



Research *Review*

The Wildland-Urban Interface: Mapping the Story of the Growing Wildfire Problem

All across America, an important trend in housing—families moving out of the big cities—has been changing the landscape and ecology of America. While some are just moving to the inner suburbs, many are moving to the far edges of metropolitan areas and others are moving out entirely, back to small cities and small towns or even into the countryside and the wildlands. This trend, called “ex-urbanization,” began in the 1970s, slowed in the 1980s, but picked up again in the 1990s.

Moving to the outer edges of metropolitan areas allows families to find affordable houses surrounded by trees and bits of woodlands while still commuting to their city jobs. Other families are seeking refuge from the hectic pace of urban/suburban life even further out. They are buying second homes in the country or the woods where they hope to find tranquility and a closer connection to nature and recreation. Some even abandon the city entirely and move their primary residence really far from the city. Modern communications methods (Internet, fax, satellite phones, and overnight express) have made full-time living and working in the near-wilderness feasible. Writers, designers, artists, business people, and many others can manage their lives and succeed in their careers out in “the boonies.” Others go to live an alternative lifestyle in self-sufficient “off-the-grid” homesteads or retire to a “farmette” and grow organic apples or vegetables, sheep, alpacas, or cattle. Although they are finding themselves in different kinds of places, all these families are moving to improve their quality of life.

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Mike Derer, AP Images, used with permission.

A neighborhood in Barnegat, NJ, after a fire started by New Jersey National Guard training exercises ignited part of the Pine Barrens and burned 17,000 acres in South Ocean County on May 17, 2007. Fifty homes were damaged or destroyed, but no one was killed.

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THE WILDLAND-URBAN INTERFACE

All these people are living in or near various kinds of wildlands, in what is termed the "wildland-urban interface" (the "interface" or WUI). The WUI is broadly defined as any place where the housing density meets or exceeds a minimum of 1 house per 40 acres (averaged within a census block) and over half of the vegetation within that census block is wildland vegetation—forest, wetland, shrub land, or grassland. Even areas within city/suburban boundaries are part of the WUI; for example, Los Angeles, San Diego, and Atlanta have extensive WUIs.

Getting "close to nature" can be a wonderful experience for many, but life at the WUI has unexpected dangers. In areas with cool climates and adequate rainfall, like the Northeast, the dangers at the WUI aren't too bad: the bears eat your birdseed and the ticks may carry Lyme disease, but fires are rare (except in pockets of Wisconsin, Michigan, New York, and New Jersey where pine barrens are found). However, in areas where the wildlands are drought-prone, dominated by fire-dependent vegetation, or filled with dead or susceptible fuels, the WUI can be quite dangerous. Houses may ignite from the radiant heat of the fire front, or more commonly, from burning embers (known as firebrands) borne on the wind. Thus you don't even have to live directly in the forest to be in danger from fire. Many wildlands all across America have gone up in flames from lightning strikes, unattended or abandoned campfires, cigarette butts, or arson. In the past decades, drought, insect outbreaks, and past fire practices have resulted in forests with high fuel loads and increasingly devastating fires. With the increase in house construction in the WUI, more families find their homes in the path of a wildland fire.



AP Images, used with permission.

A forest of chimneys, all that remains of a California neighborhood after the firestorm of October 19-22, 1991. The Oakland Hills Firestorm burned only 1,520 acres but killed 25 people and destroyed 2,843 single-family homes and 437 apartment units in 72 hours. It was the costliest fire in U.S. history—insured losses alone totaled around \$1.5 billion.

WHY DOES THE INTERFACE MATTER?

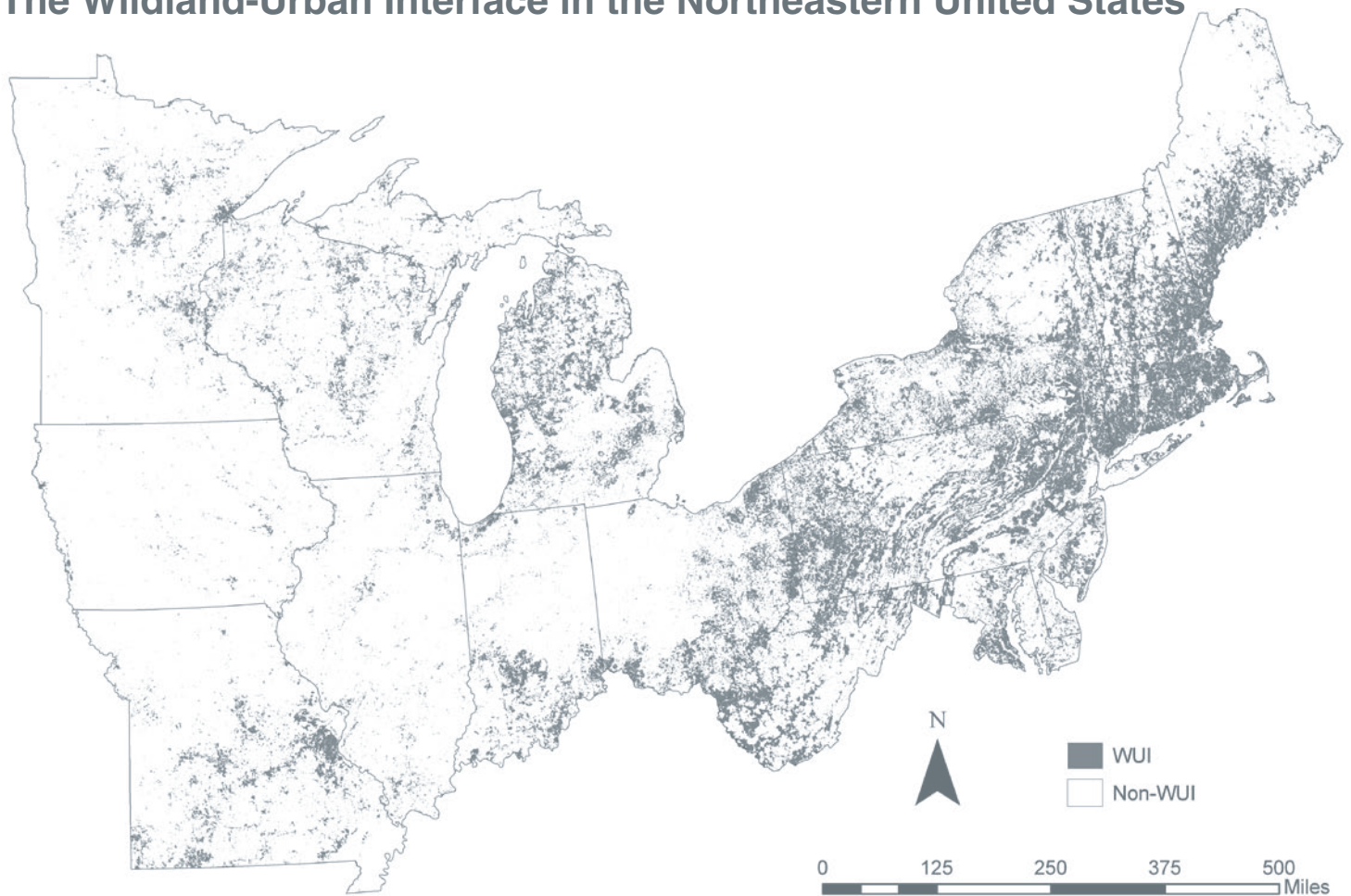
Growth of the WUI worries resource managers because homes and human activities affect natural resources. Paved surfaces change the flow of rainwater, roads cut through wildlife habitat, curbs present a barrier to small amphibians and reptiles, and pets may disturb or eat birds and small wildlife. Because of issues like these, resource managers have always viewed residential growth with some trepidation.

But it is wildland fire that puts the WUI on the front pages of newspapers and makes the lead on the evening news. When homes are located in or near vegetation, wildland fire is carried into these neighborhoods and wildland firefighters must make a priority of protecting these structures. The disastrous fire season of 2000, with 10 major fires across the West, was called "the worst fire season in 50 years" (92,250 fires burned about 7.4 million acres) and cost \$1.6 billion to suppress. This season led to the National Fire Plan and the Healthy Forest Restoration Act, which gave new direction to firefighting efforts and required land management agencies to focus on the WUI.

Mechanical thinning, prescribed fire, and other hazardous fuel reduction efforts were directed to the WUI and managers prioritized these areas for outreach programs to

educate homeowners on fire safety. But prioritizing the WUI required knowing where it was. Everyone had their own idea of what a WUI was and "knew" where it was, however, there was no consensus, no single map, and no common definition.

The Wildland-Urban Interface in the Northeastern United States



PIONEERING NRS STUDIES HELP WUI FIRE MANAGEMENT

Dr. Susan I. Stewart, a U.S. Forest Service (USFS) scientist at the Evanston, IL location of the Northern Research Station (NRS), is studying how social sciences support natural resource management and policy. She focuses her research on the role of housing in landscape change. With her cooperators—Volker Radeloff (University of Wisconsin, Madison) and Roger Hammer (Oregon State University, Corvallis)—she developed methods to measure the growth of housing down to the sub-county scale and made some

really eye-catching maps of the Midwest. The USFS fire research and resource management communities realized that these maps and data could provide the solution to the WUI mapping problem. The USFS National Fire Plan research program funded Stewart to map the WUI on a national scale and describe changes over time in both housing growth and vegetation.

The WUI maps are used all over the United States by many different people and organizations involved in fire policy. When the U.S. Congress asks, “Just how big IS this WUI

The USFS National Fire Plan research program funded Stewart to map the WUI on a national scale and describe changes over time in both housing growth and vegetation.

problem?”, the statistics on WUI houses and areas of expected growth are used in testimony. When fire destroys a major portion of a California neighborhood, the news media ask why THIS neighborhood burned and not THAT one. WUI maps can provide the answers. In day-to-day operations, managers need to know which parts of their fire management unit are officially designated as WUI so they can track treatments on those lands, and for this purpose, the WUI data was made a part of the Fire Program Analysis System. Whether an area has a fire problem or not, the ongoing interactions between people and the environment that occur in WUI neighborhoods also concern ecologists. For them, WUI data provide specific, objective indications of where human impacts are occurring, thus giving scientists a valuable research tool to investigate and document how people change their world.

The WUI map and preliminary projections about future WUI locations have been useful; however many questions about housing growth in and near our forests still remain and WUI research continues. Protected areas, such as national parks, national forests, and other state and federal lands, attract home buyers who value nearby recreation opportunities and guaranteed open space. However, these areas are also places where managers want to let fire resume its natural role and cycles. Because of the potential for conflict, land managers need to know about the amount and nature of housing growth clustered around public lands. New land cover data on wildland vegetation will update the WUI maps so that current conditions can be compared with older conditions (early 1990s and 2000s) to provide an empirical basis for assessing changes over time in wildland vegetation and the WUI itself. This information can also help in predicting future changes in fire risk. Thus, what started as a regional social science research project has developed into an important tool that helps the nation’s wildland firefighting community deal with the growing and increasingly costly problem of fires in the wildland-urban interface.



U.S. Forest Service, Apache-Sitgreaves National Forest

Twenty of the 426 structures burned near the Apache-Sitgreaves National Forest after the Rodeo-Chediski fire, June 18 to July 17, 2002. This fire was the largest in Arizona history, burning about 465,000 acres and costing about \$153 million to suppress. Fortunately, no lives were lost.



U.S. Forest Service, Apache-Sitgreaves National Forest

Another view of the structures burned by the Rodeo-Chediski fire of 2002.

Biography

Dr. Susan I. Stewart received her degrees from Michigan State University, East Lansing: Doctor of Philosophy (1994) in park and recreation resources, specializing in resource economics; Master of Science (1990) in park and recreation resources; and Bachelor of Arts (1984) in multi-disciplinary social sciences. She began her work for the USFS Northern Research Station in 1994 and is stationed at Evanston, IL. Contact her at sistewart@fs.fed.us; 847-866-9311 ext. 13; or U.S. Forest Service, 1033 University Place, Suite 360, Evanston, IL 60201-3172.



Wildland-Urban Interface Facts

The 2000 U.S. WUI map offers some surprising insights about the extent and distribution of the interface across the United States. Please remember that maps of the WUI are NOT maps of fire danger, but of the location of the WUI itself. Stewart and her cooperators have interactive maps of the eastern U.S., a national map, and a complete listing of state-level WUI information available at: www.silvis.forest.wisc.edu/projects/WUI_Main.asp

1. All states have at least a small amount of WUI lands; some have almost three-quarters of their lands in the WUI (see #7).
2. Across the United States, 9.4% of all land is classified as WUI and 38.5% of all homes are in the WUI; in 19 of the lower 48 states, more than half all homes are in the WUI.
3. WUI area is concentrated along the Atlantic Seaboard, but western states have the highest proportions of their homes in the WUI; California, Florida, and Texas have the largest numbers of homes in areas where wildland vegetation is relatively dense.
4. In the Rocky Mountains and the Southwest, virtually every urban area has a large ring of WUI.
5. WUI is also commonly found in areas with extensive recreation and tourism, including the northern Great Lakes area, the Missouri Ozarks, and areas in the West around the ski resorts such as Aspen, CO; Jackson Hole, WY; Park City, UT; etc.
6. Although the WUI is not extensive along the Pacific Coast, it encompasses a high percentage of homes, particularly in fire-prone southern California.
7. The large eastern and southern states have the most land area in WUI, but the smaller, northeastern states have the highest percent of their lands in WUI—Connecticut is #1 (72%) and RI is #2 (70%).

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