

Forests, Farms & People

**Land Use Change on
Non-Federal Land in Oregon
1974 - 2014**



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SUMMARY

Oregon has done remarkably well in preserving forests, farms, and rangeland from development. Ninety-seven percent of all non-Federal land in Oregon that was in resource land uses in 1974 remained in those uses in 2014. Ninety-nine percent of all non-Federal land in Oregon that was in resource land uses in 1984, after comprehensive land use plans were implemented, remained in these uses in 2014. With the housing industry still reeling from the 2007 financial crisis and subsequent Great Recession, development of resource lands in Oregon hit a record low between 2009 and 2014.

Development of resource land to low-density residential or urban uses is consistent with land use goals, plans, and zoning. Most development of resource lands occurs adjacent or close to existing developed areas, thereby minimizing development scattered through Oregon's forests and farm lands.

Structures continue to be built on lands remaining in forest, agricultural, and range uses at high rates, even after the implementation of county comprehensive land use plans. However, the impact of these additional structures on management of Oregon's resource lands is lessened because most of the structures built are relatively close to land in low-density residential or urban uses.

It is notable that for land in wildland forest use owned by forest industry and non-Federal public owners, both the rate of development of wildland forest to low-density residential and urban uses and the number of structures built on land remaining in wildland forest use remained low over the study period. Most development of land in wildland forest use occurred on other private (non-industrial) ownerships.

LAND USE CHANGE ON NON-FEDERAL LAND IN OREGON

For many decades Oregon has experienced substantial population and economic growth, resulting in growing demand for land that could be developed for urban and low-density residential uses. In response to concerns about conversion of Oregon's highly productive forests and farms to more developed uses, Oregon enacted the Land Conservation and Development Act in 1973 to limit and manage conversions of resource lands. Land use plans mandated in the Act were fully implemented in all Oregon counties by the mid-1980s.

This report examines changes in land use and land use trends on non-Federal land in Oregon between 1974 and 2014, both before and after lands use plans were implemented. It also provides insights about land use change that occurred in this period during times of economic boom, recession, and recovery.

WHAT WE DID

We evaluated land use and structure density on 37,003 sample points distributed across non-Federal land in Oregon for seven successive periods between 1974 and 2014. The evaluation was based on interpretation of aerial imagery acquired in 1974, 1984, 1994, 2000, 2005, 2009, and 2014. Each sample point was classified into one of eight land use classes at each date, and structures in the surrounding area were counted. Definitions associated with these attributes are the same for 2014 and earlier years. Thus, a major strength of this report is that it is based on data that are sampled and defined consistently across four decades. This allowed us to determine how land use planning has shaped land use change in Oregon and to show the impacts of recent turbulent economic times on land use change. The 1974-1984 period was before comprehensive land use plans were implemented; the remaining six periods were after land use plans were implemented. Measurements taken for the 2005-2014 period included impacts on Oregon's housing industry from the 2007 financial crisis and resulting Great Recession.

The eight land uses classes used in this report are: wildland forest, wildland range, intensive agriculture, mixed forest/agriculture, mixed range/agriculture, low-density residential, urban, and other (sand, water, and bare rock). Figure 1 provides examples of these land use classes. Forest, agricultural and range uses are considered resource uses in this report; urban and low-density residential uses are considered to be developed uses. Figure 2 shows the distribution of these classes across Oregon and where lands in resource uses were converted to low-density residential or urban uses.

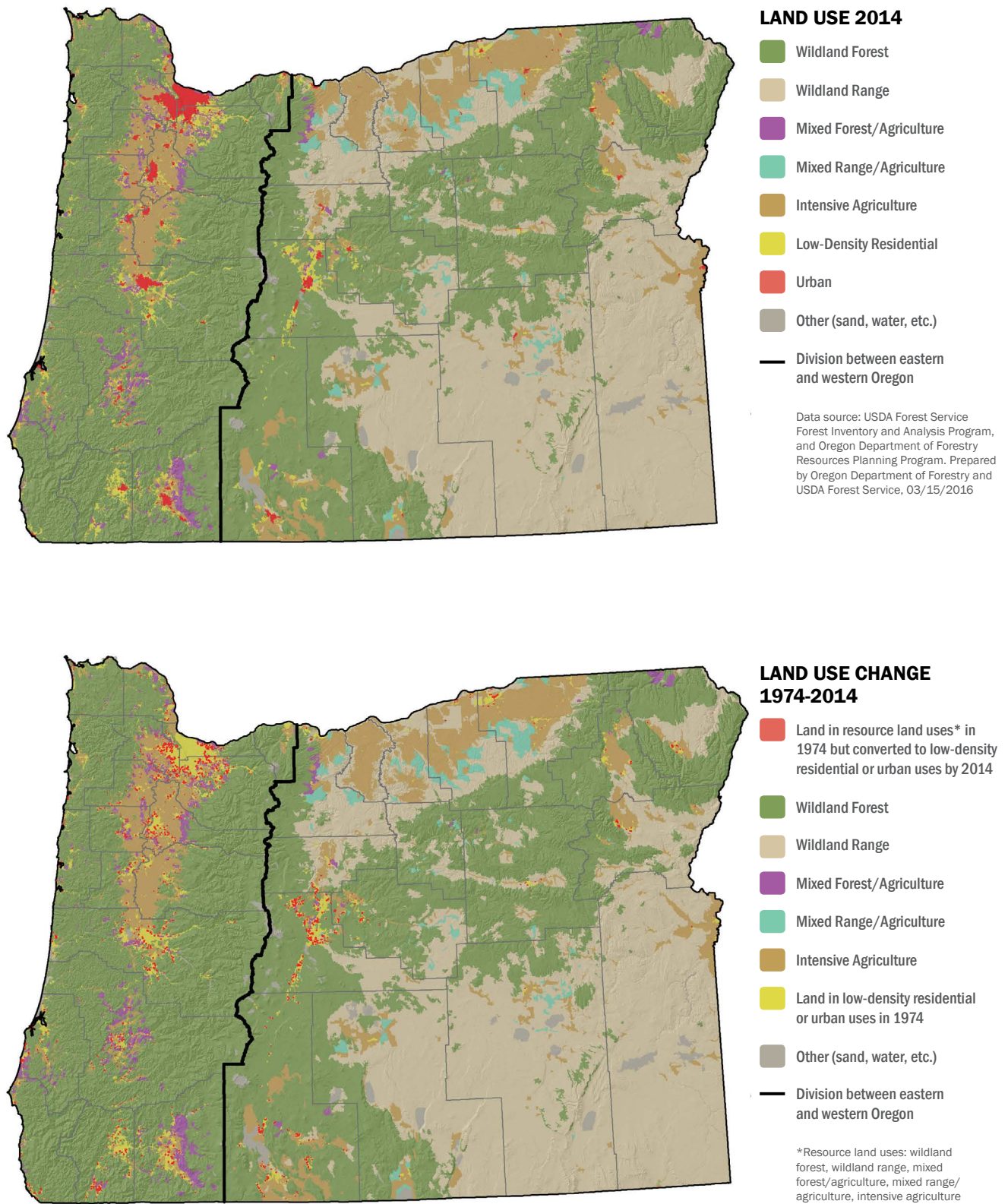


Figure 1 – Land use classes



Interpreters evaluated 37,003 sample points distributed across non-Federal land in Oregon on imagery taken at successive dates: 1974, 1984, 1994, 2000, 2005, 2009, and 2014. Each sample point was classified into one of 8 land use classes at each date (mixed range/agriculture is not shown above). The sample points and data collected on each point are consistent over time.

Figure 2 – Land use and land use change in Oregon



KEY FINDINGS

LAND USE AND LAND USE CHANGE

- Ninety-three percent of all non-Federal land in Oregon was in resource uses in 2014. Wildland forest, the land use with the largest non-Federal area in Oregon (Table 1), comprised 36 percent of non-Federal land, followed by wildland range with 31 percent of non-Federal land in Oregon.

Table 1 – Area of non-federal land in Oregon, by land use class and year

Land use class	1974	1984	1994	2000	2005	2009	2014	Change in area 1974 to 2014
THOUSAND ACRES								
Resource land uses:								
Wildland forest	10,693	10,570	10,512	10,497	10,468	10,455	10,446	-247
Wildland range	9,297	9,164	9,116	9,087	9,045	9,034	9,013	-284
Mixed forest/agriculture	959	901	877	876	864	855	853	-105
Mixed range/agriculture	658	664	666	678	690	690	699	41
Intensive agriculture	5,848	5,806	5,786	5,757	5,747	5,733	5,740	-109
Total area	27,454	27,105	26,957	26,895	26,815	26,768	26,751	-704
Developed land uses:								
Low-density residential	785	1,060	1,165	1,196	1,246	1,282	1,291	506
Urban	378	453	495	526	556	568	576	198
Total Area	1,163	1,512	1,660	1,722	1,803	1,850	1,867	704
Other land uses ¹	88	88	88	88	88	88	88	0
Total area: All land uses	28,706	28,706	28,706	28,706	28,706	28,706	28,706	0

¹ Includes areas of naturally non-vegetated land such as lava fields, beaches, dunes, and large bodies of water.

- Ninety-seven percent of all non-Federal land in Oregon in resource land uses in 1974 remained in these uses in 2014 (Figure 3). Ninety-five percent remained in resource uses in western Oregon and 99 percent remained in resource uses in eastern Oregon.
- Ninety-nine percent of all non-Federal land in Oregon that was in resource land uses in 1984 (after comprehensive land use plans were implemented) remained in those uses in 2014 (Figure 3).
- Development of resource lands hit a record low between 2009 and 2014. Only 3,000 acres per year of Oregon's farms, forests, and rangeland shifted to low-density residential or urban uses.
- Between 1974 and 2014 a total of 704,000 acres of non-Federal land shifted from resource uses to low-density residential or urban uses (Table 1). Ninety-five percent of this change (669,000 acres) occurred on private land.
- The greatest conversion of resource lands, proportionally, occurred on land in mixed forest/agriculture use (Figure 4 and Table 1), which decreased by 11 percent (105,000 acres) over the study period. This was followed by a three percent decline of land in wildland range use.

Figure 3 – Non-Federal land remaining in forest, farm, or range uses, 1974-2014

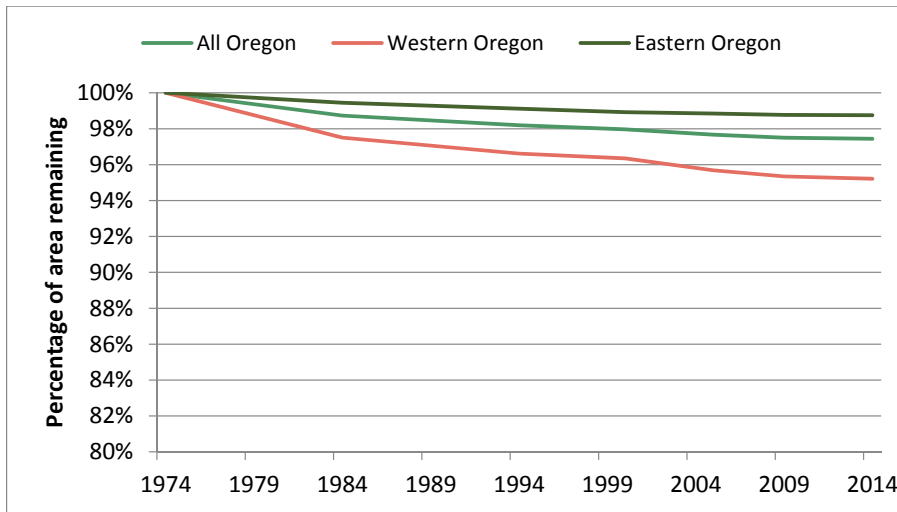


Figure 4 – Non-Federal land remaining in wildland forest and in mixed forest/agriculture uses, 1974-2014

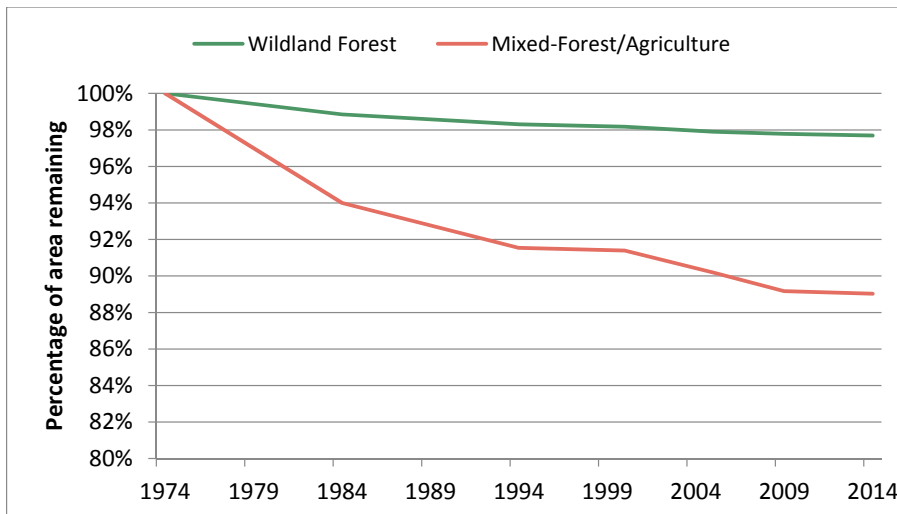
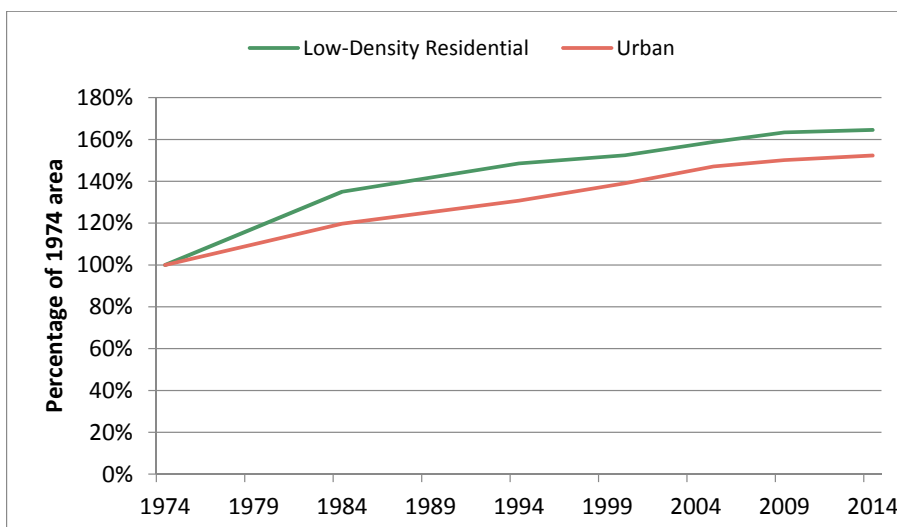


Figure 5 – Increases in the area of low-density residential and urban uses on Non-Federal land, 1974-2014



- The largest total area loss of non-Federal land in a specific resource land use during the study period was a decrease of 284,000 acres of land that shifted from wildland range use to more developed uses (Table 1).
- The largest single gain in the area of non-Federal land in a specific land use over the study period was an increase of 506,000 acres of land in low-density residential use (Table 1). This was followed by an increase of 198,000 acres of land in urban use. Proportionally, this is a large increase in the area of both uses (Figure 5).
- Development of non-Federal resource lands to more developed uses over the study period was mostly conversions to low-density residential use, but 107,000 acres shifted from resource uses directly to urban use. Additionally, 92,000 acres changed from low-density residential use to urban use.
- Also notable: in eastern Oregon, 129,000 acres of non-Federal land changed from wildland range use to intensive agriculture use between 1974 and 2014, with 62 percent of this change occurring in the 1974 to 1984 period.
- Area and changes in area of non-Federal land in wildland forest use varied by owner class (Tables 2 and 3). The area of land in wildland forest use owned by forest industry and by non-Federal public owners remained nearly constant over the study period. However, land in wildland forest use owned by other private (non-industrial) owners declined by seven percent (220,000 acres).
- The conversion of privately-owned land in resource uses to low-density residential or urban uses slowed dramatically in Oregon after comprehensive land use planning was implemented in the mid-1980s (Figure 6). On private land in Oregon, the net average annual loss in the area of land in resource uses to low-density residential and urban uses declined from 35,000 acres annually between 1974 and 1984 to 13,000 acres annually between 1984 and 2005. Between 2005 and 2014 (which includes the great recession) the average annual loss of resource lands dropped to 7,000 acres.

Table 2 – Area of non-Federal land classified as wildland forest use, by region and owner class, 2014

Region	Forest industry	Other private	Non-Federal public	All non-Federal owners
THOUSAND ACRES				
Oregon	6,155	2,815	1,476	10,446
Western Oregon	4,396	1,670	1,061	7,127
Eastern Oregon	1,759	1,145	415	3,319
AREA, BY OWNER CLASS, AS A PERCENTAGE OF NON-FEDERAL LAND WILDLAND FOREST				
Oregon	59%	27%	14%	100%
Western Oregon	62%	23%	15%	100%
Eastern Oregon	53%	35%	12%	100%

Table 3 – Change, in percent, in the area of non-Federal land classified as wildland forest use between 1974 and 2014, by region and owner class

Region	Forest industry	Other private	Non-Federal public	All non-Federal owners
CHANGE, IN PERCENT, IN WILDLAND FOREST AREA BETWEEN 1974 AND 2014				
Oregon	0%	-7%	-1%	-2%
Western Oregon	0%	-10%	-1%	-3%
Eastern Oregon	0%	-4%	0%	-1%

Figure 6 – Net average annual loss of private land changing from forest, farm, and range uses to low-density residential or urban uses, 1974-1984, 1984-2005, and 2005-2014

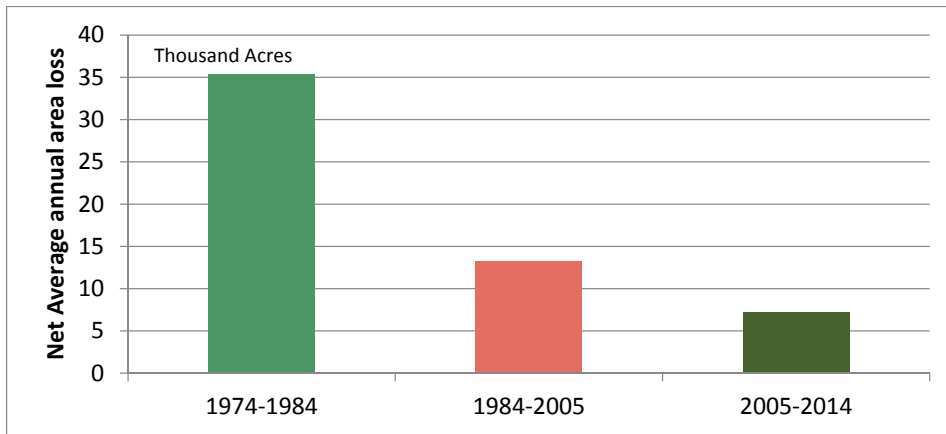


Figure 7 – Average area, per new resident, of private land changing from forest, farm, and range uses to low-density residential or urban uses, 1974-1984, 1984-2005, and 2005-2014

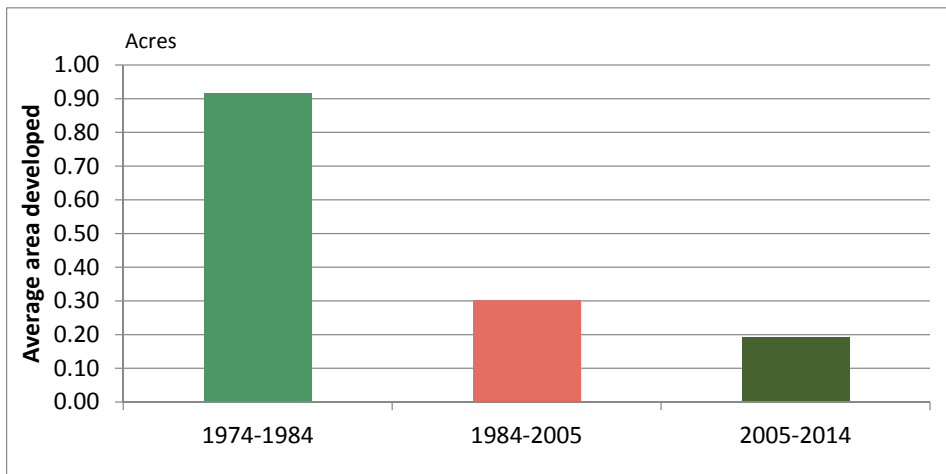
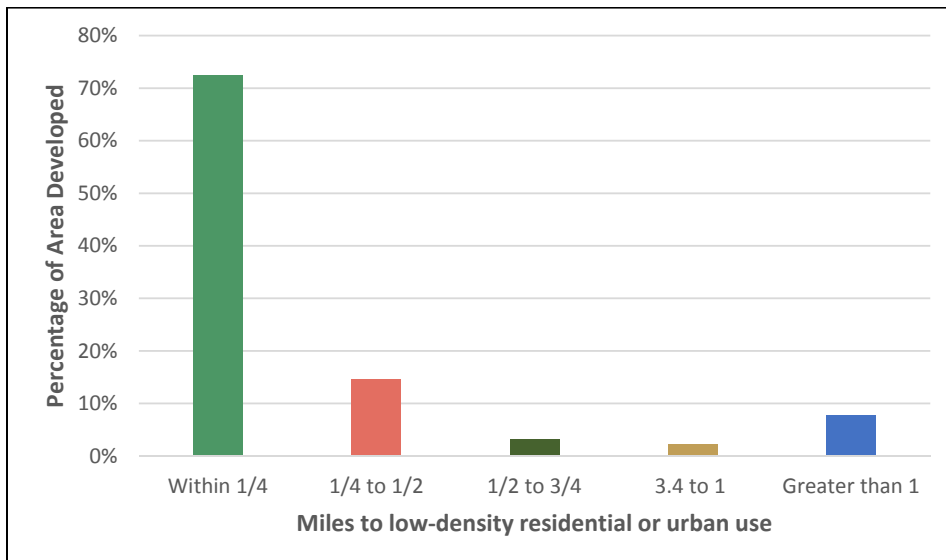


Figure 8 – Area, in percent, of private land in forest, farm, or range uses converted to low-density residential and urban uses, by distance to more developed uses, 2005-2014



- Less area developed per new Oregon resident means a higher density of population on land already in low-density residential and urban uses and less development of resource lands. The area of private land converted from resource land uses to low-density residential or urban uses decreased from 0.9 acres per new resident in the 1974-1984 period to 0.3 acres per new resident between 1984 and 2005, after land use plans were implemented (Figure 7). Between 2005 and 2014 (which includes the great recession) the area of resource land developed dropped to 0.2 acres per new resident.
- Development of privately-owned resource lands to low-density residential or urban uses is currently consistent with land use goals, plans, and zoning. Scattered development is minimized, with most development of resource lands occurring adjacent to or close to existing developed areas. Between 2005 and 2014, 72 percent of land in forest, farm and range uses that was converted to more developed uses was located within one-fourth mile of already developed areas (Figure 8).
- Areas with large populations and high population growth do not coincide with where the majority of conversion of Oregon's forests, farms and range lands occurs. Oregon's most populous counties—Multnomah, Washington, and Clackamas—had 44 percent of Oregon's population in 2014 and accounted for 59 percent of Oregon's population growth between 2005 and 2014. However, these three counties accounted for only 15 percent of the conversion of private resource land to low-density residential or urban uses in the 2005-2014 period.

DEVELOPMENT ON LAND REMAINING IN RESOURCE USES

- Land use planning had an impact in preventing construction of structures on non-Federal land remaining in farm, forest and range uses. However, the impact of land use planning in preventing scattered structures from being built was not as strong as its impact in preventing resource lands from being converted to more developed uses (Figures 3 and 9).
- The average number of structures per square mile on non-Federal land increased for all resource uses throughout the study period. Starting with relatively low numbers of structures, the largest percentage increases in number of structures per square mile were in wildland forest (increasing 172 percent) and wildland range (increasing 151 percent) (Figure 9).
- Starting with relatively high numbers of structures (4.6 structures per square mile), intensive agriculture had the lowest percentage increase in structures on non-Federal land in resource uses (54 percent) over the study period (Figure 9).
- Notable is the relatively small three percent increase in structures per square mile on land in wildland forest use from 2009 through 2014, the two percent increase on land in intensive agriculture use, and the one percent increase on land in range use.
- Similar to area and changes in area of non-Federal land in wildland forest use, the number of structures and changes in the number of structures per square mile varied by owner class (Figure 10). The number of structures on land in wildland forest use owned by forest industry and by non-Federal public owners remained low over the study period. However, the number of structures on land in wildland forest use owned by other private (non-industrial) owners increased dramatically, to four structures per square mile. This is a housing and population density where conflicts with other uses can occur.
- During the 2005-2014 period, most new structures added to private land remaining in wildland forest use were adjacent or close to existing low-density residential or urban areas (Figure 11). However, 21 percent of the structures added to land remaining in wildland forest use were constructed more than one mile from areas of low-density residential or urban uses.

Figure 9 – Structures per square mile on non-Federal land remaining in intensive agriculture, wildland forest, and wildland range uses, 1974-2014

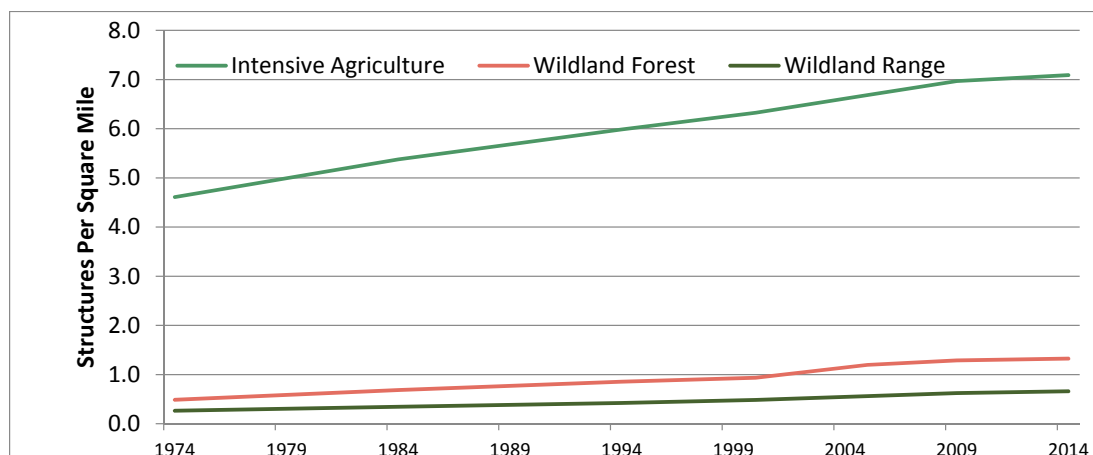


Figure 10 – Structures per square mile on non-Federal land remaining in wildland forest use by ownership class, 1974-2014

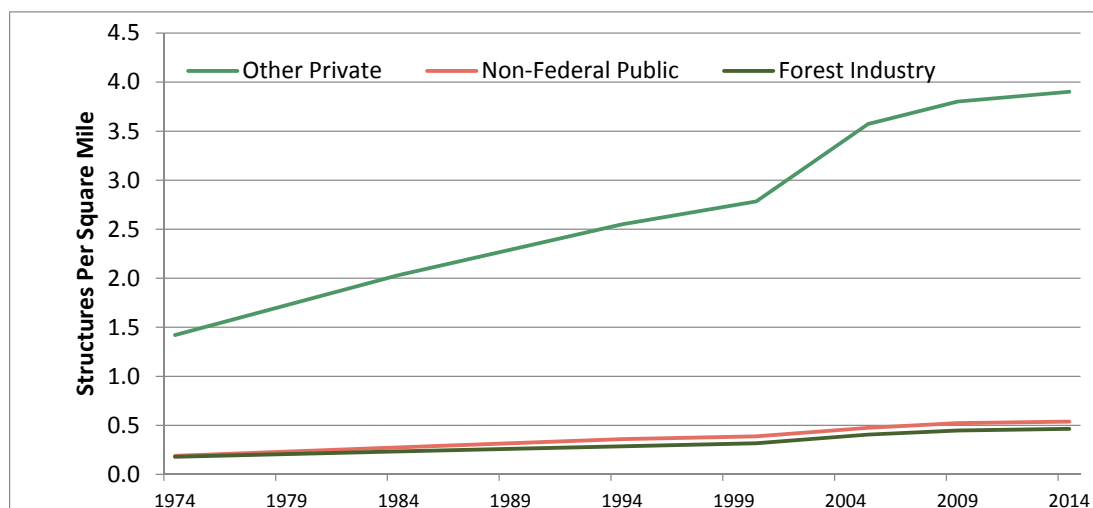
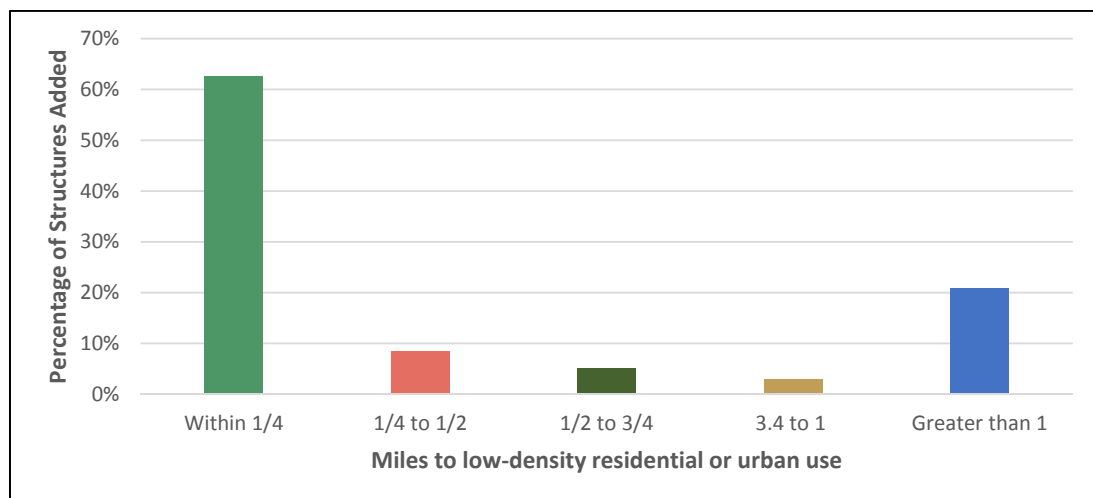


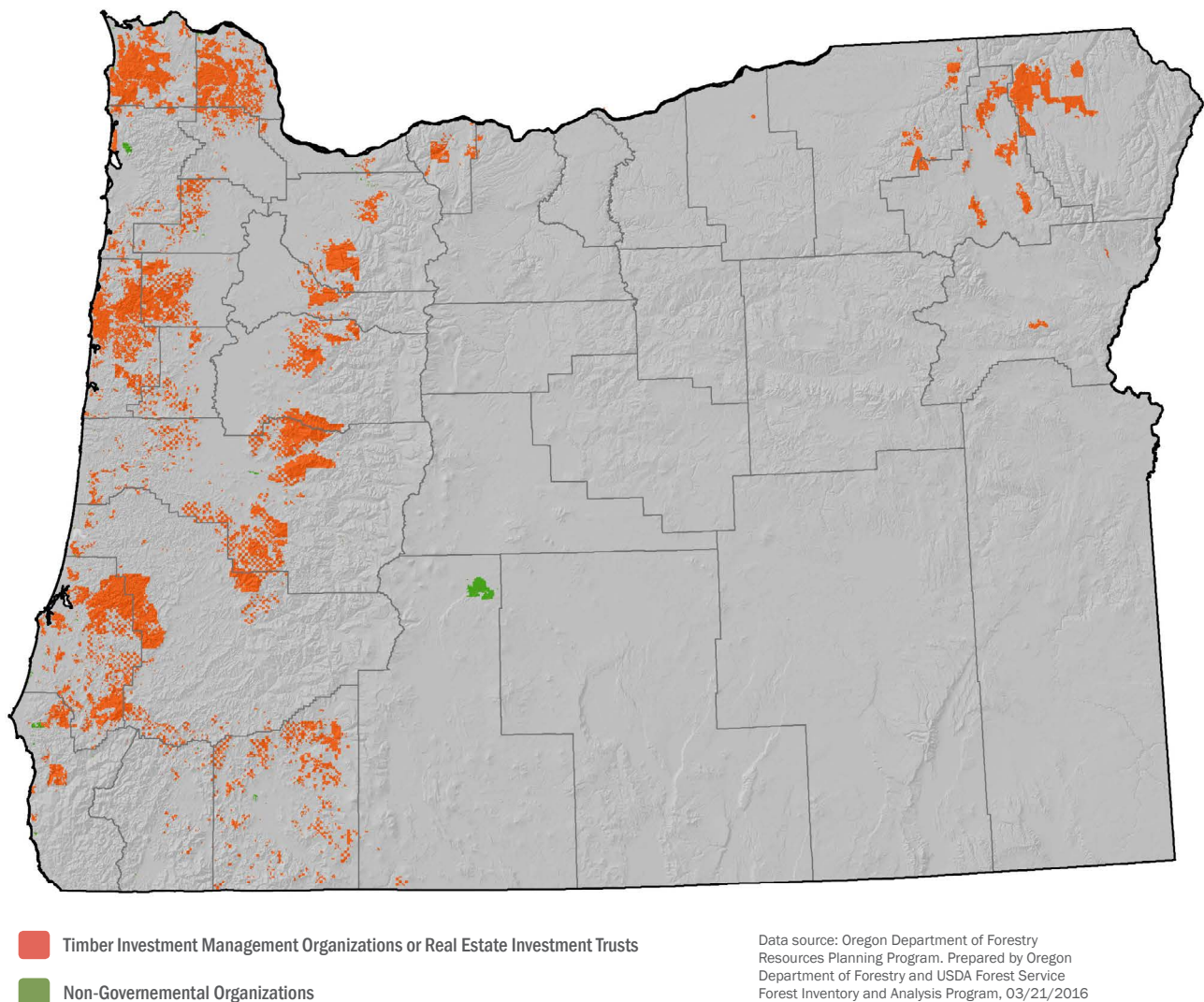
Figure 11 – Increase in structures, in percent, on private land remaining in wildland forest use, by distance to more developed uses, 2005-2014



UNANSWERED QUESTIONS

- Unheard of in Oregon forestry circles in the 1970s, TIMOS (Timber Investment Management Organizations) and REITS (Real Estate Investment Trusts) have since purchased large areas of land in wildland forest use in Oregon. Figure 12 shows the location of the 2,733,000 acres of forest land, 99 percent of which is wildland forest, in Oregon owned by TIMOS and REITS. The acquisition of these properties, which had previously been owned by forest industrial owners, could impact efforts to minimize fragmentation and development within forested landscapes. Whether these TIMOS and REITS will retain this land in wildland forest use long term, develop it, or sell it to other private (non-industrial) owners or to developers is a question that should be addressed in future land use studies.
- Historically, “other private” owners have developed relatively large percentages of their land in wildland forest use to more developed uses (Table 3). If other private owners purchase land being sold by TIMOS and REITs, will they fragment it by adding houses or by converting relatively large shares of it to low-density residential and urban uses as they have historically? Or, even with changes in private wildland forest ownership patterns, will Oregon’s land use laws continue to minimize forest fragmentation?

Figure 12 – Location of land owned by timber investment management organizations, real estate investment trusts, and non-governmental organizations, 2014



- Another major change in forest land ownership has been the purchase of forest land by conservation groups such as The Conservation Fund and Nature Conservancy. Figure 12 shows the location of the 45,000 acres of land, 89 percent of which is wildland forest, in Oregon owned by conservation groups. Although conservation groups can help protect special spaces in Oregon's forests and provide important educational values, this ownership is not currently large enough to significantly impact Oregon's forest economy. Often, private forest land is acquired and later transferred to public agencies for management. Will conservation groups begin keeping forest land and become a major owner of Oregon's forests?
- Oregon's prime timberland, timberland available and suitable for intensive timber management, is the driver of the state's forest products industry. It also provides fish and wildlife habitat, clean water, and other values Oregonians have come to expect from their forests. The area of prime timberland is limited by laws, policies, and plans which reserve much of Oregon's Federally-owned forest land from timber management. The area of prime timberland is also constrained by forest productivity, dwelling density, and land use zoning. The area of prime timberland in Oregon has fallen dramatically and is now approximately one-third of what it was in the 1970s. Will Oregon's land use system continue to protect the remaining prime timberland in spite of increasing pressures for development generated by an improving economy and growing population?
- Lack of affordable housing is a high profile issue in the Portland and Bend areas. Regionally, how do Oregon's land use laws affect housing costs? If land use laws increase housing costs, what are the environmental, economic, and social costs of allowing additional land in resource uses to be developed to nonresource uses or for additional housing to be allowed on land remaining in resource uses?
- Economics as well as land use planning are important in driving land use change. As shown in Figure 10 for other private owners (the ownership where most of the development of wildland forest occurs), building on land remaining in wildland forest increased dramatically during the housing bubble, but slowed down dramatically during and immediately after the great recession. What does an improving economy mean for land use change in Oregon? And how do economic forces interact with land use planning to drive development on Oregon's resource lands?
- In the next 30 years, Oregon's population is projected to increase by 1,397,000 people (35 percent). Given this growth, three key questions arise:
 - How much private land currently in resource land uses will be converted to low-density residential or urban uses?
 - How much will the population and the number of structures increase on private land remaining in resource land uses? And,
 - How will these increases in population and the number of structures affect the productivity, use, and management of land, private and public, remaining in resource land uses?

Future collection and analysis of data consistent with the data used in this study would help answer these questions. Analyses looking at how development is affecting fire protection and suppression costs, water quality, and land use conflicts are needed immediately. Research is also needed to look for opportunities where underproductive resource land can be released for development.

WHERE TO FIND MORE INFORMATION

More detailed information about the data and techniques used in this report is available:

Forests, Farms and People: Land Use Change on Non-Federal Land in Western Oregon 1973-2009 (Lettman and others 2011) is available at https://www.oregon.gov/ODF/Documents/ForestBenefits/ForestsFarmsAndPeople1974_2009PublishedJuly2011.pdf.

Changes in Land Use and Housing on Resource Lands in Washington State, 1976-2006 (Gray and others 2013) is available at http://www.fs.fed.us/pnw/pubs/pnw_gtr881.pdf.

