

## THE WILDLAND-URBAN INTERFACE IN U.S. METROPOLITAN AREAS

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*ABSTRACT: Wildland urban interface (WUI) issues are significant for urban foresters. An analysis of 12 metropolitan areas shows that the WUI is concentrated in these metro areas relative to the rest of their respective states.*

### Introduction

The interface between wildland vegetation and human settlements holds unique challenges for resource management (Macie and Hermansen 2002). The significance of the wildland-urban interface (WUI) has grown in recent years because the WUI itself has grown. Widespread, rapid housing growth during the 1970s and 1990s, particularly in rural areas and on the fringes of urban areas, has created more interface areas (Heimlich and Anderson 2002). This paper presents a spatial analysis of the WUI surrounding urban areas in 12 selected metropolitan areas in the U.S.

Policy makers and fire professionals recognize that the WUI is an area where wildland fire puts homes and people at risk (Cohen 1991). The National Fire Plan enacted in 2000 directs resources to communities in the WUI (USDA and USDI 2001). While the risk of fire is currently the most high-profile WUI issue, there are other issues of equal or greater significance to resource managers such as wildlife habitat loss and encroachment; human-wildlife interactions; forest fragmentation; exotic and invasive pests; and potential changes in forest productivity that result when forested areas become part of the WUI. The scope and seriousness of the WUI issue is still unclear, in part because the WUI itself can be defined in many different ways. Research focusing on WUI issues could benefit managers by determining where the WUI is currently located, and for this purpose we are working to map and analyze the WUI across the United States, and to examine its dynamics over time.

### Mapping the Wildland Urban Interface in the United States

Our WUI definition follows the Federal Register, and we identify intermix and interface types of WUI (Teie and Weatherford 2000; USDA and USDI 2001). The two components used here to define the WUI are (a) human presence, measured using housing data from the block-level housing unit counts from the decennial censuses; and (b) wildland vegetation, assessed with the 1992/3 National Land Cover dataset (NLCD) (Vogelmann et al. 2001). For a given census block to be intermix WUI, it must be 'vegetated' and have more than 6.16 housing units/km<sup>2</sup> (more than 1 house per 40 acres). A census block is 'vegetated' if more than 50 percent of its landcover is classified as forest, shrub, native grassland, transitional or wetland. All other census blocks, including those dominated by agriculture or orchards, are classified as 'non-vegetated' and are not included in the intermix WUI. Interface WUI does not depend on vegetation within the census block. It must have more than 6.16 housing units/km<sup>2</sup> and lie within 2.414 km (1.5 miles) of an area (made up of one or more contiguous Census blocks) that is at least 75 percent 'vegetated' and larger than 5 km<sup>2</sup> (1,325 acres). Using these criteria, we find that the WUI is widespread across the country, covering almost 10 percent of the land base in the lower 48 states and encompassing 37 percent of all homes. In some eastern states, lands classified as WUI make up more than half the total land area in the state. Western states have smaller proportions of their land classified as WUI, but well over the majority of the homes are located within its boundaries. Intermix WUI is concentrated in the East, South, and Midwest; interface is more typical of the West, though New York and Pennsylvania have extensive interface, too.

The WUI tends to be concentrated in and around metropolitan areas, and suburban WUI is widespread and a major component of the entire WUI in each state. While city centers are too densely settled to reach the 50 percent vegetation threshold, the wide ring of suburban and exurban areas surrounding urban centers is often part of the WUI. Our analysis of 12 metropolitan areas (i.e., cities plus surrounding areas, as designated by the Census Bureau) across the U.S. shows that in each, the percentage of the land base classified as WUI is greater than that in the rest of the state (table 1). This holds true across the country; despite major regional differences in the character of the WUI, its area is always concentrated in metropolitan areas. For example, in Atlanta, 54 percent of the land area is classified as WUI, while across the rest of Georgia, just 19 percent of land is in the WUI. The proportion of homes in the WUI is more mixed across these metropolitan regions, with only 4 of the 12 metropolitan areas having a higher percentage of their homes in the WUI than their respective states. Looking again at Atlanta, 52 percent of homes are in the WUI, while 55 percent of homes across the rest of the state are in the WUI.

## Conclusion

The WUI is defined as the area where houses and wildland vegetation meet or intermingle. These conditions are met in many cities and suburbs, especially in those neighborhoods built in recent decades under zoning regulations requiring large lots, catering to home buyers who want more space. The work urban foresters have done to establish and maintain urban forests, their efforts to teach developers how to preserve existing vegetation, and the trend toward maintaining open space in and around housing developments are all reflected in the current size of the WUI. The consistent preference Americans express for living in small towns (Brown et al. 1997) and their ability to act on that preference are manifested in the extent of the WUI. A house in the WUI is a mainstay of the 21st Century American dream.

The concentration of the WUI in metropolitan areas suggests that urban foresters and wildland resource managers must both address WUI issues. The extent of the WUI in metropolitan areas is a sign that urban foresters are making cities greener, more pleasant and healthier places to live. But with this success comes a need to face the particular challenges associated with the WUI. Fire, wildlife management, forest health, and many other issues must be dealt with in the rich social context of growing urban and suburban communities.

**Table 1.** The Wildland –Urban Interface (WUI) in Metropolitan Regions and in the Remainder of the State

Metro and State	Area of WUI		Houses in WUI	
	Metro	Remainder of State	Metro	Remainder of State
-----Percent-----				
Atlanta, GA	54.3	19.0	52.3	55.4
Austin, TX	30.5	4.5	69.5	25.7
Boston, MA <sup>1</sup>	76.0	60.5	47.1	67.5
Chicago, IL <sup>1</sup>	5.9	1.8	8.4	4.7
Denver, CO	10.2	2.2	34.0	61.5
Jacksonville, FL	31.1	17.8	40.4	25.7
Los Angeles, CA	21.7	6.7	28.6	48.6
Phoenix, AZ	6.1	2.5	43.4	71.7
Portland, OR <sup>1</sup>	10.6	2.8	32.8	52.2
Salt Lake City, UT	2.9	1.3	41.6	68.7
San Diego, CA	22.2	6.8	50.9	40.8
Seattle, WA	25.2	7.1	35.7	63.4

*Note.* US Census Bureau-designated standard areas were used to define metros.

*1.* These metropolitan areas extend beyond one state, and counties in adjacent states were excluded.

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## Citation

<sup>1</sup> Definitions and information about the Census Bureau's metropolitan designation can be found at <http://www.census.gov/population/www/estimates/aboutmetro.html>