by thousands of individuals or entities across the West. While only a fraction of the total forested landscape, private working forests provide critical ecosystem services — clean water, wildlife habitat, wood products, flood protection, erosion control, family and community identity, recreation opportunities, carbon sequestration, and many others — to their owners and to the public. They also create important linkages within the broader landscape, facilitating the production of ecosystem services on public lands. However, we are in danger of losing the benefits provided by private working forests owing to such forces as changing climate, economic conditions, demographics, and competing social values.

- **Climate change –** Altered temperature and precipitation patterns are contributing to increased fire risk, insect outbreaks, and other threats to private working forests.
- **Changing economic conditions –** Market shifts both locally and globally are making the sale and conversion of private working forests more financially feasible than owning and managing that land.
- **Changing demographics and social values –** A growing, aging, and urbanizing population is making decisions that are often at odds with rural values and the conservation of private working forests.

The impact of these changes to private working forests is degradation (decreased health and resilience) or conversion to non-forest uses, which is occurring at an ever-increasing rate. By one estimate, 1.5 million acres of private forest land in the U.S. are lost to conversion each year.[2] Housing density will increase substantially on more than 57 million acres of rural private forest nationwide between 2000 and 2030.[3]

Threats to private working forests are complex and interrelated.

The threats facing private working forests are traceable to a complex set of drivers, none of which act independently. These drivers interact in ways that put stress on private working forests and the benefits they provide to owners and the public. For example, in addition to

[1] Smith et al. 2009 (These data are consistent across the continental United States, Alaska, and Hawaii but exclude the Pacific Islands. Also see Appendix 1.)

[2] Oregon Forest Resources Institute (OFRI) 2008

[3] Stein et al. 2005, 2010

affecting forest ecosystems directly, climate change is affecting the policy environment, spurring mitigation and adaptation responses that, in turn, affect markets and economic regulations. Similarly, a lack of social license to practice forestry (on both private and public lands) has direct impacts on the health and resilience of private working forests and is contributing to the decline of the forest products industry in the Western U.S. A clear understanding of these cause-and-effect relationships can lead to the development of solutions that do more than simply treat symptoms.

Collaborative processes yield creative solutions.

To explore the relationships among the threats facing private working forests across the West, and to identify solutions that address underlying issues, the Western Forestry Leadership Coalition (WFLC) brought together family and large-scale forest landowners, county commissioners, local and regional planning agencies, state forestry and wildlife agencies, federal land managers, tribes, universities, conservation districts, and nonprofit organizations at six exploratory workshops across the West. From this, a drafting committee synthesized workshop input and developed this report, which includes recommendations for addressing the threats to western private forests. The goal is to facilitate the creation of a new policy framework and new business model that, together, address the needs of private forest landowners; local, state and federal agencies; conservation organizations; and other stakeholders in the western U.S. and strive toward the following outcomes:

- Mitigate and adapt to climate change by facilitating sustainable forest management that increases carbon sequestration and storage (mitigation) and minimizes risks and impacts to forest health from fire, insect outbreaks, and other problems associated with climate change (adaptation).
- Support a diversity of markets for forest products and ecosystem services that will help create an economic environment more amenable to owning and managing forest land for multiple benefits and products.
- Contribute to the creation of a social environment within which forests and sustainable forest management are understood and valued for their economic, social, and environmental benefits.

The recommendations in this report focus on achieving these outcomes by rewarding landowners for their stewardship of ecosystem services, promoting diverse markets (existing and new), and facilitating action through cross-ownership management and partnerships. The recommendations, like the threats, are interdependent and therefore will be most effective if acted upon concurrently and iteratively by multiple partners. We will know we have achieved success when:

- Ecosystem services are appropriately valued and can play a larger role in the management decisions of private forest landowners, broadening the portfolio of products and benefits for which they can manage their land and realize profit.
- Private forest landowners can realize additional economic value and enhance forest health and resilience through a diversity of markets that include the utilization of woody biomass, and therefore will be more likely to hold onto their land in the face of development and other pressures to sell.
- The overall capacity to manage working forests is increased through effective cross-ownership planning and partnerships. Enhanced coordination of landowners can leverage resources, curtail disinvestment in working private forests, improve the quality of life in forest-dependent communities, and help retain the green infrastructure these lands provide.

THREATS TO WESTERN PRIVATE FORESTS WORKSHOP LOCATIONS AND DATES

Central Rockies
(AZ, CO, NM, NV, SD, UT, WY)
Lakewood, CO – March 4-5, 2009

Northern Rockies
(ID, MT)
Boise, ID – March 18-19, 2009

Interior Alaska
(AK)
Anchorage, AK – April 7-8, 2009

Central Plains
(CO, KS, ND, NE, SD)
Nebraska City, NE – April 15-16, 2009

Pacific Northwest & Coastal Forests
(AK, CA, OR, WA)
Seattle, WA – April 29-30, 2009

Hawaii & the Pacific Islands
(Hawaii, the Territory of American Samoa, Republic of Palau, Federated States of Micronesia, Territory of Guam, Commonwealth of Northern Mariana Islands, and Republic of the Marshall Islands)
Koror, Palau – May 4-8, 2009

A full list of participants signing on to the final report can be found at the back of this report.

Introduction

The Threats to Western Private Forests Strategic Initiative has engaged diverse stakeholders to explore threats to the health and sustainability of private working forests in the Western U.S. Open conversations about the long-term prospects of private forests have yielded a better understanding of both the challenges facing private working forests and opportunities that lie ahead, and have led to the development of broad recommendations to take advantage of these opportunities.

The Process

This initiative began with the recognition that current policies and programs are insufficient to sustain private working forests as a critical component of the western landscape. Similarly, research approaches to understanding the barriers to owning and managing land have inadequately addressed the complexity of threats facing private working forests across the West.

In the interest of better understanding these threats and providing support to members of the private forestry community as they "retool" to allow continued management of their forests, the Western Forestry Leadership Coalition (WFLC) convened a series of workshops in early 2009. These workshops were organized to explore a few basic questions: Why and how are the ecological and social benefits, and the economic viability of private working forests at risk? What can be done to conserve those benefits and sustain ownership and management of private working forests?

Five workshops were held in different subregions of the West, and brought together representatives from state forestry and wildlife agencies, tribes, regional and local government, USDA Forest Service, Natural Resources Conservation Service, Bureau of Land Management, industry, academia, conservation organizations, and most importantly, private forest landowners. One additional listening session was held with foresters and stakeholders from the U.S.-affiliated Pacific Islands.

Following the exploratory workshops, a drafting committee was convened comprising select workshop participants from all subregions of the West as well as new members who brought different perspectives to the table. The drafting committee was charged with reflecting the views expressed at the workshops, but also with adding analysis and interpretation of the issues. This report is the culmination of the drafting committee's efforts. It has been vetted by the WFLC membership and was subsequently approved by the WFLC Executive Board. It highlights the importance of private working forests across the West, identifies critical issues threatening their health and integrity, and puts forward recommendations to a broad audience to directly address these threats and ensure the sustainability of western forests and the human and ecological communities they sustain.

Forests Across the West

Profile of private forest landowners across the West

There are over 109 million acres[4] of private forest land owned by thousands of individuals or entities across the West. These entities include families (managing anywhere from less than 10 to more than 5,000 acres), corporate owners (including Alaska Native Corporations, Timber Investment Management Organizations (TIMO), Real Estate Investment Trusts (REIT), and vertically integrated companies managing large acreages), and tribes. Most of the nearly 19 million acres[5] of tribal forest land is in the West. They are owned and managed by almost 300 unique tribal governments, often in small parcels (less than 1,000 acres). These acres include federal land held in trust for tribes as well as land owned by individuals.

While corporate and industrial forest landowners often hold large areas of forest, over half (57 percent) of the private family forest land is in parcels less than 500 acres, and more than a third (34 percent) is in parcels less than 100 acres.[6] Sixty-five percent of all private family forest landowners in the West own less than 10 acres, and 91 percent own less than 50 acres (Table 1).

Table 1. Family forest land ownership across the West, by number of acres and owners

Area (thousands of acres) of private family forest land							
Total	**1-9 ac**	**10-49 ac**	**50-99 ac**	**100-499 ac**	**500-999 ac**	**1,000-4,999 ac**	**5,000+ ac**
44,094	3,087	7,937	3,528	10,583	5,291	9,260	4,409
	7%	18%	8%	24%	12%	21%	10%

Owners (thousands of individuals/entities) of private family forest land							
Total	**1-9 ac**	**10-49 ac**	**50-99 ac**	**100-499 ac**	**500-999 ac**	**1,000-4,999 ac**	**5,000+ ac**
1,430	930	372	57	57	14	-	-
	65%	26%	4%	4%	1%	<1%	<1%

Source: Butler 2008 and Butler et al. 2009 (National Woodland Owner Survey data are based on a representative sample of private family forest owners. Number of acres and owners and percentages are approximate.)

The biophysical (ecological) issues most often reported by private family forest owners across the West are fire, insects or plant diseases, and undesirable plants. The major social-economic issues across the West are keeping land intact for heirs, high property taxes, trespassing or poaching, and misuse of forest land, such as vandalism and


Bob Sturtevant


Jay Gregg


Teofilo

[4] Smith et al. 2009 (These data are consistent across the continental United States, Alaska, and Hawaii but exclude the Pacific Islands. Also see Appendix 1.)

[5] Bureau of Indian Affairs (BIA) 2009

[6] Butler 2008, Butler et al. 2009 (Survey reports of private landowners, their issues and intentions exclude non-coastal Alaska, Hawaii, the Pacific Islands, and Nevada.)

REGIONAL DIFFERENCES

Many of the challenges encountered by management of private forest lands are shared across the West, but there are distinct conditions in certain regions that should be considered.

REGIONAL FOCUS: ALASKA

For many reasons, Alaska is unique. Scale sets it apart: there are 127 million acres of boreal and coastal forest. Ownership patterns also differ greatly from elsewhere in the U.S.: 99 percent (Hull and Leask 2000) of private lands are owned by regional and village Native corporations established through the Alaska Native Claims Settlement Act (ANCSA). The bulk of these ANCSA lands are not located near Alaska's urban centers, but are spread across the landscape in the vicinity of small rural communities. The small villages of Alaska are largely accessible only by boat or air, and struggle with decreasing populations and a poor economic outlook. In many rural communities, private ANCSA lands play an important role in local economic development and maintenance of traditional subsistence lifestyles.


Dana Coelho

dumping. Management strategies differ across individual private forest landowners, but over a quarter of all private forest landowners have little or no management actions planned. The harvest of firewood is common across all ownership sizes, and the harvest of saw logs and pulpwood is common on larger holdings (100 acres or greater).

Private forests' place in the landscape

Western private forests often border or are intermixed with public lands, and play a critical role in the connectivity and functioning of the whole forested landscape. The 364 million acres of forests in the West differ greatly in their ecological composition. They include everything from the sparse scrub woodlands of the arid interior to the ecologically and economically important forests of the Pacific Northwest. They include the boreal forests of northern Alaska; the fire-prone ponderosa pines of Idaho, Montana, Arizona, and New Mexico; the seas of lodgepole pine on the high plateaus of Oregon and Wyoming; tropical forests in Hawaii and the Pacific Islands; and the central hardwood forest that stretches across the Great Plains. They include Colorado's golden-leaved aspen stands; the tamarack and larch whose needles yellow and drop each year; and the evergreen subalpine, grand, noble, and Douglas-firs of the western Rocky Mountains. An incredibly diverse set of ecosystems, western forests are difficult to characterize as a whole.

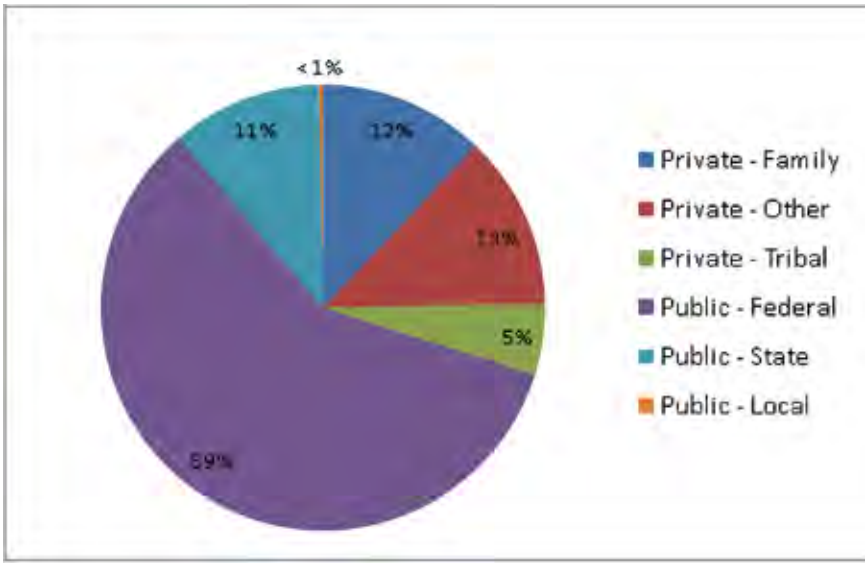
The amount and distribution of forest resources also differs across the West. Total forested area per state ranges from 1.7 million acres in Hawaii to over 125 million acres in Alaska and from less than 2 percent of the total land area in North Dakota to more than 52 percent in Washington. Forests occur in large blocks, small patches, and in thin ribbons along rivers and streams. Each type is a valuable contributor of ecosystem services and economic value to landowners and the public.

Approximately 70 percent of all western forests are publicly owned (Figure 1), and 59 percent are owned and managed by the federal government, primarily the USDA Forest Service, for a variety of objectives and public values. Public forests comprise over 255 million acres across the West, compared to 31 million acres east of the Mississippi River, 19 percent of all forest lands in the Northeast and South. Private lands make up a small, but critically important part of the western landscape. The percentage of forest under private ownership ranges from just under 2 percent in Nevada to about 40 percent in California and as high as 95 percent in Kansas.

Benefits of private working forests

Forests across the West provide critical ecological, economic, and social services to the public. Private working forests help sustain these public benefits and provide landowners with a sustainable source of income.

Figure 1. Public and private ownership of forest lands in the Western U.S.



Source: Butler 2008

Private working forests contribute to the economic well-being of the Nation. They include some of the most productive timber stands in the country, provide a domestic source of wood products (timber and non-timber, biomass energy, etc.), and are an important economic anchor for many rural communities. In Alaska, private forests on Native corporation lands play a key role in supporting local subsistence economies. Across the West, private working forests provide abundant recreational opportunities and support cultural values.

The ecological services provided by private working forests are many. They hold snow and control snowmelt, maintain streambanks and stabilize soil on steep slopes, regulate watershed hydrology, and provide clean water. They also produce oxygen, clean the air, and sequester carbon. They comprise valuable agroforestry and riparian systems and maintain connectivity (critical to the delivery of many ecosystem services such as habitat, wildlife travel corridors, and clean water) in an increasingly fragmented landscape. Their normal and natural cycles of succession, fire, and disease ensure that these ecological services and their associated plant and animal species are continually renewed and sustained.

Private working forests provide habitat for hundreds of species including big game such as elk, deer, moose, lion, and bear; endangered species such as grizzly bear, bald eagle, woodland caribou, salmon, spotted owl, wolf, lynx, trout, and marbled murrelet; and many species of migratory birds, raptors, herons, owls, woodpeckers, reptiles, amphibians, bats, ungulates, and small mammals.

REGIONAL FOCUS: CENTRAL PLAINS

In the Central Plains (Nebraska, Kansas, North Dakota, South Dakota, and eastern Colorado and Wyoming), forests are a small but important part of a large agricultural landscape. Trees have a unique cultural legacy here, as many of them were planted to make life in a barren, windswept landscape more livable. The region places a strong emphasis on urban forestry, green infrastructure, windbreaks, and riparian areas — working trees or agroforests — as a means to restore and protect valued ecosystem services. The forests here are impacted by urban growth, but also by perceived competition with agriculture for water and land area for grazing and food production. Almost all of the forested lands in the Central Plains are privately owned.

REGIONAL FOCUS: PACIFIC ISLANDS

The forests of Hawaii and the Pacific Islands host a treasure trove of biological diversity, thanks to their expansive geographic range and the isolation of island ecosystems. In Hawaii, 90 percent of the 10,000 native species of flora and fauna are endemic (native only to the Hawaiian Islands). The rich forests of Hawaii and other Pacific Islands are sources of water, subsistence, wood, recreation, and aesthetic and cultural values. But the diversity and health of forest species face serious threats, largely from invasive plants and animals, which can disrupt natural cycles, crowd out native species, and cause billions of dollars in damage and restoration costs.

Sustaining Western Private Forests, People, and Places

Private working forests contribute to the diversity and vitality of the western landscape. But there is a cost to maintaining and enhancing these contributions, and it has become less feasible for private forest landowners to bear these costs amid growing conversion pressure, changing economic conditions, competing social expectations, and environmental challenges such as climate change. These challenges are as complex as the forest ecosystems and the communities and people they sustain. To fully address the barriers to owning and managing private working forests, it is necessary to separate the symptoms of problems — that which we can see on the ground — from their causes, which are often interrelated and compound one another. That is exactly the approach taken in this report, and it is the relationships and complexities among problems and their causes that drive the recommendations in this report.

Threats to Western Private Forests — A Systems Approach

The threats facing private working forests in the West are complex. For this reason, we took a systems approach to better understand the many connections and to develop recommendations more responsive than those in effect today, which tend to focus largely on symptoms rather than their causes. The desire is to understand the system and then target recommendations to leverage points where they can have the most impact.

Drivers, Stressors, and Impacts

Through careful review of ideas generated during the exploratory workshops and reference to additional sources and professional expertise, the drafting committee broke down the threats to western private forests into three related categories — drivers, stressors, and impacts.

The highest level causes of threats to western private forests are drivers. Climate change, shifting economic conditions, and changing demographics and social values were identified as the drivers of the threats facing private working forests. Drivers are beyond our control and unlikely to change in the near term, but are critical to understanding the relationships among more immediate threats and how proposed solutions might lead to positive change or unintended negative consequences.

Stressors are the result of one or more drivers and include things such as increased wildfire risk, invasive species, market disruption, and conflicting government regulations. These are most easily considered the threats to western private forests themselves and are the proximate causes of impacts to forests, or what is seen and felt on the ground. The two most fundamental impacts discussed are 1) the loss or degradation of forests and the ecosystem services they provide owing to a combination of natural and human causes, and 2) the sale or conversion of forests to non-forest land uses because holding on to the forest land is not economically feasible.

SYSTEMS THEORY

Developed in the 1950s, systems theory has been applied to various fields — organizational management, defense, computing, ecology — to discover counter-intuitive implications of policy decisions and craft improved responses to problems that can be adapted over time. Interactions and feedbacks are responsible for the "complexity" of the systems studied. Understanding them helps identify leverage points where new policy actions may be applied for maximum effectiveness.

CLASSIFICATION OF DRIVERS

Climate Change

- Warmer temperatures
- Altered precipitation (timing and amount)
- Sea level rise

Shifting Economic Conditions

- Globalization
- Local, national, and international markets (supply and demand disruption)

Changing Demographics and Social values

- Population growth
- Aging population
- Urbanizing population
- Desires and behavior

WHERE'S THE FIRE?

When considering issues of concern for private forest landowners in the West, wildfire comes immediately to mind. Yet when the participants at the exploratory workshops were asked to identify and discuss underlying threats to private working forests, wildfire did not dominate the conversation.

Clearly, wildfire can be a force of destruction—threatening resources that people value and often causing economic damage. However, wildfire is also a natural component of many western forest ecosystems.

When the issue of fire came up, it was framed within a broader discussion of biomass utilization and fuels reduction. This approach can help foster new opportunities for private forest landowners to engage in sustainable fuel treatment activities, ultimately encouraging the chances that wildfire can play a functional role in forest management.

Coconino National Forest

To illustrate this hierarchy and potential interactions among drivers and stressors, we offer these examples. This list is not exhaustive, rather it is meant to highlight a few key interactions and encourage further thought.

- An aging population (demographic driver) of working forest landowners sells or passes on their land (stressor) to new, younger owners who may lack the interest, knowledge, or financial resources (economic and values drivers) to continue managing that forest land. These owners may be pressured to sell to a developer and, faced with a higher economic return for development (stressor), sell the land for homes to be built (impact). Forest is lost, fragmented, and ownership is broken up into smaller, more difficult to manage units (impact).

- Warmer temperatures and reduced precipitation (climate change driver) combine to increase the occurrence and severity of wildfire and insect/disease infestation (stressors), which then results in ecosystem degradation (impact).

- Changing and often conflicting public values (values driver) have led to the creation of a system of federal land management policies that are also conflicting (stressor). The resulting barriers — whether conflicting goals, redundancies, or different timelines across agencies — often impede management of public lands (stressor) and the health of these and neighboring private lands suffers for it (impact).

- The loss of processing facilities and dwindling markets for wood products (economic driver) has significantly changed the financial realities facing private forest landowners (stressor), forcing many to sell their land (impact). At the same time, without compensation for the public benefits working forests provide (stressor), many landowners are unable to bear the cost of managing their forests for biodiversity, ecosystem services, and overall forest health (stressor) and the lands become degraded or are converted (impact).

The threats to western private forests take many forms. The relationships among drivers, stressors, and impacts are complex and interrelated. The exercise of tracing impacts on the land back to possible causes and interactions is a difficult, but valuable undertaking. A clear understanding of these cause-and-effect relationships points us to solutions that acknowledge drivers, address the causes (stressors) of the problem (impact), and helps us design solutions that avoid unintended consequences.

Changing Demographics and Social Values

The Western U.S., along with the country as a whole, has seen population growth along with major shifts in the age distribution, location, and values of that population. These changes in demographics and social values are putting exceptional stress on private working forests both directly — fragmentation and conversion in the wildland-urban interface — and in ways not easily seen — underlying values that drive consumption, development, and forest management decisions.

The U.S. population has grown from 152 million in 1950 to an estimated 304 million today.[7] Over that same period, we have become increasingly urban (81 percent of Americans now live in cities[8] compared to 65 percent in 1950) and older (12.5 percent of Americans are 65 and older today, compared to 8.1 percent in 1950). Our consumption patterns have also changed, in general and specific to forest products. For example, in 1950 the average home was occupied by 3.4 people, and was less than 1,000 square feet in size.[9] Today the average home holds 2.5 people and is more than double the size, about 2,500 square feet.[10] Per capita consumption of paper products has also more than doubled. Domestic (and particularly western) production, however, has not kept pace with demand.

Western production capacity has been shifted to the Southeastern U.S. and out of the country. Harvest has also shifted away from public lands and onto private lands. Some of this shift is due to today's Americans demanding more environmental amenities from forests while having less patience for the harvest and regeneration required to sustain both those amenities and a forest products industry. This conflict also manifests itself in federal and local legislation, leading to gridlock when the desire to manage public forests for timber production and restoration objectives comes up against the desire to preserve wilderness and other values such as water, natural landscapes, and recreation opportunities. However, active forest management can be, and often is, compatible with these other values.

In addition to these general trends, there is a place-based threat to private working forests as the wildland-urban interface grows to accommodate new residents seeking to live and own property in rural, forested settings. According to the Pacific Forest Trust, 1.5 million acres of private forest land in the U.S. are lost each year to conversion.[11] Housing density will increase substantially on more than 57 million acres of rural private forest nationwide between 2000 and 2030.[12] This growing and changing population is exerting its influence — politically, fiscally, and physically — across both public and private forests in the West. In Oregon, for example, private forest owners are less likely to manage their land (such as thinning trees to promote future growth) in locations where development has happened.[13] Across the West, private working forests are being fragmented and broken into smaller parcels, negatively affecting forest health and the ability to manage at a landscape scale.

[7] All population statistics are from the U.S. Census Bureau unless otherwise noted.

[8] United Nations (UN) 2007

[9] Daugherty and Kammermeyer 1995

[10] National Association of Homebuilders 2003

[11] Best and Wayburn 2001, Oregon Forest Resources Institute (OFRI) 2008

[12] Stein et al. 2005, 2010

[13] Kline et al. 2004

Shifting Economic Conditions

Forests produce a myriad of economic and non-market values. Some of these economic values are determined in marketplaces such as the local timber market, the woody biomass market, or, for the land's development value, the residential housing market. Other values — including services provided by forests such as clean air, clean water, wildlife habitat, pleasant scenery, soil protection, recreation, and cultural heritage — lack a marketplace where they may be realized in a financial sense. They do, however, factor into land-holding decisions of forest landowners, which are based on their individual goals and objectives and may or may not be economic. Changes in markets, both domestically and internationally, affect private working forests in complex ways. At the same time, economic policy that addresses one value (such as development potential, timber, or carbon) of privately held forest land often has unintended consequences on other values (such as wildlife habitat or clean water) that the same parcel can produce. The same is true across ownerships; policies directed at one ownership type (such as federal land) often have unintended consequences on other types (such as state and private lands).

The retention and sustainable management of private working forests in the West is threatened by the loss of the forest products industry, driven in large part by global economic forces, unintended consequences of public policies, and a lack of incentives for managing for ecosystem services that provide public benefit. Without infrastructure and markets (for traditional, nontraditional, and emerging products) forest land has virtually no direct economic value as forest, and a landowner cannot overcome other values (such as development), leading to subdivision and conversion. Land use regulations and tax codes can also reduce the management options available to private forest landowners and impede successful transfer from one generation to the next.

Economic and non-market values are impacted by regional land uses and the policies affecting those uses. Policies that lower regional harvest levels can lead to reduced investments in infrastructure. Timber markets disappear without a minimum level of harvest activity, adequate investments in infrastructure, or with higher transportation costs owing to lost infrastructure. The lack of timber markets changes forest values and increases the probability of forest conversion to alternative uses. Ultimately, when forest ownership is no longer meeting the objectives of a landowner, selling the property becomes an option as opposed to retaining the land in its current use. Under these circumstances the land value associated with the sale of the parcel is higher than the value of holding the land under current use. The longer the condition of sell values exceeding hold values exists, the higher the probability that the forest land use will change. When such changes begin to be realized, the risk of conversion to alternative land uses increases.

Climate Change

Scientific consensus is that climate change is having and will continue to have far-reaching and unpredictable effects on western forests. Observed changes in climate being experienced in the Western U.S. include rising temperatures, changing patterns and amounts of precipitation, and (in the case of Alaska, Hawaii, and the Pacific Islands) sea level rise. These changes influence both physical and political environments, altering ecosystems over long periods of time and encouraging the creation of greenhouse gas (GHG) pollution regulations and market-based solutions that can address the threats posed by a changing climate.

Climate change threatens forests directly as warmer temperatures increase water demand and decreased base flow of waterways creates drought stress. Altered patterns of precipitation can also lead to flash floods and reduced aquifer recharge. Increased plant stress levels can lead to more severe insect and pathogen outbreaks, increased frequency and intensity of wildfires, and an overall loss of resilience in forest ecosystems. Warmer temperatures can further exacerbate insect problems by preventing die-back over winter and accelerating life cycles. Changes in environmental conditions caused by climate change may also reduce the sequestration capabilities of forests and increase GHG emissions in the long run, leading to continued change and stress.

Climate change is also driving opportunities for mitigation and adaptation as well as meeting other conservation needs. Consideration of national and regional climate change and carbon policies is fueling demand for renewable energy sources, including woody biomass, and carbon sequestration, a valuable forest ecosystem service. The predicted severity of climate change effects are driving the creation of adaptation plans that include responses to reduce forests' susceptibility to drought and fires, and increase resilience to native and invasive pests and pathogens.

Overlapping Drivers, Stressors, and Impacts

The drivers outlined above do not act independently. Instead, they interact in complex ways to place stress on private working forests and ultimately lead to impacts on forest ecosystems and the benefits they provide. Demographics and values, economics, and climate change interact at basic levels (such as values driving economic decisions and manifesting as climate change policies) and closer to the ground (multiple reasons for the lack of forest management and the perpetuation of forest health risks). The following examples illustrate this point.

- Increased temperatures and altered precipitation patterns as a result of climate change (driver) combine to create drought stress in trees and forests. These forests, both public and private, are at increased risk of and are experiencing more severe wildfire and pest/pathogen outbreaks (stressor). Risk is perpetuated by an inability to conduct sustainable forest management practices (such as thinning or prescribed burning) driven in part by regulations that reflect the public's displeasure with seeing harvest (values driver). Forest management is also being blocked because it is not a profitable or economically feasible use of the land (economic driver) and because the forest products infrastructure required to process the harvested material has been lost or is inadequate (stressor). Ultimately this means declines in forest health and resilience (impact) and the loss of services and value from the forest (impact).

- The increase in public demand (values driver) to live and recreate in and amongst forests has increased the value of those lands within the residential housing market (economic driver) and is driving conversion of forest land to other uses (impact). Where a private forest landowner is struggling economically to keep the land as forest owing to a lack of traditional or non-traditional markets for products and services (stressor), there is increased pressure to sell those lands toward a "higher and better use (impact). With the large generational shift in family woodland owners that is beginning to occur (stressor) because of aging populations (demographics driver), these pressures will be even greater as a younger generation inherits the land.

- Recently developed strategies to deal with the effects of climate change (driver), efforts to create market-based solutions to reduce air pollution levels (climate change and economic drivers), and regulations that control the level of GHG emissions are incomplete because they do not fully engage private landowners of all sizes as part of the solution (stressor). A lack of understanding of how carbon markets function, the lack of capacity for biomass utilization from all lands, current forest conditions that create increased fire risk and intensity, and increased pathogens (stressors) combine to impact private working forests both physically and economically. Overstocked forest conditions combined with the inability to remove and process biomass for energy (stressor) reduce options for responding to climate change.

- Local market conditions, national and regional economic policy, and/or global economic processes (economic drivers) change the economic value of working forests (stressor). As these values change and forest land is transferred from one generation to the next (demographic driver), lack of economic return from practicing forestry (stressor) combined with a heavy tax burden (stressor) often keep the new owner from owning and managing his or her working forest (impact).

- Wood imports have increased over the past three decades to meet demand. This increase has a lot to do with global economic conditions as well as domestic policies and public values (economic, demographics, and values drivers). The vast tracts of public forest west of the Rocky Mountains once provided a ready source of timber products and sustained forest-based economies. These "timber towns" — icons of cultural heritage throughout much of the West — depended on the harvest and milling of forest products for their livelihoods. However, timber harvest on public land has sharply declined and led to loss of infrastructure (stressor), which in turn has led to a decrease in economic opportunity for private forest owners from the production of forest products (impacts).

It is in the interactions among drivers, stressors, and impacts that a fuller understanding of the threats facing private working forests in the West can be found and from where the most powerful solutions to these threats can be developed. These solutions, outlined in the recommendations to follow, strive to address problems at these leverage points.

Recommendations

Analysis of the threats to western private forests — from drivers and stressors to on-the-ground impacts — has led to the development of recommendations in three broad categories: ecosystem services, forest products markets and woody biomass, and cross-ownership management and partnership. These recommendations are meant to foster solutions at a reasonable and meaningful scale — solutions that can affect a set of interacting threats and that seek to avoid unintended consequences. Policy, program, and on-the-ground actions by a multitude of partners in line with these recommendations can contribute to a future where sustainable forest management is an economic reality, a recognized social benefit, and a significant contributor to forest health and long-term climate change mitigation and adaptation goals.

The Drafting Committee has collaboratively developed the recommendations that it believes will address the major threats to sustaining the economic and ecological viability of private working forests in the West. These recommendations are not intended to be implemented by the WFLC or its individual members. The Drafting Committee is aware that WFLC is a unique state and federal partnership working with the people and resources in the West. Instead, it is through the WFLC's partners, including the Council of Western State Foresters (CWSF), that some of the specific recommendations can be pursued at the appropriate level. Some of the recommendations are implementation ready. Other recommendations may require additional dialogue before the policy environment is right for beneficial change to occur. In all cases, WFLC members can play a central role in shepherding solutions, through partners and through issue education at all levels.

Reward landowners for their stewardship of ecosystem services

Changing social values, including the desire and ability to live in or near forested areas, are creating pressure to subdivide and develop private working forests across the West. These pressures are exacerbated by the current imbalance between real estate and timber markets and a lack of markets for ecosystem services. Private forest landowners are unable to realize economic value for the ecosystem services (including clean and abundant water, wildlife habitat, carbon sequestration, and others) that their forests provide for the public benefit. The inaccurately low economic value of forests is unable to compete with high real estate values, and these working landscapes are being converted to other uses. With the loss of private working forests, we also lose the ecosystem services they provide. The creation of markets for ecosystem services, financial incentives, and changes to land use and tax policy could contribute the necessary additional revenue streams needed to raise working forest values to levels that more appropriately account for their public benefits and allow for more robust competition with other land uses.

WFLC members should work with the CWSF and other partners to accomplish the following at the federal and state levels.

- Develop new markets for ecosystem services that compensate private forest landowners for the benefits their forests provide to the public; ensure that these markets are informed by the collaborative development of national guidelines.
- Support, encourage, and fund applied research in ecosystem service valuation, monitoring, and modeling to facilitate the entry of these values into existing and emerging markets.
- Support the creation of new and modification of existing tax policies and financial incentives that are consistent and integrated across scales (local, state, federal) to encourage the retention of private working forests, encourage long-term forest management, and support the provision of a range of ecosystem services.
- Encourage the development and improvement of local and state land use policies (e.g., planning and zoning ordinances, subdivision codes) and compensation mechanisms (e.g., transfer of development rights) to create incentives and reduce disincentives for the conservation of private working forests.

Understanding and measuring success

Implementation of these recommendations will lead to a future where ecosystem services are appropriately valued and can play a larger role in the management decisions of private forest landowners, broadening the portfolio of products and benefits for which they can manage their land and realize profit. In this future, recognition of a fuller set of forest ecosystem values in land use and tax policy creates incentives and reduces disincentives to owning and managing private working forests. In sum, the economic value of owning and managing private working forest can now compete with development value on a more equal playing field. As partners work towards this desired future, there are many benchmarks that can help measure progress including the amount and nature of tax benefits provided to private forest landowners, the number and effectiveness of ecosystem services markets, and the number of private forest landowners conserving their land as a result of new values being realized.

ALL LANDS VISION

Secretary of Agriculture, Tom Vilsack (2009), outlined his vision for the future of our Nation's forests to be achieved through collaboration among federal agencies, State Foresters, tribes, and partner groups in an "all lands" approach. The Drafting Committee's analysis of threats to western private forests and their recommendations to WFLC and partners support the Secretary's vision.

"There is no doubt that we are facing a health crisis in our forests. Climate change places them under increasing stress that exacerbates the threats of fire, disease, and insects... The threats facing our forests don't recognize property boundaries. So, in developing a shared vision around forests, we must also be willing to look across property boundaries. In other words, we must operate at a landscape-scale by taking an all-lands approach."

"Forest restoration led by the dedicated people at the Forest Service opens non-traditional markets for climate mitigation and biomass energy while appropriately recognizing the need for more traditional uses of forest resources … Emerging markets for carbon and sustainable bioenergy will provide landowners with expanded economic incentives to maintain and restore forests … Markets for water can also provide landowners with incentives to restore watersheds and manage forests for clean and abundant water supplies. These markets can also create jobs in rural communities near forests."

Promote diverse forest products markets and the utilization of woody biomass

Active forest management often involves harvesting trees of various sizes to reduce fire risks, address insect and disease outbreaks, and improve overall forest health and resilience. The removal of this material from the forest and the potential economic value realized by private landowners require diverse and economically viable markets. Existing and emerging forest products markets such as for woody biomass are critical to addressing both the economic and forest health-related threats facing western private forests. They will also contribute to climate change mitigation and adaptation. Used as a means to realize additional economic value within a managed forest ecosystem, traditional forest products and woody biomass utilization (for thermal energy, electricity generation, and transportation fuels) can influence the decisions made by private landowners with regard to selling or holding onto their land. Increased resilience is a necessary part of a climate adaptation strategy. Avoided carbon emissions, whether through the replacement of fossil fuel use or reduction of wildfire frequency and intensity, contributes to climate change mitigation. Replacing fossil fuels also contributes to energy security.

WFLC members should work with the CWSF and other partners to accomplish the following at the federal and state levels.

- Facilitate the utilization of diverse forest products, including woody biomass as a renewable energy resource, to achieve land management goals on private working forests, climate change mitigation and adaptation, energy security, and overall sustainability goals on all lands by supporting the development of infrastructure and a consistent supply.
- Implement programs and tools that support traditional markets and woody biomass utilization, as well as consistency of supply at the appropriate scale (often local) such as long-term power purchase contracts, federal stewardship contracts, matching payment programs, fuel supply incentives, revolving loan funds, and tax credits.
- Secure funding for woody biomass utilization through traditional and emerging markets, mitigation and adaptation funds, federal programs supporting climate change adaptation, and other venues.
- Define renewable biomass in federal legislation to recognize material produced by sustainable forest management on private, state, and federal lands as legitimate sources and to facilitate their inclusion in renewable energy policy, portfolio standards, and markets.
- Develop and promote methods to verify and communicate that sustainable forest management is an ecosystem, social, and economic benefit.

Understanding and measuring success

Implementation of these recommendations could lead to a future where private forest landowners can realize additional economic value through the sale of traditional forest products and woody biomass material. This will more likely allow them to hold onto their land in the face of development and other pressures to sell. In this future, federal, tribal, state, and local plans and policies fully support and encourage the development of diverse markets that include woody biomass energy products (for electricity, direct heat, and transportation fuels) as part of climate change, energy security, and economic development solutions. Forest health and resilience are enhanced and wildfire risks reduced through sustainable forest management that incorporates woody biomass utilization. As partners work towards this desired future, there are many benchmarks that can help measure progress including the successful implementation of a renewable biomass definition in federal legislation and the number of states or regions incorporating woody biomass into climate change adaptation plans and renewable portfolio standards.

Facilitate action through cross-ownership management and partnerships

Because of patchwork ownership patterns across the Western U.S. and the scale of the threats private working forests face, cross-boundary coordination is especially important. Being able to work together toward a shared all-lands vision will become more and more important as populations increase, fragmentation continues with the expansion of the wildland-urban interface, and impacts of climate change become more acute. Just as wildfire, insects, and diseases cross political and other boundaries, management strategies should occur at a landscape scale in order to effectively address these and other interrelated threats. Cross-ownership management and partnerships among private forest landowners, public (state and federal) land management agencies, tribes, and communities is crucial to success on the ground and must aspire to overcome regulatory and other barriers that often keep sustainable forest management for multiple products and services from happening.

WFLC members should work with the CWSF and other partners to accomplish the following at the federal and state levels:

- Encourage the USDA to clarify, articulate, and develop the means to implement the all-lands approach by engaging in partnerships with federal, tribal, state, local, and private stakeholders. Ensure that this approach clearly recognizes the important role of both private and public forests in traditional wood commodity markets as well as new and emerging ecosystem service markets.
- Support effective partnerships among landowners, government entities, and communities at meaningful scales through substantive engagement and the contribution of political and financial resources.
- Move toward an environment that values and makes effective use of collaborative partnerships, compensation options, and market-based solutions, especially in and around the wildland-urban interface.
- Encourage coordination among regulatory and land management agencies at all levels (federal, tribal, state, local) to eliminate redundancy and to streamline permitting and environmental review processes.

Green infrastructure is strategically planned and managed networks of natural lands, working landscapes, and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations (The Conservation Fund 2009, Benedict and McMahon 2002). Landscape ecology principles drive a focus on connectivity within the green infrastructure network.

Working private forests provide critical "hubs" — large conservation areas — as well as "corridors" — critical linkages between conservation areas, including public lands. Recognition of the economic value of ecosystem services and their incorporation into planning and management decisionmaking supports this kind of integrated and strategic approach to conservation for ecological, social, and economic benefit.

Understanding and measuring success

Implementation of these recommendations could lead to a future where disinvestment and loss of private working forests are curtailed, green infrastructure is retained, and quality of life for forest-dependent communities is enhanced through effective cross-ownership planning and land management. In this future, the overall capacity and ability to manage working forests across ownership boundaries to address community and ecosystem issues of greatest concern is increased. As partners work towards this desired future, there are many benchmarks that can help measure progress including definition and integration of the all-lands approach into federal, tribal, state, and local program policy; the number of collaborative partnerships in areas with significant forest health and fragmentation issues; and demonstrated changes in regulations that encourage collaboration and reduce barriers to cross-ownership action.

Conclusion and Use

Western private forests provide forest products, important islands of biodiversity, wildlife corridors, recreation, and a wealth of other ecosystem services, yet they make up a small percentage of the western landscape. Their long-term outlook is therefore disproportionately important. This is becoming increasingly clear as development of the wildland-urban interface expands, climate continues to change, and natural resource professionals are realizing that the habitat needs of fish, wildlife, and plant species of concern cannot be met on the public forest land base alone.

To begin developing recommendations for conserving and enhancing benefits from western private forests, we first sought to gain an understanding of how private landowners and other stakeholders characterized existing threats to the continued viability of working forests. Over the course of six workshops, we gained input on a broad range of concerns from people whose livelihoods depend on working forests. Rather than drawing up a long tally of the threats they identified and attempting to devise piecemeal strategies for addressing them, the drafting committee compiled them and studied connections between threats and their underlying causes. By recognizing the complexity of the causes, mapping out their relationships, and finding points of overlap, the drafting committee sought to increase the effectiveness of the solutions by creating a few well-placed recommendations. This collaborative, creative process led to the recommendations in this report, which can be used as the foundation of a policy framework outlining a new business model serving private forest landowners; local, state, and federal agencies; environmental organizations; and other stakeholders in the Western U.S.

Continued collaboration and creativity will greatly increase our chances of success. As public values continue to change and ecosystem service markets emerge, the distinction between ecological, social, and economic benefits of forests will continue to blur. The tradeoffs that must be made among these often competing values are also becoming increasingly difficult, particularly in areas characterized by a diversity of forest ecosystems and checkerboard ownership patterns. Management challenges such as wildfire and invasive species do not stop at jurisdictional boundaries, and require cross-boundary coordination. Therefore, conservation and sustainable management of private working forests as a critical component of the landscape depend upon coordinated action among the equally diverse forest landowners, public and private.

We heard workshop participants say, “Forestry is no longer competitive with other uses of the land.” It is the hope of this initiative that this statement is proven wrong. Private working forests contribute economically, ecologically, and culturally to people everywhere, and in directing our efforts to their continued existence, we are preserving and promoting the wealth and progress of the entire Nation.

Acknowledgements

This report was conceived, informed, and drafted by numerous committed individuals including members of the WFLC Executive Board and the Threats to Western Private Forests core team, drafting committee, and workshop participants. Our sincere thanks go to everyone for their vision and dedication. Special thanks go to Jay Jensen, former WFLC Executive Director and current USDA Deputy Undersecretary for Natural Resources and Environment, and to Paul Ries, USFS Director of Cooperative Forestry for their early and continued support of the initiative. Our thanks also go to Rachel White with the USFS Portland Forestry Sciences Lab for her valuable editing assistance.

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CONTEXT FOR PARTICIPATION AND SIGN-ON TO THE FINAL REPORT

Drafting Committee members were selected to represent diverse western geographies, interests and expertise, as well as for their demonstrated leadership in private forestry. Drawing from the results of the regional workshops, Drafting Committee members wrote this consensus report, which seeks to utilize and build on the workshop results and to integrate and synthesize their own views. This report reflects their consensus agreement but may not reflect their individual views in each detail. Drafting Committee members have been asked to consider their professional interests, but to represent their own perspectives — not necessarily those of their employer. By signing on to this report, Drafting Committee members have indicated that it is an acceptable reflection of both their views and the views of the larger Drafting Committee.

CONTEXT FOR PARTICIPATION AND SIGN-ON TO THE FINAL REPORT

Experts on private lands and forestry issues were asked to attend six workshops across the West. At these day and a half meetings, participants were asked to consider the underlying threats to sustained retention of private working forests and to suggest some possible ways to ameliorate those threats. The workshops were structured as brainstorming sessions and participants were not asked to come to agreement as part of the workshop outcomes. Workshop participants have been asked to sign on to this report as a way of indicating their participation in developing the crucial information that has been the foundation for this report. By signing on as workshop participants, they have indicated that the outcomes of this report in its final form are consistent enough with their personal views that they can support it.

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Input was received on the Threats to Western Private Forests Strategic Initiative at the annual WFLC Pacific Islands Committee meeting. Attendees at this meeting included state and territorial foresters and program managers from Hawaii, the Territory of American Samoa, Republic of Palau, Federated States of Micronesia, Territory of Guam, Commonwealth of Northern Mariana Islands, and Republic of the Marshall Islands. Discussion was facilitated by Laurie Tippin, Director of State & Private Forestry for the USFS Pacific Southwest Region.

Definitions Used in This Report

Climate change adaptation – The adjustment in natural or human systems in response to actual or expected climate change impacts, which moderates harm or exploits beneficial opportunities. (IPCC, 2007a, b)

Climate change mitigation – The avoidance or reduction of climate change impacts through limiting or preventing greenhouse gas emissions and enhancing activities that remove them from the atmosphere. (IPCC, 2007a, b)

Ecosystem Services – The benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling, that maintain the conditions for life on Earth (Millennium Ecosystem Assessment 2005)

Infrastructure – When used in reference to the forest products industry, infrastructure includes the facilities, workforce, and expertise necessary to sustain production capacity.

Invasive Species – A species that is non-native (or alien) to an ecosystem and whose introduction causes or is likely to cause economic, environmental harm or harm to human health. Invasive species can be plants, animals, or other organisms. (USDA National Invasive Species Information Center)

Private Working Forest – Forest owned by private individuals, families, companies, and tribes that provides value (economic, environmental, and social) to both the forest landowner and society.

Sustainable Forest Management – The practice of meeting the forest resource needs and values of the present without compromising the similar capability of future generations. Sustainable forest management involves practicing a land stewardship ethic that integrates the reforestation, managing, growing, nurturing, and harvesting of trees for useful products with the conservation of soil, air and water quality, wildlife and fish habitat, and aesthetics. (excerpt from the SAF Dictionary of Forestry 2008)

Western U.S. – The members of the Western Forestry Leadership Coalition (WFLC) include the 23 State and Pacific Island Foresters of the West and the seven western Regional Foresters, three western Research Station Directors, and Forest Products Lab Director of the USDA Forest Service. 'The West' and 'Western United States' as used in this report refer to the geographic area covered by the WFLC.

Wildland-Urban Interface – The area where houses meet or intermingle with wildland vegetation. Also a legal definition in relation to fire risk to communities meaning the area within or adjacent to an at-risk community that is identified in a community wildfire protection plan; or if a community wildfire protection plan is not in effect, an area extending 1/2-mile from the boundary of an at-risk community.

Woody Biomass – Any organic matter from plants, which is derived from forest-related resources, solid wood waste materials, or agricultural sources. Eligible forest-related resources are mill residues, other than spent chemicals from pulp, manufacturing, pre-commercial thinnings, slash, and brush. Solid wood waste materials include waste pallets, crates, dunnage, manufacturing and construction wood waste (other than pressure-treated, chemically-treated, or painted wood wastes), and landscape or right-of-way tree trimmings. The term biomass can also be used to refer to any organic matter from a plant grown for the exclusive purpose of producing energy.

References

Benedict, M.A.; McMahon, E.T. 2002. "Green Infrastructure: Smart Conservation for the 21st Century." Renewable Resources Journal. 20: 12-17.

Best, C.; Wayburn, L. 2001. America's Private Forests: Status and Stewardship. Covelo, CA: Island Press.

Bureau of Indian Affairs (BIA). 2005. *Status of Forest Management Inventories and Planning*. Compiled by U.S. Department of the Interior, Bureau of Indian Affairs, Division of Forestry, Branch of Forest Resource Planning. September 30, 2005. (http://www.itcnet.org/includes/downloads/4_atus_of_forest_inventories.pdf)

Butler, B.J. 2008. *Family Forest Owners of the United States, 2006*. Gen. Tech. Rep. NRS-27. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.

Butler, B.J.; Miles, P.D.; Hansen, M.H. 2009. *National Woodland Owner Survey Table Maker Web-Application Version 1.0*. Amherst, MA: U.S. Department of Agriculture, Forest Service, Northern Research Station. (http://fiatools.fs.fed.us/NWOS/tablemaker.jsp)

Collie, J.S.; Walters, C.J. 1987. Alternative Recruitment Models of Adams River Sockeye Salmon (Oncorhynchus nerka). Canadian Journal of Fisheries and Aquatic Sciences. 44: 1551-1561.

Daugherty, H.G.; Kammermeyer, K.C.W. 1995. An Introduction to Population, 2nd Edition. New York, NY: The Guilford Press.

Henderson, J.E.; O'Neil, L. J. 2004. "Conceptual Models to Support Environmental Planning and Operations." SMART Technical Notes Collection, ERDC/TN SMART-04-9. Vickburg, MS: U.S. Army Engineer Research and Development Center.

Hull, T.; Leask, L. 2000. *Dividing Alaska, 1867-2000: Changing Land Ownership and Management*. Institute of Social and Economic Research, University of Alaska Anchorage. (http://nrm.salrm.uaf.edu/~stodd/AlaskaPlanningDirectory/landOwnership.html)

Intergovernmental Panel on Climate Change (IPCC). 2007a. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,* M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds. Cambridge, UK: Cambridge University Press. (http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm)

IPCC. 2007b. *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,* B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer, Eds. Cambridge, UK: Cambridge University Press. (http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg3_report_mitigation_of_climate_change.htm)

Kline, J.D.; Asuma, D.L.; Alig, R.J. 2004. "Population Growth, Urban Expansion, and Private Forestry in Western Oregon." *Forest Science*. 50(1): 33-43.

Liu, Z.; Koerwerc, J.; Nemotod, J.; Imurae, H., In press. Physical Energy Cost Serves as the "Invisible Hand" Governing Economic Valuation: Direct Evidence from Biogeochemical Data and the U.S. Metal Market. Ecological Economics.

Meadows, D. 1999. Leverage Points: Places to Intervene in a System. Hartland, VT: The Sustainability Institute.

Millennium Ecosystem Assessment (MEA). 2005. *Ecosystems and Human Well-being: A Framework for Assessment*. Islands Press. (http://www.millenniumassessment.org/en/Framework.aspx)

National Association of Homebuilders. 2003. A *Century of Progress: America's Housing, 1900 to 2000.* (http://www.nahb.org/fileUpload_details.aspx?contentID=7135)

Oregon Forest Resources Institute (OFRI). 2008. *The Future of Oregon's Working Forests.* (http://www.oregonforests.org/assets/uploads//Working_Web.pdf)

Senge, P.M. 2006. The Fifth Discipline: The Art & Practice of the Learning Organization. New York: Doubleday.

Smith, W.B.; Miles, P.D.; Perry, C.H.; Pugh, S.A. 2009. *Forest Resources of the United States, 2007: a Technical Document Supporting the Forest Service 2010 RPA Assessment.* GTR-WO-78. Washington, DC: U.S. Department of Agriculture, Forest Service, Resources Planning Act. (http://www.treesearch.fs.fed.us/pubs/17334)

Society of American Foresters (SAF). 2008. "Sustainable Forest Management." *Dictionary of Forestry.* (http://dictionaryofforestry.org/dict/term/sustainable_forest_management) Last updated 10/23/2008.

Stein, S.M.; McRoberts, R.E.; Alig, R.J.; Nelson, M.D.; Theobald, D.M.; Eley, M.; Dechter, M.; Carr, M. 2005. *Forests on the Edge: Housing Development on America's Private Forests.* Gen. Tech. Rep. PNW-GTR-636. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Stein, S.M.; McRoberts, R.E.; Mahal, L.G.; Carr, M.A.; Alig, R.J.; Comas, S.J.; Theobald, D.M.; Cundiff, A. 2010. *Private Forests, Public Benefits: Increased Housing Density and Other Pressures on Private Forest Contributions.* Gen. Tech. Rep. PNW-GTR-795. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

The Conservation Fund. 2009. *"What is Green Infrastructure?"* (http://www.greeninfrastructure.net/content/definition-green-infrastructure)

United Nations (UN). 2007. *World Urbanization Prospects: The 2007 Revision Population Database.* United Nations Population Division. (http://esa.un.org/unup/)

U.S. Census Bureau. 1995. *Urban and Rural Population, 1900 to 1990.* Released October, 1995. (http://www.census.gov/population/censusdata/urpop0090.txt)

USDA National Invasive Species Information Center. "What Is an Invasive Species?" (http://www.invasivespeciesinfo.gov/whatis.shtml)

Vilsack, T. 2009. Agriculture Secretary Tom Vilsack: Remarks as Prepared for Delivery. Seattle, WA. August 14, 2009.

Walters, C.J.; Holling, C.S. 1990. Large-Scale Management Experiments and Learning by Doing. Ecology. 71(6): 2060-2068

Witt, U. 1997. Self-Organization and Economics What is New? Structural Change and Economic Dynamics. 8: 489-507.

Appendices

Appendix 1. Private Forest Ownership Patterns in the Western U.S.

Region, Subregion, and State	Forest - All ownerships	Forest - Private	Forest - Private	Forest - Public	All land	Forest - All ownerships
	Acres (thousands)	%	Acres (thousands)	Acres (thousands)	Acres (thousands)	%
ROCKY MOUNTAIN						
Intermountain						
Arizona	18,671	39.53%	7,381	11,291	72,688	25.69%
Colorado	22,612	23.70%	5,360	17,252	66,486	34.01%
Idaho	21,430	11.91%	2,553	18,877	52,933	40.49%
Montana	25,014	28.09%	7,026	17,987	93,271	26.82%
Nevada	11,089	1.91%	212	10,876	70,264	15.78%
New Mexico	16,682	37.95%	6,331	10,351	77,766	21.45%
Utah	17,962	16.77%	3,013	14,950	52,697	34.09%
Wyoming	11,445	16.97%	1,942	9,503	62,343	18.36%
Intermountain total	**144,905**	**23.34%**	**33,818**	**111,087**	**548,448**	**26.42%**
Great Plains						
Kansas	2,106	94.68%	1,994	112	52,511	4.01%
Nebraska	1,245	87.71%	1,092	153	49,032	2.54%
North Dakota	724	70.44%	510	214	44,452	1.63%
South Dakota	1,682	29.25%	492	1,190	48,882	3.44%
Great Pains total	**5,757**	**71.01%**	**4,088**	**1,669**	**194,877**	**2.95%**
ROCKY MOUNTAIN TOTAL	**150,662**	**25.16%**	**37,906**	**112,756**	**743,325**	**20.27%**
PACIFIC COAST						
Alaska						
Alaska	126,869	28.28%	35,875	90,994	365,482	34.71%
Alaska total	**126,869**	**28.28%**	**35,875**	**90,994**	**365,482**	**34.71%**
Pacific Northwest						
Oregon	30,169	36.66%	11,059	19,111	61,599	48.98%
Washington	22,279	44.01%	9,806	12,474	42,694	52.18%
Pacific Northwest total	**52,448**	**39.78%**	**20,865**	**31,585**	**104,293**	**50.29%**
Pacific Southwest						
California	32,817	40.23%	13,202	19,614	100,207	32.75%
Hawaii	1,748	66.08%	1,155	593	4,106	42.57%
Pacific Southwest total	**34,565**	**41.54%**	**14,357**	**20,207**	**104,313**	**33.14%**
PACIFIC COAST TOTAL	**213,882**	**33.24%**	**71,097**	**142,786**	**574,088**	**37.26%**
WEST TOTAL	**364,544**	**29.90%**	**109,003**	**255,542**	**1,317,413**	**27.67%**

Source: Butler 2008, U.S. Census Bureau 1995

Appendix 2. Conceptual Model

The challenge of organizing and applying scientific understanding to the threats to private working forests across the Western U.S. is especially great given the large spatial and temporal scales at which forest ecosystems function. This led the drafting committee to pursue a "systems approach." Systems theory has been applied to fields as diverse as organizational management (Senge 2006), macroeconomics (Witt 1997; Liu in press) and ecology (Collie and Walters 1987; Walters and Holling 1990) in order to discover counter-intuitive implications of policy decisions and craft improved responses to problems that can be adapted over time. Interactions and feedbacks are responsible for the "complexity" of the systems studied. Understanding them helps identify leverage points where new policy actions may be applied for maximum effectiveness (Meadows 1999). Use of systems analyses to explore and communicate causal pathways using a common framework is expanding owing to requirements for integration among disciplines and increased emphasis on regional and national policy solutions.

A conceptual model of the social, economic, and ecological threats to private working forests illustrates connections between drivers, stressors, and their impacts on the system as a whole (Figure A1). Drivers can be considered first-order influences and stressors second-order influences in chains of cause and effect, where there are several links before the final effects are realized as impacts.

Figure A1. Conceptual model

In this context, drivers are defined as natural and anthropogenic processes that cause (force) changes to the system (Henderson and O'Neil 2004). Drivers are an organizational device to allow the authors to begin with the "big picture" in mind. Drivers may be natural or anthropogenic in nature. Climate change, shifting economic conditions, and changing demographics and social values were identified as the drivers of threats facing private working forests (Table A1). Drivers are beyond our control and unlikely to change in the near term, but are critical to understanding the relationships among more immediate threats and how proposed solutions might lead to positive change or unintended negative consequences.

Table A1. Classification of drivers

Climate Change	Warmer temperatures, altered precipitation (timing and amount),more intense stormsSea level rise
Shifting Economic Conditions	Globalization, local, national, and international markets (supply and demand disruption)
Changing Demographics and Social Values	Population growth, aging population, urbanizing population, desires and behavior

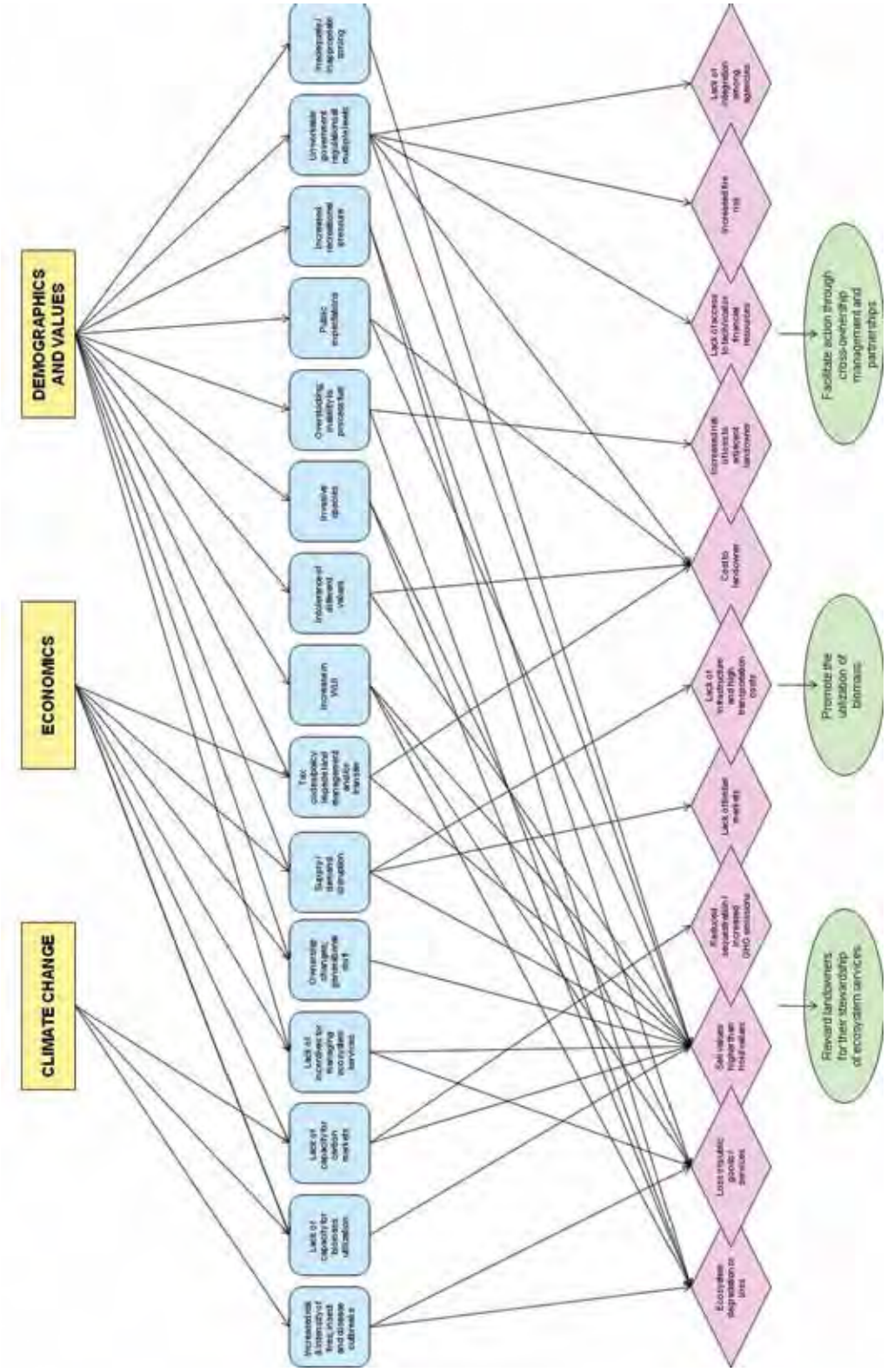
The drivers of the system set in motion flows of energy and material over time and space. Stressors are defined as threats to the stability of a system, or other symptoms of stress on the system; as such they are the physical, chemical, biological, and human-influenced changes that result from the drivers (Henderson and O'Neil 2004). Stressors have associated time dimensions and usually can be quantified (e.g., increased fire risk and intensity). Stressors may affect a single resource or component, or the stressor may act on multiple components. Examples of the stressors identified include increased wildfire risk, introduction of invasive species, market disruption, and conflicting government regulations.

In the conceptual modeling process, the ecosystem or socio-economic state or condition of interest is affected by the stressors, which creates an impact. Impacts are defined as any change to characteristics of the system that has been affected by the stressors. In this conceptual model, impacts are an organizational construct, like drivers, that organize the system into major components. The impacts focus all of the changes of the stressors and are not intended to represent an exhaustive list of changes caused by the drivers and stressors. The impacts to western private working forests are diverse and span economic, social, and ecological characteristics; including lack of markets, infrastructure and high transportation costs; sell versus hold value dynamics, loss of public goods and services, and ecosystem degradation or loss. The two most fundamental impacts discussed are 1) the loss or degradation of forests and the ecosystem services they provide because of some combination of natural and human causes, and 2) the sale or conversion of forests to non-forest land uses because to hold onto the forest land is not economically feasible.

Using the conceptual model as a guide for discussion, examination of the drivers, stressors, and impacts provides a view of connections that are important when examining the threats to private working forests across the West (Figure A2). Clear connections between human choices and actions and ecological effects are visible within the conceptual model. Changes in technology, population growth, societal values, markets, and economies within the region will drive changes in land use and resource management. Proposals for conserving and enhancing private working forests and the benefits they provide must be made in the context of these drivers and interactions among the stressors that follow.

Figure A2. Expanded conceptual model

Analysis of drivers (upper boxes), stressors (middle boxes),impacts (lower diamonds) and their connections (arrows) lead to strategies (lower ovals). Synthesized from the findings of expert workshops throughout the West.



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