



Rural Studies Program Working Paper Series

Demographic Trends, the Wildland-Urban Interface,
and Wildfire Management

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Demographic Trends, the Wildland-Urban Interface, and Wildfire Management⁴

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House Interior, Environment & Related Agencies Appropriations Subcommittee

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Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to appear before you today to discuss demographic trends and the Wildland Urban Interface (WUI), as they relate to wildfire management. I am an Assistant Professor of Sociology at Oregon State University. I am a demographer and received my PhD from the University of Wisconsin in 2001 and served on the faculty there until I joined the OSU Provost's Sustainable Rural Communities Initiative in 2006. My research focuses on the demographic processes that are profoundly changing landscapes and ecosystems across the U.S., notably migration and population growth and redistribution. Along with my colleagues Volker Radeloff, an Associate Professor of Forest and Wildlife Ecology at the University of Wisconsin, and Sue Stewart, a Research Social Scientist at the Forest Service Northern Research Station, I have been examining the location, extent, and future expansion of the WUI in the U.S. and the associated implications for wildfire management, forest productivity, and ecological change.

⁴ Text, Figures, and References available at:
<http://ruralstudies.oregonstate.edu/rspworkingpaper.htm>

I will provide an overview of the demographic trends that have impacted and will continue to impact the “wicked” wildfire management problem in the U.S., with particular attention to the emergence of the WUI. A wicked problem: (1) is both a cause and consequence of a complex set of related problems; (2) is embedded in a dynamic social, political, and economic context that; (3) results in stakeholder groups developing valid but contradictory and evolving definitions, explanations, and solutions with; (4) every solution generating myriad consequences, some undesirable, that cannot be understood prior to implementation and finally; (5) lacks any final resolution. The appellation “wicked problem” has been aptly applied to wildfire in the U.S., and especially the Western U.S., for more than 20 years. In recent years it has become readily apparent that wildfire cannot be treated as a “tame” problem that can be resolved by consensus solutions, such as fire suppression, fuel treatments, prescribed burning, land-use regulation, etc. Given the wicked nature of the wildfire management problem, I expect that some of the testimony that I present today may differ from, and even contradict, the definitions, explanations, and solutions presented by others. Such a situation is simply unavoidable when confronting a wicked problem.

The most fundamental demographic characteristic, population, more than doubled in the U.S. between 1940 and 2000 reaching 280 million in 2000 and surpassing 300 million in 2006. For a variety of reasons, broadly categorized as declining average household size and changes in vacancy rates, the number of housing units more than tripled during the same six-decade period, reaching 116 million in 2000. Although there is not an adequate accounting of recreational or seasonal homes in the U.S. national statistical system, the expansion of

multiple homeownership (that is second, third, and even higher order homes) has also expanded significantly since 1940 and contributed to the divergence of population and housing growth. It is estimated that in 1940 there was 5.6 seasonal housing units for every 1,000 persons in the population. By 2000 that rate had more than doubled to 12.8 (3.6 million units). The population of the U.S. is expected to continue to grow, surpassing 360 million around 2030. Housing can be expected to continue to grow at a faster rate to accommodate population growth and future changes in household structure and housing occupancy. Conservatively, the number of housing units will reach 158 million by 2030.

Although the magnitude of population and housing growth are important, the changes in population distribution and, by extension, settlement and housing patterns, have a much larger impact on the wildfire problem in the U.S. As you are already aware, the decades since 1940 have witnessed a significant interregional migration in the U.S. with significantly higher population growth in the West and South than in the Northeast and Midwest. A deconcentration of population has also occurred with population growth shifting away from urban areas to the periphery of metropolitan areas and to selected nonmetropolitan areas, suburbanization or even more appropriately exurbanization. Population growth among nonmetropolitan counties is closely associated with the abundance of natural amenities, such as: warm, sunny winters; mild summers; water bodies; mountains, and forests. During the 1990s, nearly 3 million new housing units were built within 25 km of National Forests, a 18% growth rate that was considerably higher than the 13% national rate.

During the 2007 fire season nearly 8.8 million acres burned in the 14 contiguous states of the Western U.S. (which I will hereafter refer to as the West), accounting for 75% of acres burned by wildfire in the 48 contiguous states. The West also contains approximately 88% of the Federally-owned land in the contiguous 48 states. Florida and Georgia (which I will hereafter refer to as the Southeast) accounted for another 1.4 million acres burned. Thus, these 16 states combined accounted for 91% of the acres burned by wildfire in the 48 contiguous states last year. As I describe the long-term demographic trends affecting wildfire in the U.S., I will compare these 16 states to the other 32 contiguous states, although I am not inferring that wildfire risk are uniform across or even within states, that other states do not confront significant wildfire management issues, or that acres burned in a single fire season is an adequate assessment of wildfire.

The population of the West was 4.5 times larger in 2000 (85.5 million) than it was in 1940 and the population of the Southeast was 4.8 times larger (24.1 million). In contrast, the population in all other contiguous states combined was only 1.7 times larger in 2000 than it had been in 1940. With the higher population growth rates in the West and Southeast, housing growth rates were also higher. Between 1940 and 2000, the number of housing units increased by a factor of 5.8 in the West and 7.6 in the Southeast but only by a factor of 2.6 in the remainder of the contiguous U.S. Thus, 28.3 and 9.2 million housing units were added in the West and Southeast respectively. Over the past several decades the higher population and housing growth rates in the West and Southeast have begun slowing and converging with the remaining states of the contiguous U.S. According to independent population projections

and our own housing projections, this convergence will continue to do so over the next several decades.

These broad demographic trends have contributed to the growth and expansion of the WUI, a wildfire-related wicked problem that has been recognized as an important element of wild fire policy since as early as 1960. As is typical of wicked problems, the WUI is widely recognized and acknowledged but its definition, delineation, and implications are not agreed upon. The WUI is the area where houses meet or intermingle with undeveloped wildland vegetation. I will present results from a National Fire Plan funded research project that I have been part of that has delineated the WUI at the block level (as defined by the U.S. Census Bureau) for the entire U.S. Our definition is derived from a USDA/USDI 2001 *Federal Register* notice, which itself was derived from a report by the Western States' Governors' Association. According to the definition, WUI areas must contain at least one housing unit per 40 acres (16 units/mile² or 6.17 units/km²). According to our definition, the WUI is comprised of Intermix, in which at least 50% of the area is vegetated, and Interface, in which less than 50% of the area is vegetated but it is within 1.5 miles (2.4 km) of a large area (> 5 km²) that is more than 75% vegetated. I want to acknowledge that our approach is just one of a number of emerging definitions of the WUI. In developing alternative WUI delineations, other researchers have used statistical or geographical techniques to alter the U.S. Census Bureau block boundaries or incorporated "Community Wildfire Protection Zones," a concept derived from the Healthy Forest Restoration Act. Although the various WUI definitions may seem to conflict with each other in certain respects, they can each contribute to a more thorough understanding of the wicked WUI problem.

According to our definition, 11% of the land area (715,000 km²) and 38% of all housing units (44.3 million) in the coterminous U.S. were located in the WUI in 2000. Of the total WUI area, 82% was intermix and 18% interface but 49% of WUI houses are in the intermix and 51% are in the interface. In other words, although WUI land area is dominated by intermix, due to higher housing densities in the interface, housing units are nearly equally distributed between the two types of WUI. In 2000, the WUI accounted for 104 million people, 37% of the population. In the West, only 3% of the land area was WUI in 2000 but in the southeast 26% of the land area was WUI. However, in both the West and Southeast just over 45% of the housing units were located in the WUI (11.1 and 4.1 million units respectively). The map of the WUI in 2000 demonstrates that the WUI is a national phenomenon, although the wildfire risk facing WUI areas varies widely.

During the 1990s, the WUI area grew by 19% (115,000 km²) and the number of WUI housing units increased by 22% (8.0 million) in the coterminous U.S. In the West 2.2 million housing units were added to the WUI (25% growth), as were 1.4 million (39% growth) in the Southeast. During the 1990s, for every 100 additional housing units constructed nationally, 53 housing units were added to the WUI. New housing units can be constructed in a WUI area or in an area that becomes WUI due to increasing density, in which case the existing units in that area also become WUI. Through this “WUIfication” process, the West added 66 additional WUI housing units for every 100 new housing units constructed and the Southeast added 74. If the relationship between new housing unit construction and additional housing units in the WUI remains unchanged, between 2000 and 2030 there will be an additional 12.3

million WUI units in the West and an additional 4.6 million in the Southeast, representing 111% growth in the West and 93% growth in the Southeast. In contrast, WUI housing would grow by only 44% in the remaining contiguous states.

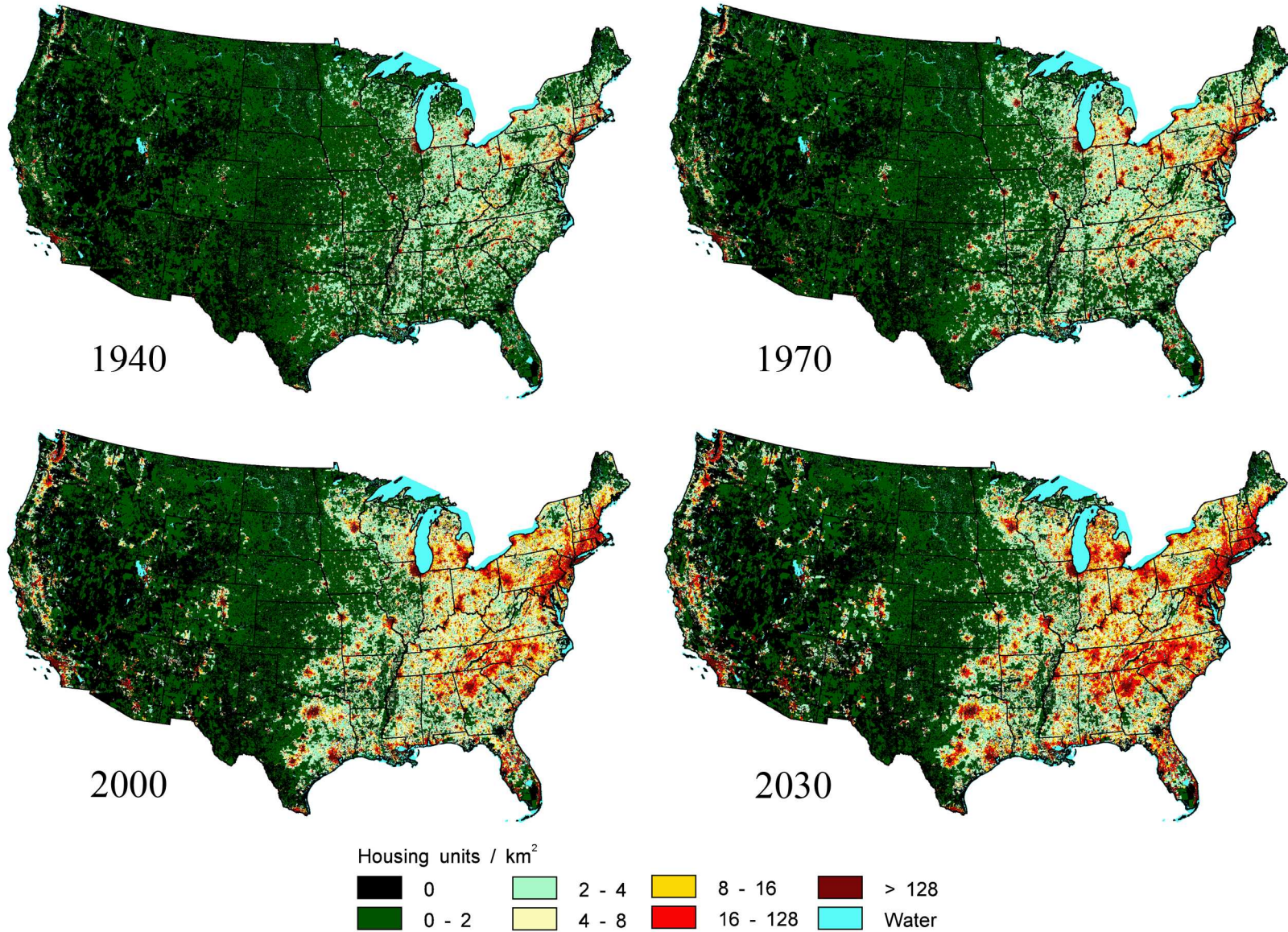
I want to mention one additional demographic process that will affect the WUI and fire management in the future, births. In this case, the more than 65 million births that occurred in this the U.S. between 1946 and 1964, the baby boom years. Baby boomers currently comprise nearly one quarter of the U.S. population. With respect to the regions that I have been discussing, the net migration, that is the difference between the number of out-migrants and the number of in-migrants, of baby-boom age persons (not all of whom were born in the U.S.) added 6.7 million people to the population of the West and 3.8 million to the population of the Southeast over the course of the four decades between 1960 and 2000. On the other hand, during each of those decades, except the 1990s, a net outflow of baby boom migrants reduced population growth in the remaining contiguous states.

With each lifecycle change, the baby boom generation has had a profound impact on this country, and we are on the verge of another one of those lifecycle changes, retirement. Just last month (January of 2008) the oldest baby boomers reached Social Security eligibility age, 62, and began applying for benefits. The largest baby boom cohorts occurred between 1954 and 1964, with births exceeding 4 million annually, and so the effects of baby boom retirement will increase during the next few years and cannot be expected to begin abating for at least another 20 years. Previously, I mentioned that natural amenities, or amenity migration, has largely determined population growth patterns among nonmetropolitan

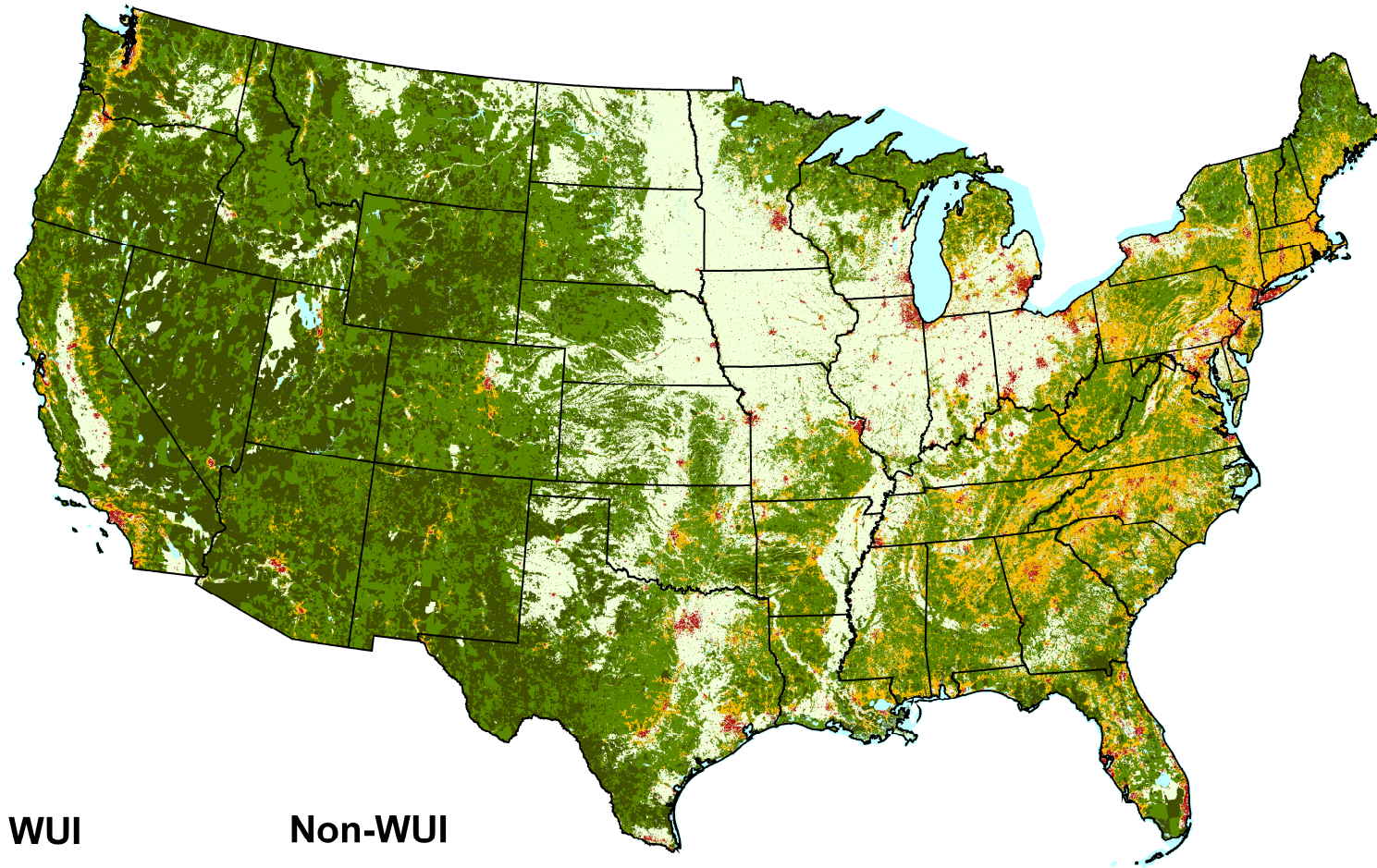
counties. Of course, much of this amenity migration can also be termed retirement migration. Over the course of the four decades between 1960 and 2000, the net migration of retirement age persons (age 50 to 69) added 1.5 million people to the West and 3.1 million to the Southeast. During the 1990s, the net migration rate for the retirement age population was 2.4% in the West and 20.0% for the Southeast. Given that the baby boom generation is 1.6 times larger than the 1990 retirement-age cohort, during the height of baby boom retirement, commencing in about 2015, they may account for 400,000 persons being added to the population of the West and 1.2 million to the population of the Southeast each decade.

In conclusion, the growth and expansion of the WUI are significantly exacerbating the wicked wildfire management problem in the U.S. Although population growth has had an impact on the emergence of the WUI, the deconcentration of population and housing, amenity-driven population growth in select nonmetropolitan counties, and interregional population shifts to the West and Southeast, have had and will continue to have much greater impacts. In the coming decades, we can expect the retirement of the baby boom generation to have extensive impacts on these trends. Just as the life cycle transitions of the baby boom have had far-reaching impacts on countless institutions and issues in the U.S., so will their retirement alter the WUI and the wicked wildfire management problem.

Housing Density in the United States, 1940, 1970, 2000, and Projected 2030



Wildland-Urban Interface in the United States, 2000



WUI

Intermix and interface

Non-WUI

Vegetated

Very low density housing

No housing

Non-vegetated or agriculture

High and medium density housing

Low and very low density housing

Water

