



## Economic Impacts of Wildfire

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### INTRODUCTION

As wildfires are growing in scale and duration, and increasing numbers of communities are affected, we need a clearer understanding of how wildfires affect economies and communities. Wildland fire impacts are often described in terms of lives threatened, structures and homes lost or damaged, overall suppression costs, and damage to the natural resource base on which many rural communities rely. This fact sheet shares results from two studies to illustrate economic impacts that reach beyond the primary indicators of suppression costs and homes lost. This information can help public officials, community leaders, and local citizens understand the larger wildfire impacts on economies and society.



Wildfires can have significant economic and social impacts on communities. PHOTO BY JAN AMEN, TEXAS FOREST SERVICE.

### ECONOMIC IMPACTS OF WILDFIRE

Wildfires can have both positive and negative effects on local economies. Positive effects come from economic activity generated in the community during fire suppression and post-fire rebuilding. These may include forestry support work, such as building fire lines and performing other defenses, or providing firefighting teams with food, ice, and amenities such as hotels and washing machines.

However, local economies only experience positive effects if fire suppression spending and contracting is done locally. In addition, future benefits are only possible if the fire stimulates, rather than stops, economic development efforts associated with recovery and forest restoration.

Among other negative economic effects for communities, wildfires can burn timber, make recreation and tourism unappealing, and affect agricultural production. Local communities often become concerned about the effects of smoke on health and safety, as well. Depending on the severity and location of a wildfire, post-disaster recovery can come with a considerable price tag. Factors that affect state and local budgets in the long-term include

- replacement of lost facilities and associated infrastructure,
- watershed and water quality mitigation, and
- sensitive species and habitat restoration.

The Joint Fire Science Program, following the worst wildfire season in Florida (1998), funded a research project focused on the wildfires that occurred in St. John's River Water Management District (SJRWMD) to quantify fire impacts and provide insight into what is necessary to recover from catastrophic wildfires.<sup>1</sup> The 1998 wildfires burned more than 499,000 acres mostly on the east side of the state, destroyed or damaged 337 homes, and cost approximately \$880 million (Table 1).

A similar study was conducted in 2003 following a series of wildfires in San Diego County, California where more than 376,000 acres burned, resulting in 3,241 homes lost.

Table 1: Wildfire Cost Estimates from Florida Study (in millions)<sup>1</sup>

Cost Type	Total Estimated Cost	Cost Per Acre	Percent Total
Timber	\$605	\$1,212	68.75%
Fire Suppression	\$100	\$200	11.36%
Disaster Relief	\$25	\$50	2.84%
Property Losses	\$12	\$24	1.36%
Tourism	\$138	\$276	15.68%
<b>TOTAL</b>	<b>\$880</b>		

Table 2: Wildfire Cost Estimates from San Diego County Study (in millions)<sup>2</sup>

Cost Type	Total Estimated Cost	Cost Per Acre	Percent Total
Fire Suppression and Emergency Response	\$ 43,230,826	\$115	1.8%
CalTrans	\$15,000,000	\$40	0.6%
San Diego Gas and Electric	\$71,100,000	\$189	2.9%
FEMA- Hazard Mitigation	\$14,000,000	\$37	0.6%
Watershed Protection	\$47,183,333	\$126	1.9%
Estimate of Lost Business Economic Activity	\$365,500,000	\$972	14.9%
Unemployment Insurance	\$400,000,000	\$1,064	16.3%
FEMA- Disaster Loans	\$170,000,000	\$452	6.9%
FEMA- Individuals and Household Program	32,900,000	\$88	1.3%
FEMA- Supplemental Assistance	\$1,400,000	\$4	0.1%
FEMA- Public Assistance	\$103,200,000	\$275	4.2%
Foundation/Grant Programs	\$3,273,560	\$9	0.1%
American Red Cross	\$7,500,000	\$20	0.3%
Home, Business and Property Loss	\$1,164,955,197	\$3,099	47.5%
Medical Costs	\$10,773,560	\$29	0.4%
<b>TOTAL</b>	<b>\$2,450,016,476</b>		

San Diego State University conducted the study to highlight the actual economic costs of wildfire.<sup>2</sup> The San Diego County fires were estimated to cost approximately \$2.45 billion (Table 2).

### STATE BUDGET IMPACT

States have the obligation to ensure public safety and fire protection—a task accomplished through the combined efforts of state, county, and local agencies. When budgets are cut, the government’s responsibilities for wildfire management generally remain the same. The short-term budget impact to the state includes costs for fire suppression, staff, equipment, supplies, transportation and mobilization of those fighting the fire. In response to large wildfires, the state often incurs additional costs in recovery bond measures, local assistance grants, and investments in additional equipment and fire response staff. For instance, the state can cover insurance claims for losses to infrastructure, facilities, and other resource obligations following a wildfire. Additional costs may be incurred by the state from unemployment insurance claims.

The Florida study estimated that the state contributed over \$6 million in disaster relief which did not include unemployment insurance. Federal aid was crucial in this case, as the region received more than \$100 million after the fire season of 1998 to cover many of the suppression costs. California incurred a total cost of fire suppression over \$43 million, roughly 1.8% of the total economic loss estimated. California also created a Catastrophic Event Memorandum

Fund, equaling \$39.5 million, to take care of their responsibility toward covering losses to infrastructure, facilities, and other resource obligations. San Diego State estimated over 5,000 unemployment claims coded as either fire or disaster related.

### INFRASTRUCTURE ECONOMIC IMPACT

Wildfires frequently damage community infrastructure, including highways, communication facilities, power lines, and water delivery systems. Restoring basic services is a top priority, and, many agencies and organizations incur significant restoration costs after a fire. State transportation departments’ efforts to restore roads and highways include the costs of maintenance and damage assessment teams, field data collection, and replacement or repair of roads, guardrails, signage, electrical supply, culverts, and landscaping.

Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground delivery lines, and soil erosion or debris deposits into waterways after the fire. Municipal water managers must address water supply impacts, and the potential costs associated with changes in quantity and quality. Utilities and communications repairs are also necessary for equipment damaged by a fire. This includes power lines, transformers, cell phone towers, and phone lines. Tax payers feel the squeeze on these repairs as each state typically reimburses the majority of costs incurred by the companies paying for the repairs.



Post-fire management of natural areas often requires watershed restoration. PHOTO BY LARRY KORHNAK, UNIVERSITY OF FLORIDA.

Florida facilitated these repairs by increasing sales tax variably throughout the 16 county region affected by wildfires to collect almost \$43 million dollars for the fire season of 1998. The 2003 wildfires resulted in significant losses to San Diego's infrastructure. The total economic impact on infrastructure was \$147.3 million, with a majority of the loss as 3,200 utility power poles, 400 miles of wire, 400 transformers, and damage to 100 other pieces of related utility equipment.

### NATURAL AREAS ECONOMIC IMPACT

Post-catastrophe management of endangered species and their habitat is a complex issue. Management requires extensive funding for watershed restoration and hazard mitigation efforts. Portions of these funds are used to restore habitat and control the potential impact of erosion and floods in the following seasons. While not easily measured, loss of ecosystem services could potentially be included in the total economic loss. The Florida study did not quantify these economic impacts due to the complexity of environmental management and restoration.

The San Diego State study was able to estimate costs associated with erosion, flood control, and watershed restoration. FEMA provided \$47 million in watershed restoration funding and \$14 million in hazard mitigation efforts. Recognizing the extent of these restoration efforts, San Diego County received additional financial support from the US Department of Agriculture and San Diego Gas and Electric totaling just over \$42 million. This left a huge financial responsibility on the county to provide the remaining funds to effectively restore watersheds and ecosystems. Loss of ecosystem services was estimated based on the reduced function to control runoff and reduce air pollution. These costs were estimated at \$25,349,000 and \$798,000, respectively. Along with the economic impact identified, these natural areas may also serve as significant cultural and historical resources, for which losses are not easily quantified.

### BUSINESS ECONOMIC IMPACT

Determining the total economic loss and impact of the wildfires to the region is challenging. While many of the local businesses experience impacts to facilities, shipping delays, and interruptions in employee productivity, few of them actually estimate this loss.

In 1998, the counties in the SJRWMD that were affected by the fires lost \$138 million in tourism but also experienced an increase of over \$1 billion in total business sales, compared to the same period the previous year. Forest landowners with burned timber lost approximately \$350 million in value.

The lost economic activity in the San Diego region was calculated at a conservative 10% based on gross productivity. This was due to a loss of 24 commercial buildings, a \$32.5 million drop in tourism, and almost 5,000 people out of work. As with the Florida fires, there was a significant increase in economic activity following the wildfire season associated with recovery and rehabilitation efforts. Economic growth after large wildfire events is not a result of true economic growth, but rather a response to large-scale economic and infrastructure losses.

### COMMUNITY IMPACT

Wildfires impact communities in multiple ways, from closing natural areas that residents and tourists visit to damaging homes and harming residents or firefighters. Short- and long-term impacts on recreational activity are challenging to quantify. Closures of areas often eliminate recreational activity, while interest in post-fire impacts on the wildlands may actually attract new visitors. As fires are inherently dangerous, residents and firefighters can be injured or even lose their lives during a wildfire. While it is impossible to place a dollar value on human life, it is very important to consider the impacts of these events on communities and families. In addition, long-term exposure to smoke can increase the incidence of respiratory



Communities feel significant impacts from wildfires when their homes are damaged or lost. PHOTO BY SC FORESTRY COMMISSION.

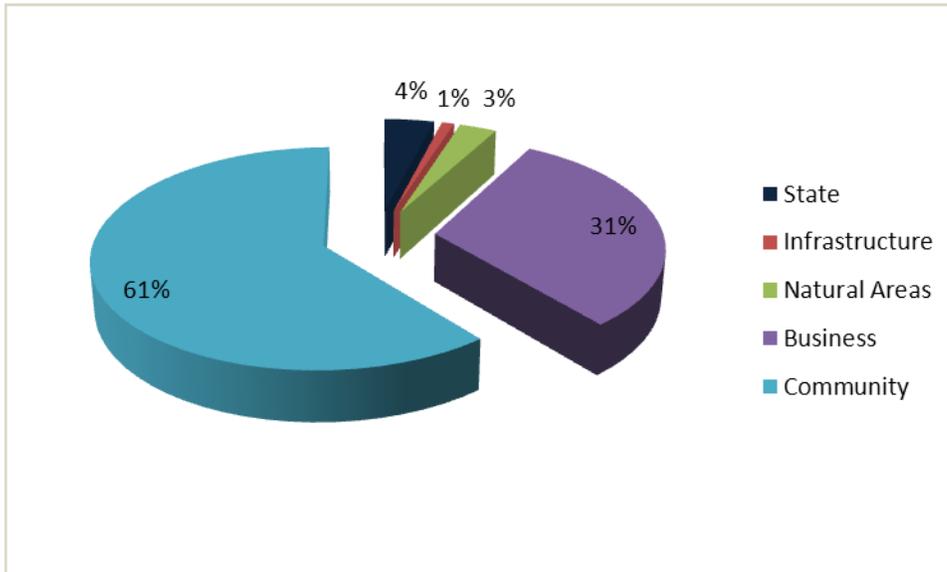


Figure 1: Proportion of Total Economic Impact Borne By Different Societal Segments (San Diego County Study)<sup>2</sup>

conditions and hospital visits. The loss of homes and employment are frequently the largest of the economic loss indicators. From 1985 to 2011 approximately 9,000 homes have been lost to wildfires across the United States. In 1998, Florida observed \$12 million dollars in property loss, but fortunately no fatalities, while in 2003 San Diego County lost of 3,241 homes, 16 civilians, and 1 firefighter.

## CONCLUSION

The Florida and California studies quantified losses of \$1,864 per acre and \$6,516 per acre, respectively. These losses provide perspective for the costs that might be associated with fuels treatments and other hazard mitigation activities intended to reduce fire spread and effects. Catastrophic wildfires produce significant ecological and economic impacts that often go well beyond the traditional impact indicators. Both studies explore these impacts and point out the need for more intricate analyses after other fires. Economic assessment of wildfires can no longer focus only on the more obvious variables, such

as acreage burned and number of personnel. Assessment must be comprehensive and include all economic impacts to gain a realistic perspective of the true impact of large wildfires (Figure 1).

## REFERENCES

<sup>1</sup> Mercer, D., Pye, J., Prestemon, J., Butry, D., & Holmes, T. (2000). *Economic effects of catastrophic wildfires: Assessing the effectiveness of fuel reduction programs for reducing the economic impacts of catastrophic forest fire events*. Joint Fire Science Program, Topic 8 of the Research Grant, Ecological and Economic Consequences of the 1998 Florida Wildfires. Retrieved from <https://srs.fs.usda.gov/econ/pubs/misc/fl-fire-report2000-lores.pdf>

<sup>2</sup> Rahn, M. (2009). *Wildfire Impact Analysis, Fire Impact Analysis, Spring 2009*. San Diego, CA: San Diego University. Retrieved from [http://universe.sdsu.edu/sdsu\\_newscenter/images/rahn2009fireanalysis.pdf](http://universe.sdsu.edu/sdsu_newscenter/images/rahn2009fireanalysis.pdf)

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For more information about the Southern Fire Exchange, visit [www.southernfireexchange.org](http://www.southernfireexchange.org) or email [contactus@southernfireexchange.org](mailto:contactus@southernfireexchange.org).

