

# Beyond California: Bordering States



*California is bordered by the Pacific Ocean to the west, Oregon to the north, to the east by Nevada and Arizona, and Mexico to the south. State borders can often complicate issues and means for their resolution. Issues vary by region, but several concerns are common to all of these cross-state areas including wildfire, water, insect and disease, energy and wildlife habitat. This chapter addresses some of these issues and challenges.*

*California is home to millions of acres of public lands including parks, forests, wilderness areas, wildlife refuges, grasslands and others. These public lands are managed by several different agencies including the Bureau of Land Management which manages over 15.2 million acres of land, the U.S. Fish and Wildlife Service, the National Park Service managing approximately 7.5 million acres of parks and recreation areas, California State Parks managing 1.5 million acres of parks, and the U.S. Forest Service that manages 20 million acres of forests and other lands. Many of these managed lands cross multiple state borders. Cooperative working relationships across borders aids in the efficient allocation of resources and sustainability of public lands.*

## KEY FINDINGS

- Drought conditions and water shortages are impacting many of the western states. These shortages are compounded by warming temperatures.
- Renewable energy policies are beneficial to the emerging industry of renewable energy generation. Many cross-state projects are being developed or awaiting approval.
- Wildfire concerns increase with drought conditions and warming temperature trends. Areas of concern include densely populated areas in the wildland urban interface (WUI), such as the Lake Tahoe area.
- Wildlife habitat decreases with urban development and deteriorating forest health. The indirect consequences of habitat loss can be devastating to ecosystems and conservation efforts.

- Movement of damaging insects and diseases across state or national borders is a critical concern for the health of our forests (wildland and urban) and rangelands.
- Non-native pests have a long history of causing severe damage to California forests. The potential for new damaging pests to arrive is great.

## **NORTHERN CALIFORNIA–OREGON BORDER**

California counties bordering Oregon include Del Norte, Siskiyou and Modoc. Several national forests can be found in this area including the Six Rivers, Shasta-Trinity, Modoc, Klamath and Rogue River-Siskiyou. The ecological functions in each of these forests vary considerably, as do the conditions.

### **Fish (Salmonids) and Water**

The Klamath River in Oregon and California was once the third most productive salmon fishery on the west coast, behind the Columbia and Sacramento Rivers. Today, the salmon runs are about 10 percent of their previous size, forcing closure of almost all ocean fishing of chinook salmon in Oregon and California for the past several years. The coho salmon is in such low numbers in the Klamath that it has been listed as threatened under the federal Endangered Species Act (ESA). The economic loss to California resulting from the closure of salmon fishing in 2008 was estimated at \$255 million and more than 2,000 jobs. In 2009, the loss was even greater at \$279 million and almost 3,000 jobs (Morse and Manji, 2009).

These are just a few of the unexpected results of dams having been built in the salmon migratory pathways without constructing salmon ladders or bypass channels. Instead, hatcheries were built to replace the loss of natural salmon runs. Federal biologists have indicated that there are several threats to salmon, including ocean conditions that produce very little food, an over reliance on hatchery fish that do not adapt to changes in conditions, and agricultural pesticides that contaminate the water.

Much of the water is controlled by the Klamath Project, one of the earliest federal reclamation projects dating back to the early 1900s. The Klamath Project

provides irrigation water to agricultural and wildlife refuge lands, as well as flood control in the Klamath basin areas in south central Oregon and north central California (Bureau of Reclamation, 2000). The project diverts water from the Upper Klamath basin in Oregon for agricultural irrigation.

Conditions and demands have changed since the early 1900s and water quality in the Klamath has continued to decline over the years, resulting in the suspension of diversions in recent years. For the past several years, toxic algae caused by water heating and stagnation has spread downriver killing thousands of fish and resulting in public health warnings (Klamath Riverkeeper, 2009).

Pressure to restore the 300-mile migratory route for the salmon has been building for years, but agreement on how to approach the restoration has been elusive. In September 2009, a tentative agreement to remove four dams, (the Klamath Hydroelectric Settlement), was made between 28 parties including American Indian tribes, farmers, fishermen and PacificCorp, the hydroelectric company that operates the dams. If impacted parties agree to the plan in December 2009, the dams will be dismantled starting in 2020 (San Francisco Chronicle, 2009).

Estimates for dam removal and river restoration costs range from 75 to 175 million dollars. Under the agreement, the cost to remove the dams is capped at 450 million dollars. Oregon Pacific Gas and Electric customers would contribute up to \$200 million, and if costs exceed this amount, California Pacific Gas and Electric would contribute another \$250 million (U.S. Department of the Interior, 2009). The agreement proposal to retire 100 thousand acres above and around Klamath Lake and 30,000 acre-feet of water to be diverted to the lake has caused concern among the cattle industry (Beaver, 2009).

## Late Seral Stage and Associated Habitat

Seral stages refer to the ecological development of plant communities from bare ground to a climax plant community. A late seral stage ecosystem generally is one that is distinguished by older trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition and ecosystem function (U.S. Forest Service and U.S. Bureau of Land Management, 2001).

Late seral stage forests support a specific group of wildlife. Wildlife of special concern to Northern California and Southern Oregon include the northern spotted owl (*Strix occidentalis caurina*) and marbled murrelet (*Brachyramphus marmoratus*).

### *Northern Spotted Owl*

The northern spotted owl is federally listed as a threatened species in California, Oregon and Washington. They generally inhabit older forests because of the abundance of structural characteristics required for nesting, roosting and foraging. They require a multi-layered, multi-species canopy with a high percentage of canopy closure. Suitable habitat areas have declined as a result of timber harvesting and wildfires. Subsequently, the northern spotted owl health and populations have also decreased (U.S. Fish and Wildlife Service, 2009).

More recently, barred owls (*Strix varia*) have invaded northern spotted owl territories, with negative impacts (strongly correlative) on northern spotted owl populations. In May 2008, the Northern Spotted Owl Recovery Plan was released to provide suitable habitat in a forest reserve-based system. This plan includes 133 owl conservation areas totaling nearly 6.4 million acres of federal land. In addition to the reserves, each state can make rules to govern timber harvests on non-federal lands. The California Forest Practice Rules provide for protection of habitat around nesting areas.

### *Marbled Murrelet*

The marbled murrelet is federally listed under the Endangered Species Act as a threatened species in California, Oregon, and Washington. Marbled murrelets spend most of their lives on the ocean, but nest in late seral stage forests. Breeding range extends from Bristol Bay, Alaska to Monterey Bay, California. They winter in the same range, but may go as far south as Southern California. In California, nests are generally found in coastal redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*) forests. Suitable habitat areas have declined as a result of commercial timber harvesting and development. Consequently, marbled murrelet populations have also decreased (U.S. Fish and Wildlife Service, 2009).

The 1997 Marbled Murrelet Recovery Plan protected known nesting and habitat sites and sought to halt population decline. In June 2009, the U.S. Fish and Wildlife Service completed a five year status review indicating that despite the recovery efforts, the status was still critical, and the marbled murrelet remains listed as threatened.

## Forest Insects and Disease

Spread of native and exotic insects and disease in California and from outside the state is a management concern. Opportunities for spread are found in unregulated transportation of goods such as firewood, Christmas trees, agricultural and nursery products. Movement of soil on vehicles and hiking boots can transport agents such as Port-Orford-cedar root disease and sudden oak death.

### *Port-Orford-Cedar Root Disease*

Port-Orford-cedar grows in the coastal region of Oregon and Northern California. It can grow in a variety of sites including stream banks, bogs, sand dunes and deep productive soils. The disease is considered a “water mold” and is more prolific in sites of slow moving water and those with poor drainage. Infected trees show rapid decline with crowns dying and root collars displaying a cinnamon-brown stain.

The disease was found in several river locations in Siskiyou and Shasta Counties in 2001. Removal treatments made to contain the spread appear to be successful with no upstream spread observed in 2008 (California Forest Pest Council (CFPC), 2008).

#### *Sudden Oak Death*

Over three million tanoaks, black oaks and coast live oaks have died in the past decade as a result of *Phytophthora ramorum* infection, or sudden oak death. Ornamental plants such as camellias and rhododendrons are also susceptible to this fungal infection. Infestation has impacted the central coast area of California and the southwest corner of Oregon, causing increased fire hazard and impact to wildlife habitat. Other tree species can be stressed by the infestation leaving them vulnerable to other pest attacks and further deteriorating forestlands.

#### *Bark Beetles and Wood Borers*

Bark beetles are one of the most destructive insects to the coniferous forests in California, impacting 4.2 million forested acres since 1994. There are many beetle genera, but the types of major concern in California include mountain pine bark beetle, Jeffrey pine bark beetle, western pine bark beetle, fir engraver beetle and the flatheaded fir borers. Beetles cause destruction in forests by engraving and boring, girdling and spreading fungi in trees. Climate change influences the frequency, intensity and distribution of bark beetle outbreaks by affecting both the beetles, and the trees. Warming temperatures in the West allows bark beetles to have a greater effect on forests in higher latitudes and at higher elevations (Lawrence, 2009).

In Northern California, mountain pine beetle has killed many trees in previous years. Increased beetle activity was noted in the Modoc National Forest in 2008. Scattered outbreaks continued to occur in the Klamath National Forest and private land in Siskiyou County, causing extensive mortality in lodgepole pine (CFPC, 2008).

#### *Douglas-Fir Tussock Moth*

The Douglas-fir tussock moth (DFTM) is a defoliator of true firs and Douglas-fir in western North America. Severe outbreaks have occurred in British Columbia, Idaho, Washington, Oregon, Nevada, Arizona, New Mexico and California (Wickman et al., 1981). Severe outbreaks have occurred in California and Oregon regions over the years. Outbreaks usually occur at several year intervals. The DFTM is considered one of the most serious defoliators in North American forests. Between 1947 and 1974 more than 1.2 million acres of U.S. forests were treated for DFTM. Intensive monitoring programs are in place to detect and control outbreaks early (European Plant Protection Organization, 2009).

The Bear Mountain area in Shasta County experienced a Douglas-fir tussock moth outbreak that lasted from 2005 to 2007 with approximately 30 acres of elevated tree mortality. In 2008, traps were installed and the data collected indicate the lowest count of DFTM in 13 years. There was no detection of DFTM defoliation or outbreaks in 2008 (CFPC, 2008).

#### **Wildfire**

The suite of wildfire-related issues in the region mirrors those found on both sides of the border and are well documented in other chapters. They include increasingly more frequent large and high-intensity fires requiring significant restoration efforts and fire threats to communities. Of particular note for this region was the 2002 Biscuit Fire, which burned almost 500,000 acres in southern Oregon and Northern California, and resulted in significant controversy over the role and efficacy of salvage logging activities on fire hazard and ecosystem recovery (Donato et al., 2006). The other notable fire-related issue endemic to the region is damage to native anadromous fish populations, particularly in the Smith River and the Klamath River watersheds. This damage may arise from either direct impacts from high severity wildfire or indirect or cumulative impacts from forest management actions (e.g., logging, road building) designed to reduce fire hazards.

## EASTERN CALIFORNIA–NORTHERN NEVADA BORDER

California counties bordering northern Nevada include Modoc, Lassen, Sierra, Nevada, Placer and El Dorado. National forest land found in this area includes the Tahoe and El Dorado National Forests and the Lake Tahoe Basin Management Unit. The area around Lake Tahoe is of special concern to California and Nevada because of its uniqueness and its sensitivity.

Northeastern California, southeastern Oregon and northern Nevada are dominated by the shrub-steppe and conifer forest habitat type (Barbour et al., 2009). Like other places in California, the interruption of the fire cycle, overgrazing and invasive plants, have combined to drastically change those habitats. For these reasons, even the previously most abundantly occurring animals have been in decline for several decades (Bunn et al., 2005). Interestingly, the shrub-steppe suffers from fire occurring either too often or not often enough, depending on the elevation (Sugihara et al., 2006). Overgrazing by sheep, cattle and wild horses has led to an increase in invasive

grasses (i.e., cheat grass (*Bromus tectorum*)). This, in turn, has increased the frequency of fires that are deadly to shrubs, thus decreasing the amount of shrub-steppe habitat available (Young and Evans, 1978). Simultaneously, the lack of fires at higher elevations in combination with the relatively wetter time period of the last 50 years has led to an increase in juniper woodland, which shades out shrubs. Grazing pressure has also negatively affected those areas with high biodiversity; springs, riparian zones, montane meadows and aspen groves, which are a small fraction of the area. If managed well, grazing can be beneficial to sensitive plants and animals (Marty, 2005). With grazing being a major economic driver in the region, it will continue to affect habitat.

### Water

Lake Tahoe is a deep fresh water lake spanning 194 square miles across the California and Nevada border. The annual average deep water transparency for Lake Tahoe between 1967 and 1971 was 97.4 feet; in 2007 it was 70 feet. The decline in water quality is due to pollution of fine sediment and nutrients, largely from stormwater runoff in urban upland areas (Lahonton Regional Water Quality Control



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Board, 2009). The Lake Tahoe basin is vulnerable to invasive species because of the many streams and rivers feeding into the lake. Non-native mollusks can have detrimental impacts on native wildlife, fisheries and ecosystems. The Asian clam (*Corbicula fluminea*) is a fast growing invasive species that has been in the lake for about 10 years and is replacing the native pea clam. Researchers are concerned that the Asian clam population may be able to aid an invasion of quagga and zebra mussels (University of California, Davis, 2009). Many non-native species are transported to new locations by recreational boaters. Boat inspections have been implemented to prevent the introduction of quagga and zebra mussels into Lake Tahoe and other lakes in the Tahoe basin.

### **Recreation**

Lake Tahoe and its forested watershed provide drinking water and various recreational opportunities including fishing, boating, swimming, camping and picnicking. Water quality conditions in the lake have been impacted by historical logging in the basin combined with urban and residential development around the lake (Murphy et al, 2000). These management activities have diminished water clarity and quality and currently the lake is listed under the Clean Water Act as impaired for both sediment and nutrients (nitrogen and phosphorus).

### **Fuel Load Management**

Threat of wildfire in the Lake Tahoe area is a top concern, especially during drought years. In June 2007, the Angora Fire destroyed 254 homes and 3,100 acres. This devastation resulted in a bi-state review of fire prevention and fuels management practices in the basin area. The review recommended several strategies such as increased defensible space, new development standards, education and implementation of a 10-year plan to reduce fuel loads (California-Nevada Tahoe Basin Fire Commission, 2008).

Current forest stand conditions in the basin contain dense, over-stocked stands with high fuel loads. Bark beetle caused tree mortality is increasing as

drought conditions persist. Unhealthy forests cannot maintain healthy wildlife habitat, causing wildlife to expand their search for food frequently to urbanized areas. Improving forest conditions by reducing fuel loads increases public safety and reduces the risk of habitat loss from catastrophic wildland fire. Non-hazardous logs and snags are purposely retained during fuel reduction efforts to provide perches, nesting and cover for wildlife habitat (USFS, 2004).

### *Biomass*

Plans to build a biomass facility in the Tahoe basin to utilize wood scraps produced in urban areas and during fuel reduction operations are being discussed. In the past, material has been burned or trucked 30 miles to the nearest biomass facility (Fletcher, 2009). Creating a biomass initiative could encourage new technologies to produce electricity and reduce the amount of forested lands cleared with prescribed burns (Holl, 2007).

### *Wildfire*

The possible influences of large wildfire on sedimentation and nutrient pollution into the lake as well as the high potential for loss of life and property have been a great concern in the Tahoe basin. The basin has historically exhibited relatively low rates of wildfire in the modern era, compared to other similar areas of the Sierra bioregion (CAL FIRE, 2009). However, the recent 2007 Angora Fire, which destroyed 254 structures in the basin's wildland urban interface, triggered significant debate over forest restoration activities and effectiveness on U.S. Forest Service lands (Safford et al., 2009; Moyle et al., 2006). There was relatively little fallout regarding impacts on lake water quality, likely owing to the massive investment in rehabilitation and restoration implemented in the months following the early-summer fire. However, fire-related impacts on watershed health and threats to life and property persist as a key issue in the basin and elsewhere.

## EASTERN CALIFORNIA–SOUTHERN NEVADA–ARIZONA BORDER

California counties bordering southern Nevada and Arizona include Alpine, Mono, Inyo, San Bernardino, Riverside and Imperial. The El Dorado, Inyo and Humboldt-Toiyabe National Forests and Death Valley National Park are located in this area. Cross state concerns in this area include the Colorado River, renewable energy sources, recreation opportunities and forest health in the southeast Sierra bioregion.

### *Recreation and Forest Health*

California's diverse topography is exemplified in the California and Nevada border region where the mountains meet the desert. Mount Whitney, the highest point in the 48 contiguous United States, and Death Valley, the lowest point in the United States, lie only 76 miles from each other in this region. The Inyo National Forest contains over two million acres and offers multiple recreational opportunities including mountain climbing, wilderness hiking, camping and fishing. Many of the recreational facilities were built more than 30 years ago and do not support today's recreational preferences. A Recreation Site Facility Master Plan process has been implemented to guide the restoration.

Forest health is threatened by bark beetle activity causing over 140,000 acres of mortality in the Inyo National Forest during the past five years (USFS FHP, 2008). Jeffery pine mortality was seen in much of the Jeffery pine stands in Inyo National Forest during 2008. Mortality was observed in groups and single trees (CFPC, 2008).

### **Water**

The Colorado River basin is the largest watershed in the American Southwest, draining approximately 246,000 square miles through portions of seven western states from the Rocky Mountains in Colorado to the Gulf of California. The threats to this ecosystem are numerous. Dams created to hold water for irrigation and residential use have altered the water flow blocking migratory paths for fish, and changing water temperatures and sediment regimes. Very

little of the Colorado River actually flows to the Gulf of California because much of it is siphoned off in Arizona and Southern California for residential and irrigation water supply needs. Drought conditions and increased population have amplified the water shortage issue and water disputes have developed as demands exceed the supply available. Modification of the natural flow of the river has also created loss of wetlands and habitat for native species and altered the Colorado River aquatic ecosystem (Grahame and Sisk, 2002). In the Colorado River delta area, wetlands have been reduced by 80 percent due to water management practices, and wetland restoration has become critical for many bird and fish species (Hinojosa et al., 2005).

### **Renewable Energy**

California has implemented policies that support increased generation of electricity from renewable resources. Several projects and initiatives have been adopted to generate renewable power. Projects may be cooperative efforts with neighboring states as renewable infrastructure is built and technologies developed. Current efforts include:

- *Renewable Energy Transmission Initiative (RETI)*: A statewide initiative to help identify the transmission projects needed to accommodate renewable energy goals, support energy policy, and facilitate transmission corridor designation and generation siting and permitting. RETI will assess competitive energy zones in California and possibly neighboring states (CEC).
- *Renewable Energy Coordination Office*: Initiative by U.S. Department of Interior to expedite the leasing and production of renewable energy resources on public lands in the West, with offices in California, Nevada, Arizona and Wyoming. Proposed wind and solar projects that could be ready for construction by the end of 2010 include more than 5,300 megawatts of new capacity, enough to power 1.8 million homes, and would create more than 48,000

project construction jobs (U.S. Department of the Interior, 2009).

- *California Renewable Energy Initiative:* Signed in October of 2009, this initiative will create a “Renewable Energy Policy Group to guide the cooperative work; develop a strategy to identify areas suitable and acceptable for renewable energy development; identify renewable energy zones based on renewable energy development potential and environmental, wildlife, and conservation criteria; prioritize application processing for solar development in renewable energy zones; and coordinate with federal and state agencies to identify energy and transmission needs, as well as to designate transmission needs and corridors” (U.S. Department of Energy, 2009).
- *California Renewables Portfolio Standards (RPS):* Established by SB 1078 (2002) and accelerated under SB 107 (2006), this requires electric corporations to increase acquisition from eligible renewable energy resources by at least one percent of retail sales per year, until they reach 20 percent by 2010 (California Public Utilities Commission, 2009). Executive Order S-14-08 (2008) established a target of 33 percent renewables by 2020, as recommended in the Energy Action Plan II.
- *Energy Corridors:* In response to the Energy Policy Act of 2005, 38 National Forest Plans were amended in 2009 to identify locations of corridors suitable for future energy transmission infrastructure across forestlands. The corridors offer a way to meet public energy needs and minimize impact to land and surface resources. Participating states include Arizona, California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming (USFS, 2009). Energy corridors may disrupt wildlife habitat and populations (Western Governors’ Association, 2008)
- *Private Projects:* Several private projects await approval and permitting, while many others are currently generating renewable energy from wind and solar. Many of these projects

cross state lines and are cooperative ventures. Projects include Western Wind Energy Corporation (WND), a company owning 500 wind turbines with 34.5 megawatt (MW) capacity and an additional 131 MW expansion power agreements in Arizona and California. WND owns additional development assets for both wind and solar energy in California, Arizona, and Ontario, Canada (WND, 2009). The Agua Caliente project includes construction of a 290-megawatt photovoltaic farm on private land in Arizona with power to be supplied to California Pacific Gas and Electric (PG&E); if the project is approved, construction will begin in 2010 (Woody, 2009). BrightSourceEnergy headquartered in Oakland, California is a producer of large-scale solar power plants. The California Public Utilities Commission recently approved contracts between BrightSourceEnergy and PG&E to supply 1,310 megawatts to serve California customers (California Public Utilities Commission, 2009).

## SOUTHERN CALIFORNIA–MEXICO BORDER

Southern California counties bordering Mexico are San Diego and Imperial. The Cleveland National Forest in San Diego County extends within five miles of the Mexico border. Management of border issues is a significant concern for the U.S. Forest Service. Concerns in this area include pollution, fire activity from illegal immigration, movement of wildlife and disease or insect transportation into the United States.

### Pollution

Pollution concerns include air, water and trash. In testimony to the U.S. House of Representative, a former Forest Supervisor discussed the impacts of illegal border activity on national forest lands (USFS, 2006). There are 1.5 million acres of national forest lands within 50 miles of the Mexican border, managing these lands is of significant concern. Issues in the Cleveland National Forest caused by cross-border violators include the creation of new trails,

abandoned campfires and large amounts of trash. In 2005, over 370 acres of national forest burned due to illegal campfires and over four tons of trash was removed (USFS, 2006).

Water pollution in the New and Tijuana Rivers is a concern. The New River has been referred to as the most severely polluted river of its size in the United States, flowing 15 miles through Baja California and then to the Salton Sea. New River contaminants include agricultural and chemical runoff from the United States (18.4 percent) and Mexico (51.2 percent), sewage from Mexicali (29 percent), and manufacturing plants in Mexico (1.4 percent). Where the river crosses at the border near Calexico, California about 100 contaminants can be detected. In 2005, Senate Bill 387 provided funding for the New River Improvement Project.

The Tijuana River flows through Mexico for most of its 120 mile length crossing into California for the lower five miles, ending at the 2,500 acre Tijuana estuary in Imperial Beach, south San Diego County. Up until the early 1990s, uncontrolled discharges of raw wastewater from Mexico flowed untreated into San Diego beach areas. In 1997, an International Wastewater Treatment plant opened to treat the water and catch trash in basins before the polluted water could flow to the coast. Population growth in Tijuana has led to more pollution and demands on the treatment plant. During the winter of 2004 and 2005, silt and sand burst through the catch basins and buried 18 acres of salt marsh (Chang, 2008). Several conservation projects are being conducted to restore the marshlands and decrease the amount of pollution coming from Mexico.

Tijuana forms part of the San Diego-Tijuana Metropolitan Area, the total population of which has been estimated to be just over 5 million in 2009, making it the 22nd largest metropolitan area in the Americas (World Gazetteer, 2010). The manufacturing and trade base in Tijuana has also increased resulting in more cross-border activity, and more pollution resulting from factories and increased transit trips. The San Diego-Tijuana Air Quality Task Force was

created under the U.S.-Mexico Border 2012 Environmental Program. One of the goals of this program is to identify major sources of air pollution and define strategies to reduce emissions (EPA, 2007).

### **Wildlife**

Barrier fences and walls being constructed along the Mexico border to reduce illegal activities are causing considerable environmental concern. Human activity (vehicular traffic, amplified noise, artificial lighting) associated with the barrier can affect how animals behave, which may lower survival rates (Oregon State University, 2009). Biologists have reported that the fence could threaten wildlife and significantly alter movement patterns and connectivity of wildlife populations. Species with small populations will be broken into smaller isolated groups which may endanger some species by making them more susceptible to disease, extreme weather events and predators. Potential impact on the pygmy owl and bighorn sheep was evaluated; the pygmy owl flew lower than the height of the fence 75 percent of the time, and an impermeable barrier would isolate the bighorn sheep and reduce their genetic diversity. Modification to the barrier fence such as gaps in steep terrain for the sheep and perches and vegetation for the owls may help the movement of wildlife which may mitigate the effect of the fence to act as a barrier.

### **Insects and Disease**

The spread of forest insect infestations and disease increase with unregulated cross-border activity and movement. The goldspotted oak borer, thought to have been brought to California on firewood illegally transported from Mexico, has been identified as the primary cause of oak mortality in Southern California. This oak borer attacks along the main stem and largest branches, weakening the tree by boring holes and leaving feeding larvae. Tree mortality occurs after continuous infestations. During 2008, approximately 1,400 dead oaks were surveyed in the Cleveland National Forest. The range of this non-native pest was 30 square miles in October 2008, investigation of impacts continues in 2009. An oak management task force has been formed to aid in the

investigation and management action to mitigate the effects of the infestation (CFPC, 2009).

Pitch canker continues to be a concern in coastal counties, and there have been isolated infestations in Southern California. Although activity has slowed in 2008 due to drought conditions, the disease has killed thousands of Monterey pines, shore pine, grey pine, ponderosa pine and Douglas-fir. All native stands of Monterey pines in California have been infested by this fungus disease that girdles branches, roots, and trunks of pine trees.

### **Wildfire**

Fire-related issues along the Mexican border, largely limited to San Diego County, involve international level cooperation, and have generally been highly successful examples of collaboration between the United States and Mexico as exemplified by the creation of the Border Area Fire Council comprising 32 separate fire management agencies from both countries. The Council's objectives are to "Establish and maintain relationships with Mexican government agencies, strengthen awareness and cooperation on biodiversity, and continue effective fire prevention, emergency response and suppression efforts." In addition to assisting in tactical collaboration on suppressing ongoing wildfires, the council has worked on developing and maintaining an international fuel break along the border, and in addressing the most problematic fire-related issue for the area, namely wildfires resulting from illegal immigration activities (Border Agency Fire Council, 2003).

### **MULTI-STATE RESEARCH PROGRAMS**

Cooperative research and monitoring programs in forest management, fisheries, wildlife and watershed studies often follow ecoregional and habitat range boundaries. Examples of efforts include the young stand computer model CONIFERS (Ritchie, 2009), and the National Council for Air and Stream Improvement (NCASI) spotted owl study (NCASI, 2006).

California is a leader in climate change mitigation and adaptation planning and program implementation. The California Climate Action Registry was started by legislative action in 2001 to begin a registry and protocol development in anticipation of a cap and trade program in greenhouse gases (California Climate Action Registry). Since then, the Climate Registry was formed to continue the voluntary inventory reporting of greenhouse gas emissions beyond California borders and throughout North America. California emission reporting is being transitioned to the Climate Registry in 2009 to be counted in the national offsets program of the Climate Action Reserve which manages the U.S. carbon market.

California is also a member of the Western Climate Initiative (WCI), a group of independent jurisdictions working together on climate change at a regional level. All states and bordering countries that are interested in collaboration to combat climate change regionally are encouraged to participate in WCI.