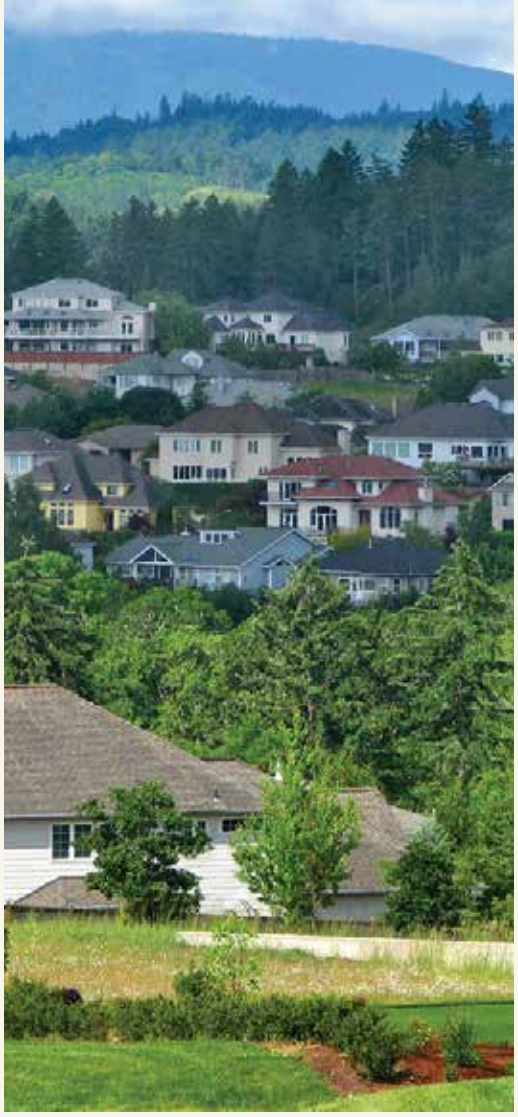




LAND USE CHANGE ON NON-FEDERAL LAND IN OREGON AND WASHINGTON

SEPTEMBER 2013

COORDINATOR

Gary J. Lettman

RESEARCHERS (Alphabetically)

Andrew N. Gray (Forest Inventory and Analysis Program, Pacific Northwest Research Station)
Andrew A. Herstrom (Oregon Department of Forestry)
Gary J. Lettman (Oregon Department of Forestry)
Neil McKay (Forest Inventory and Analysis Program, Pacific Northwest Research Station)
Joel L. Thompson (Forest Inventory and Analysis Program, Pacific Northwest Research Station)

ADVISORS (Alphabetically)

David L. Azuma (Forest Inventory and Analysis Program, Pacific Northwest Research Station)
Gretchen Nicholas (Forest Inventory and Analysis Program, Pacific Northwest Research Station)
Rod L. Nichols (Oregon Department of Forestry)
John Tokarczyk (Oregon Department of Forestry)

GRAPHIC DESIGN

Crystal Jeffers

Land Use Change on Non-Federal Land in Oregon & Washington

Oregon and Washington have experienced substantial population growth. During the time frame of this report, the population of Oregon increased by 67 percent between 1974 and 2009, a gain of 1,531,000 people, and Washington's population increased by 77 percent between 1976 and 2006, a gain of 2,785,000 people. These increases occurred almost entirely on non-Federally owned land. In this period, the patterns and rates of conversion of forest, farm, and range land to more urbanized uses differed by state as did the two states' laws and policies designed to manage and moderate these land use changes.

LAWS AND POLICIES

Oregon enacted the Land Conservation and Development Act in 1973, which was fully implemented statewide by the mid-1980s. The Act required all counties and incorporated municipalities to prepare comprehensive land use plans in accordance with 19 statewide planning goals specified in the Act. Specifically, goals 3 and 4 were intended to limit and manage the loss of forest, agricultural, and range land consistently statewide. Non-Federal lands in Oregon were zoned either for resource uses—non-developable zones that were largely rural forest, farm, and range land—or for development — developable zones that were predominately land either already urbanized or adjacent to urbanized areas (predominately areas of low density residential and urban land use classes in this study). Goal 14 mandated the establishment of urban growth boundaries to promote compact urban growth within these boundaries and to restrict the spread of development into forest and farm land.

Washington passed the Growth Management Act (GMA) in 1990. The Act was largely implemented by the mid-1990s. It required all counties and incorporated municipalities to conduct land use planning. Initial steps in the planning process required all counties to designate forest, farm, and other natural resource lands (range land was considered farm land in this process) and then to adopt local regulations to protect these lands from development. Additionally, 29 (of 39) counties were required or chose to plan fully by adopting county-wide planning policies based on 14 statewide goals specified in the Act. Each county then used its policy to develop and implement a county-level comprehensive land use plan. Included in these plans was the establishment of urban growth areas.

Oregon's land use planning process is more centralized than Washington's. In Oregon, one board—the Land Conservation and Development Commission—and one state agency—the Department of Land Conservation and Development—guide, review, and monitor land use planning throughout the state. This centralized oversight helps ensure that all county comprehensive plans and their implementation are consistent and meet the statewide planning goals.

In Washington, within the GMA framework, local governments have more flexibility regarding the specific content of comprehensive plans and implementation of development regulations than in Oregon. Furthermore, under the GMA, land use planning at the county and city levels is assumed to be valid unless a constituent petitions a state growth management hearings board and the board rules against the local government. This aspect of the GMA inserts variability of applicability across the landscape.

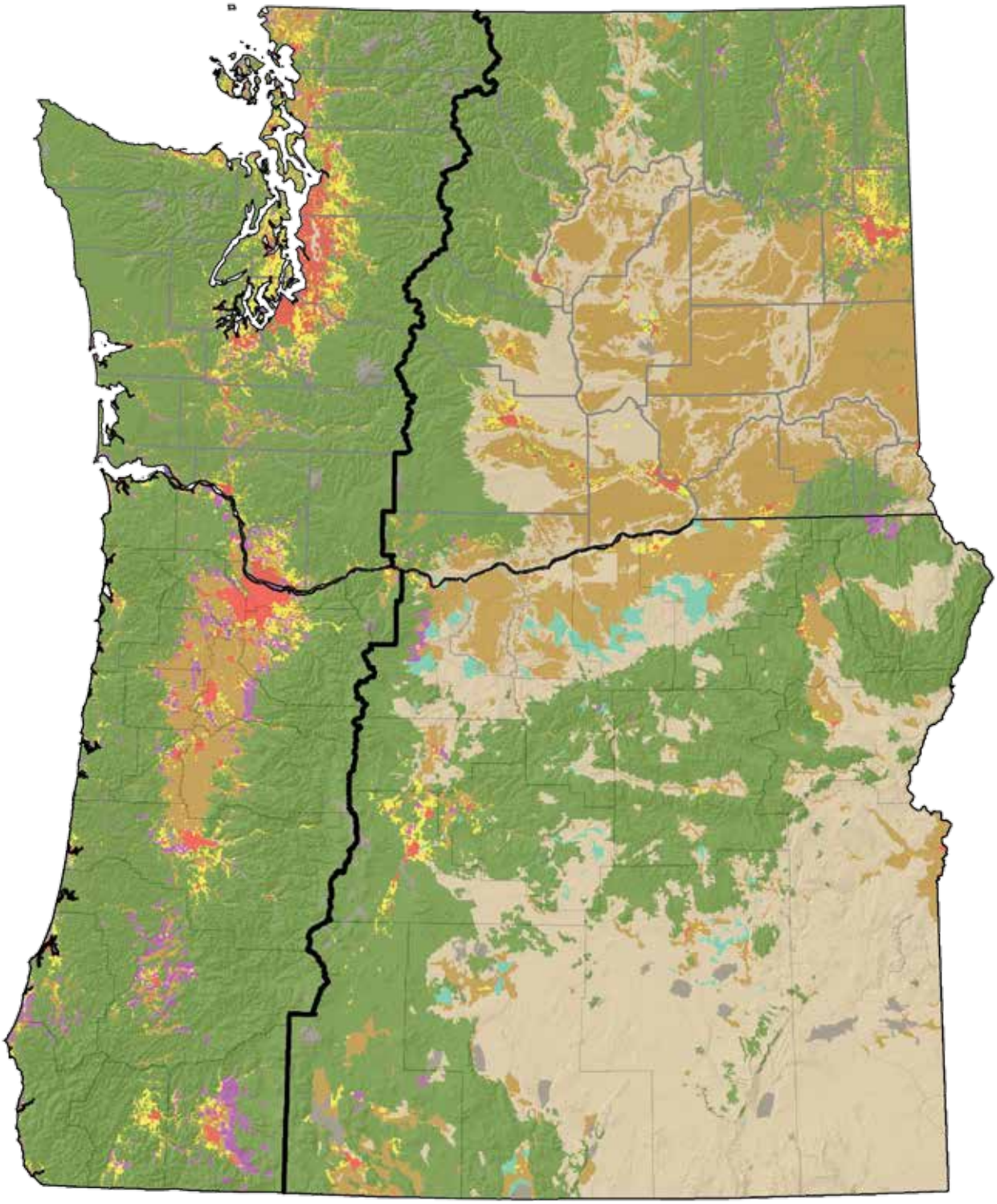
There has been much interest in land use change in both states prior to, and after implementation of these laws. This report compares land use and changes in land use on non-Federal land in Oregon and Washington from the mid-1970s through 2009.

Figure 1 provides examples of the 8 land use classes used in this report. Figure 2 shows the distribution of these classes across Oregon and Washington and delineates the boundary between the western and eastern sides of the two states.

Figure 1 — Land Use Classes

Interpreters evaluated 81,556 sample points distributed across non-Federal land in Oregon and Washington on imagery taken at successive dates. In Oregon, imagery was acquired in 1974, 1984, 1994, 2000, 2005, and 2009, and in Washington, in 1976, 1994, and 2006. Each sample point was classified into one of 8 land use classes at each applicable date (mixed range/agriculture not shown above). The sample points and the data collected on each point are consistent over time.

Figure 2 — Land Use: Washington 2006 and Oregon 2009



Wildland Forest
Wildland Range
Mixed Forest/Agriculture
Mixed Range/Agriculture
Intensive Agriculture
Low-Density Residential
Urban
Other (sand, water, etc.)
Division between eastern and western Washington and eastern and western Oregon

Data source: USDA Forest Service Forest Inventory and Analysis Program, and Oregon Department of Forestry Resources Planning Program. Prepared by Oregon Department of Forestry 08/21/2013

KEY FINDINGS

- A total of 615,000 acres in Oregon shifted between 1974 and 2009 from land in resource land uses (wildland forest, wildland range, intensive agriculture, mixed forest/agricultural and mixed range/agriculture uses) to low-density residential or urban uses (Table 1 and Figure 3); 95 percent of this change occurred on private land. In Washington, the comparable acreage change on non-Federal land between 1976 and 2006 was 1,163,000 acres with 97 percent of this change occurring on private land.
- With 9.8 percent of non-Federal land in low-density residential or urban uses, Washington's non-Federal land is more developed than is Oregon's non-Federal land, which has 6.3 percent in low-density residential or urban uses (Figure 2 and Tables 1 and 2).

Table 1 — Area of non-Federal land in Oregon and Washington, by land use class and year

Oregon: land use class	1974	1984	1994	2000	2005	2009	Change in area, 1974 to 2009
	THOUSAND ACRES						
Wildland forest	10,697	10,580	10,531	10,520	10,504	10,496	-200
Wildland range	9,320	9,187	9,139	9,112	9,096	9,091	-229
Mixed forest/agriculture	947	895	873	871	864	856	-91
Mixed range/agriculture	640	646	648	660	663	663	23
Intensive agriculture	5,849	5,795	5,779	5,751	5,741	5,730	-119
Low-density residential	791	1,064	1,159	1,184	1,201	1,225	434
Urban	378	454	491	523	551	560	182
Other	85	85	85	85	85	84	0
Total area	**28,706**	**28,706**	**28,706**	**28,706**	**28,706**	**28,706**	**0**

Washington: land use class	1976	1994	2006	Change in area, 1976 to 2006
	THOUSAND ACRES			
Wildland forest	13,713	13,298	13,064	-649
Wildland range	6,081	6,035	5,945	-136
Mixed forest/agriculture	547	475	425	-122
Mixed range/agriculture	64	64	64	0
Intensive agriculture	9,025	8,859	8,770	-255
Low-density residential	1,302	1,834	2,137	835
Urban	612	776	934	322
Other	255	259	261	6
Total area	**31,600**	**31,600**	**31,600**	**0**

- Ninety-eight percent of all non-Federal land in Oregon that was in resource land uses in 1974 remained in these uses in 2009 (Figure 4). Ninety-six percent of non-Federal land in Washington that was in these uses in 1976 remained so in 2006.
- A larger percentage of non-Federal land in resource land uses shifted to more developed uses in Washington than in Oregon over the study period (Figure 4 and Table 1). In Washington, the greatest declines, in percent, occurred on land in mixed forest/agriculture use, which decreased by 22.3 percent (122,000 acres), and on land in wildland forest use, which declined by 4.7 percent (649,000 acres). The comparable statistics for Oregon were 9.6 percent (91,000 acres) and 1.9 percent (200,000 acres) respectively.

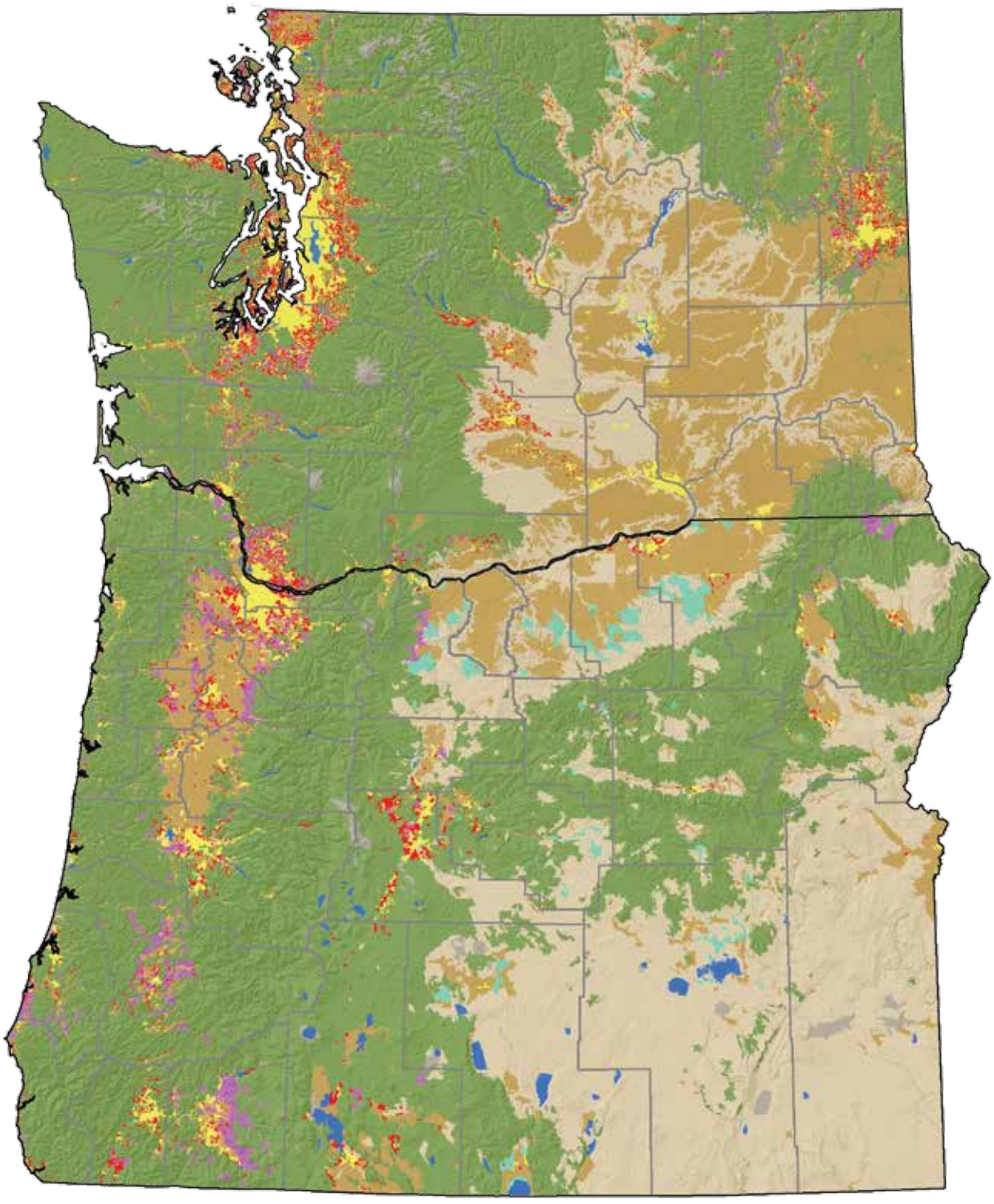
Table 2 — Percent of non-Federal land in Oregon and Washington, by land use class and year

Oregon: land use class	1974	1984	1994	2000	2005	2009
	PERCENT					
Wildland forest	37.3	36.9	36.7	36.6	36.6	36.6
Wildland range	32.5	32.0	31.8	31.7	31.7	31.7
Mixed forest/agriculture	3.3	3.1	3.0	3.0	3.0	3.0
Mixed range/agriculture	2.2	2.3	2.3	2.3	2.3	2.3
Intensive agriculture	20.4	20.2	20.1	20.0	20.0	20.0
Low-density residential	2.8	3.7	4.0	4.1	4.2	4.3
Urban	1.3	1.6	1.7	1.8	1.9	2.0
Other	0.3	0.3	0.3	0.3	0.3	0.3
Total area	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Washington: land use class	1976	1994	2006
	PERCENT		
Wildland forest	43.4	42.1	41.3
Wildland range	19.2	19.1	18.8
Mixed forest/agriculture	1.7	1.5	1.3
Mixed range/agriculture	0.2	0.2	0.2
Intensive agriculture	28.6	28.0	27.8
Low-density residential	4.1	5.8	6.8
Urban	1.9	2.5	3.0
Other	0.8	0.8	0.8
Total area	**100%**	**100%**	**100%**

- In Oregon, the largest area loss of non-Federal land in a specific resource land use during the study period was a decrease of 229,000 acres of land that shifted from wildland range use (Table 1). In Washington, the biggest area loss was the 649,000 acres that shifted from land in wildland forest use.
- On Oregon's non-Federal land that changed land uses between 1974 and 2009, shifts from resource land uses to low-density residential or urban uses accounted for 70 percent of all net area change in land uses. The comparable figure for Washington is 81 percent between 1976 and 2006.
- On non-Federal land in Oregon, the largest single gain in the area of a specific land use over the study period was a 434,000 acre increase in land in low-density residential use (Table 1). In Washington, the largest single increase was also a gain in the area of land in low-density residential use (835,000 acres).
- There was less shifting of land uses on non-Federal land remaining in resource land uses in Washington than in Oregon. Notably, in eastern Oregon, 75,000 acres changed from wildland range use to intensive agriculture use between 1974 and 2009.
- In Washington, 181,000 acres of non-Federal land in low-density residential use shifted to land in urban use during the study period. The comparable figure for Oregon was 82,000 acres.

Figure 3 — Changes in Land Use on Non-Federal Land: Washington 1976-2006, Oregon 1974-2009



Washington: Land in resource land uses* in 1976 but converted to low-density residential or urban uses by 2006 (1,163,00 acres)

Oregon: Land in resource land uses* in 1974 but converted to low-density residential or urban uses by 2009 (615,000 acres)

Wildland Forest

Wildland Range

Mixed Forest/Agriculture

Mixed Range/Agriculture

Intensive Agriculture

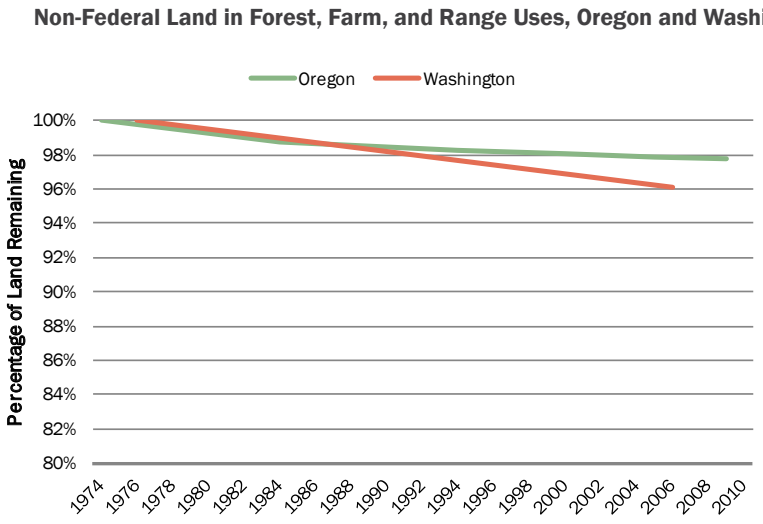
Land in low-density residential or urban in Washington (1976) or Oregon (1974)

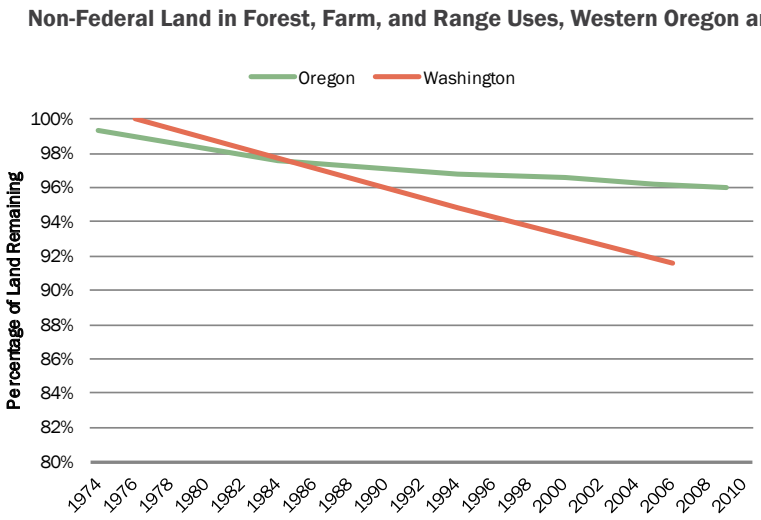
Other (sand, water, etc.)

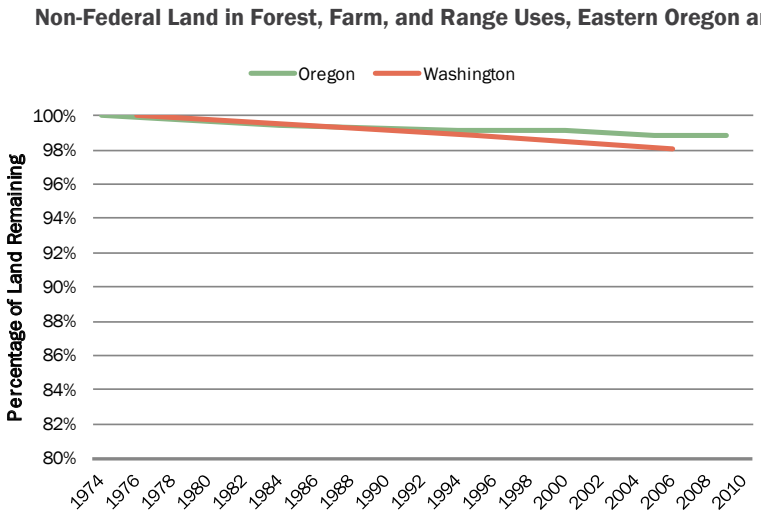
Data source: USDA Forest Service Forest Inventory and Analysis Program, and Oregon Department of Forestry Resources Planning Program. Prepared by Oregon Department of Forestry 08/21/2013

*Resource land uses: wildland forest, wildland range, mixed forest/agriculture, mixed range/agriculture, intensive agriculture

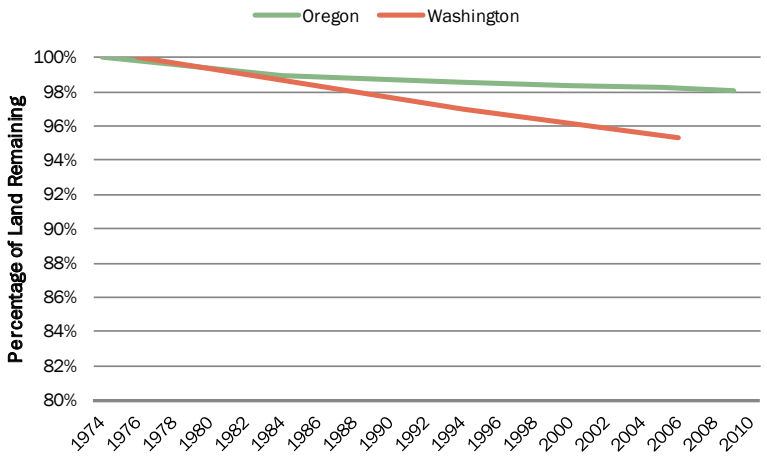
Figure 4 — Non-Federal land remaining in forest, farm, or range uses, Oregon 1974-2009, Washington 1976-2006



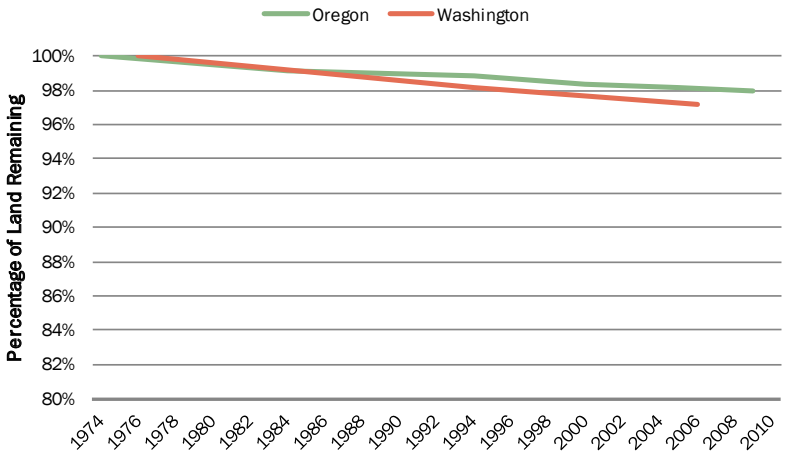




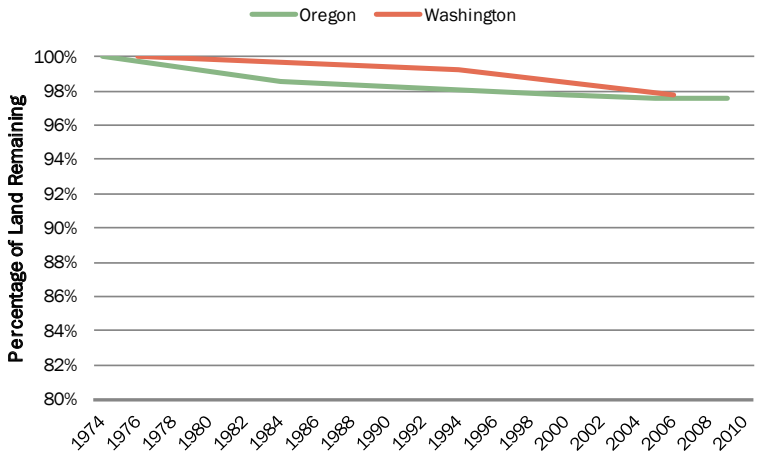
Non-Federal Land in Wildland Forest Use, Oregon and Washington



Non-Federal Land in Intensive Agriculture Use, Oregon and Washington



Non-Federal Land in Wildland Range Use, Oregon and Washington



Non-Federal Land in Mixed Forest/Agriculture and Mixed Range/Agriculture Uses, Oregon and Washington

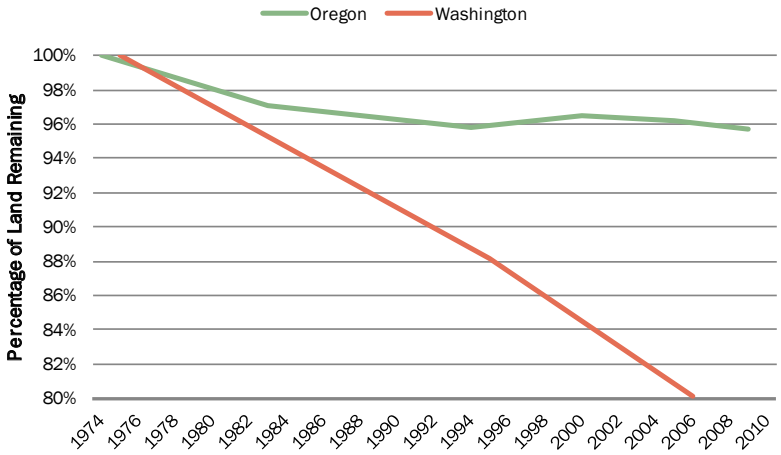


Table 3 — Change in the area of non-Federal land classified in wildland forest use, Oregon 1974-2009 and Washington 1976-2006, by side of state and owner class

	Forest industry	Other private	Other public	All non-Federal owners
	CHANGE, IN PERCENT			
Oregon	0%	-6%	-1%	-2%
Western Oregon	0%	-8%	-1%	-2%
Eastern Oregon	0%	-3%	0%	-1%
Washington	-1%	-10%	-1%	-5%
Western Washington	-1%	-23%	-1%	-6%
Eastern Washington	-1%	-4%	-1%	-3%

- Changes in area of non-Federal land in wildland forest use varied by owner class in both Oregon and Washington (Table 3). The area of land in wildland forest use owned by forest industry and by other public (non-Federal) owners remained nearly constant in both states over the study period. However, land in wildland forest use owned by other private (non-industrial) owners declined 6 percent (179,000 acres) in Oregon and 10 percent (575,000 acres) in Washington. Notably, between 1976 and 2006, there was a 23 percent decline in the area of land in wildland forest use on other private ownerships in western Washington.
- In both states, shifts from land in resource land uses to low-density residential or urban uses occurred predominately on private land. And these shifts from private resource land were largely to land in low-density residential uses, which increased in area by 1.2 million acres (Table 4).

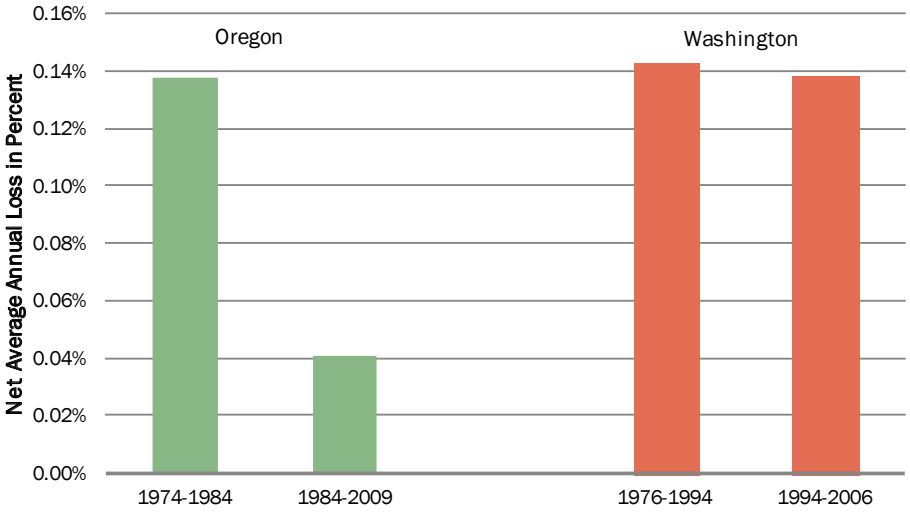
Table 4 — Area and changes in area of private land in Oregon and Washington, by side of state, land use class, and year or period

Oregon: land use class	1974	2009	Total net change 1974-2009	Average annual change in area 1974-2009	Total net change 1974-2009
	THOUSAND ACRES			CHANGE, IN PERCENT	
Western Oregon					
Wildland forest	6,264	6,114	-150	-0.1%	-2.4%
Mixed forest/agriculture	762	691	-71	-0.3%	-9.3%
Intensive agriculture	1,949	1,778	-171	-0.3%	-8.8%
Low-density residential	486	743	258	1.2%	53.1%
Urban	263	397	134	1.2%	51.1%
Eastern Oregon					
Wildland forest	2,947	2,904	-42	0.0%	-1.4%
Wildland range	8,281	8,090	-191	-0.1%	-2.3%
Mixed forest/agriculture	127	112	-15	-0.4%	-12.1%
Mixed range/agriculture	625	641	16	0.1%	2.6%
Intensive agriculture	3,639	3,677	38	0.0%	1.0%
Low-density residential	239	400	161	1.5%	67.2%
Urban	52	86	33	1.5%	63.7%

Washington: land use class	1976	2006	Total net change 1976-2006	Average annual change in area 1976-2006	Total net change 1976-2006
	THOUSAND ACRES			CHANGE, IN PERCENT	
Western Washington					
Wildland forest	5,937	5,464	-474	-0.3%	-8.0%
Mixed forest/agriculture	334	243	-92	-1.1%	-27.4%
Intensive agriculture	811	650	-162	-0.7%	-19.9%
Low-density residential	854	1,345	491	1.5%	57.5%
Urban	331	562	231	1.8%	69.9%
Eastern Washington					
Wildland forest	4,735	4,587	-149	-0.1%	-3.1%
Wildland range	5,770	5,635	-135	-0.1%	-2.3%
Mixed forest/agriculture	173	147	-25	-0.5%	-14.5%
Mixed range/agriculture	63	63	0	0.0%	0.0%
Intensive agriculture	8,123	8,037	-86	0.0%	-1.1%
Low-density residential	377	703	325	2.2%	86.2%
Urban	225	295	70	0.9%	30.8%

- In both states on private land, the area of low-density residential use increased more than twice as much as the area in urban land during the study period (Table 4). Only in western Washington was the increase in the area of land in urban use catching up with the increase in the area of land in low-density residential use. The 70 percent increase in the western Washington area of private land in urban use was greater than the 58 percent increase in the area of land in low-density residential use (Table 4).
- The conversion of private land in resource land uses in western Oregon and western Washington occurred more rapidly than in eastern Oregon and eastern Washington (Table 4).
- Approximately 90 percent of the development in the west sides of both states occurred within 30 miles of Interstate 5.

Figure 5 — Net average annual loss of private land through change from forest, farm, and range uses to low-density residential or urban uses before and after the implementation of land use plans



- The conversion of private land in resource land uses to land in low-density or urban land uses slowed dramatically in Oregon, but not in Washington after comprehensive land use planning was implemented. On private land in Oregon, the net average annual loss in the area of land in resource land uses to low-density residential and urban uses declined from .138 percent annually between 1974 and 1984 to .041 percent annually between 1984 and 2009, after land use plans were implemented in the mid-1980s. In Washington, these average annual rates of conversion were .143 percent in the period 1976 to 1994 and .138 percent between 1994 and 2006, after implementation of the GMA in the mid-1990s (Figure 5).
- The area of non-Federal land in wildland forest use with less than 10 residents per square mile declined over the study period by 6 percent (639,000 acres) in Oregon and 9 percent (1,119,000 acres) in Washington (Figure 6). This change implies that conflicts between timber management use and non-timber values are more likely. Property losses due to wildfire are also more apt to occur in these more populated forested landscapes.
- The area in Oregon of non-Federal land in wildland forest use with less than 10 people per square mile present declined 23,000 acres per year between 1974 and 1984, the decade that preceded the implementation of comprehensive county land use plans. After these land use plans were implemented in the mid-1980s, this statistic dropped to an average of 16,000 acres per year. The comparable statistics for Washington are an average annual decline of 38,000 acres between 1976 and 1994 prior to the implementation of the Growth Management Act and an average annual decline of 36,000 acres per year between 1994 and 2006 after its implementation in the mid-1990s.
- The area of non-Federal land converted from forest, farm, and range land uses to low-density or urban uses decreased in Oregon from 0.9 acres per new resident in the 1974-1984 period—before comprehensive county land use plans were implemented in the mid-1980s—to 0.2 acres per person between 1984 and 2009 after land use plans were implemented (Figure 7). In Washington, the comparable statistics remained constant at 0.4 acres per new resident before and after the implementation of the Growth Management Act. The less area developed per new resident means a higher density of population on land in low-density residential and urban uses and less development of resource lands.

Figure 6 — Non-Federal land remaining in wildland forest use with less than 10 residents per square mile, Oregon 1974-2009, Washington 1976-2006

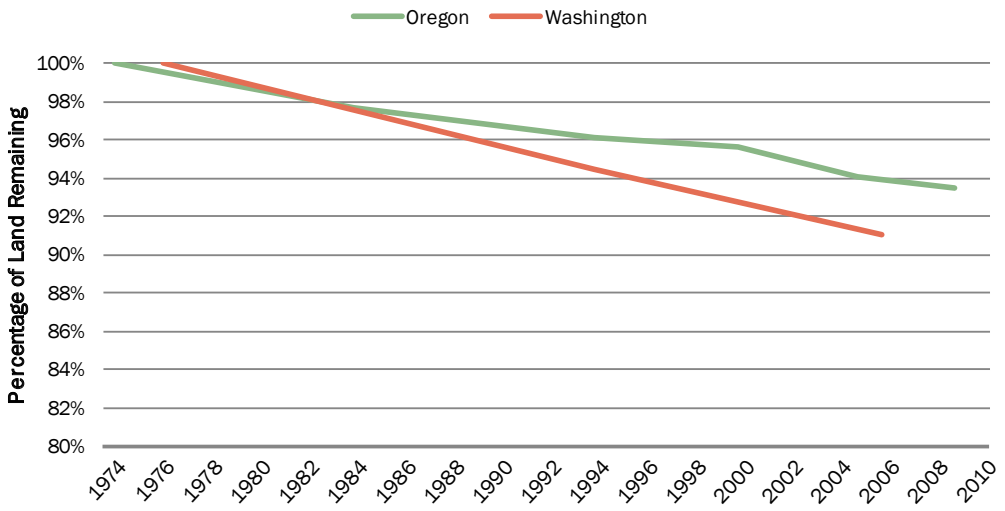
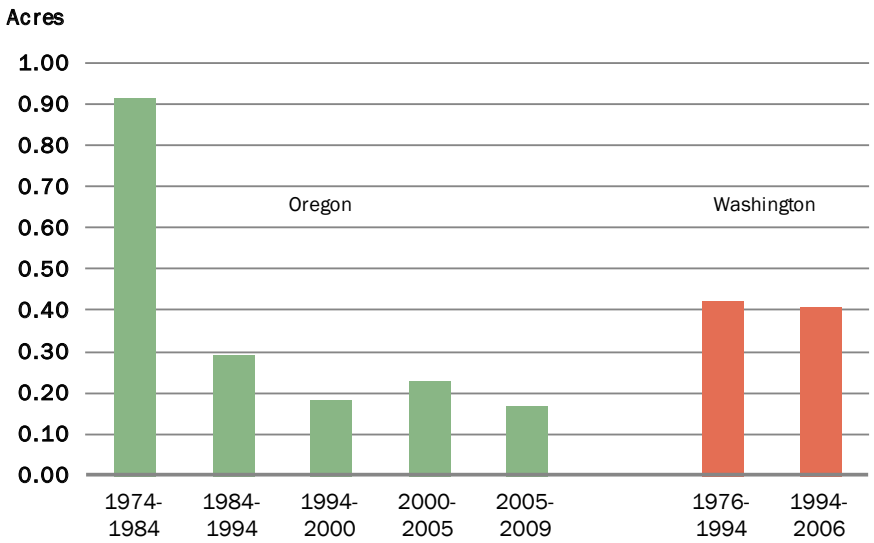


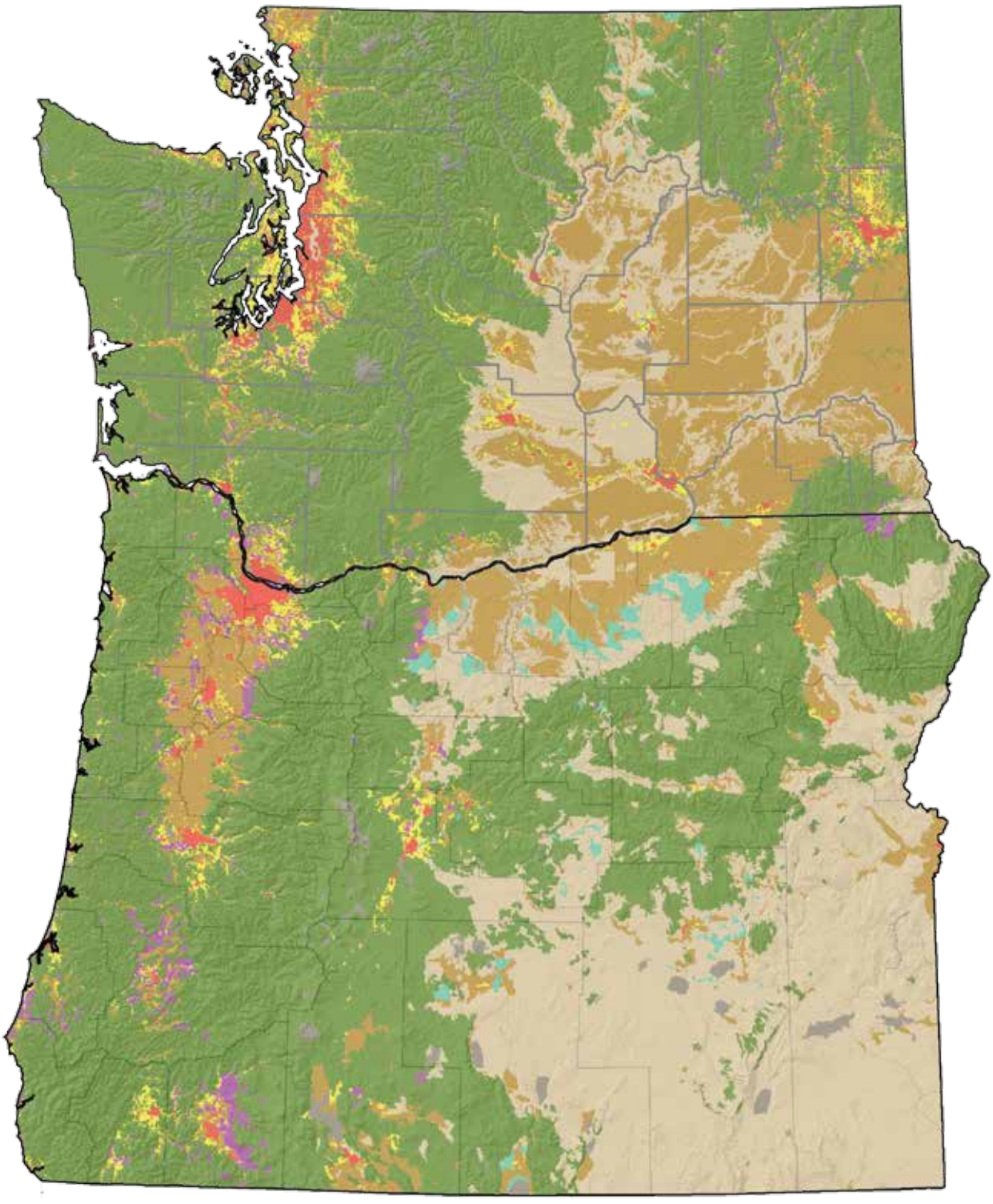
Figure 7 — Average area, per new resident, of non-Federal land changing from forest, farm, or range uses to low-density residential or urban uses, Oregon 1974-2009, Washington 1976-2006



- TIMOS (Timber Investment Management Organizations) and REITS (Real Estate Investment Trusts) have recently purchased large areas of land in wildland forest use in both states. 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 for a long time, develop it, or sell it to other private developers is an open question that should be addressed in future land use studies. Historically, "other" private owners (non-industrial private owners) have developed large portions of land in wildland forest use. This is particularly true in western Washington (Table 3).

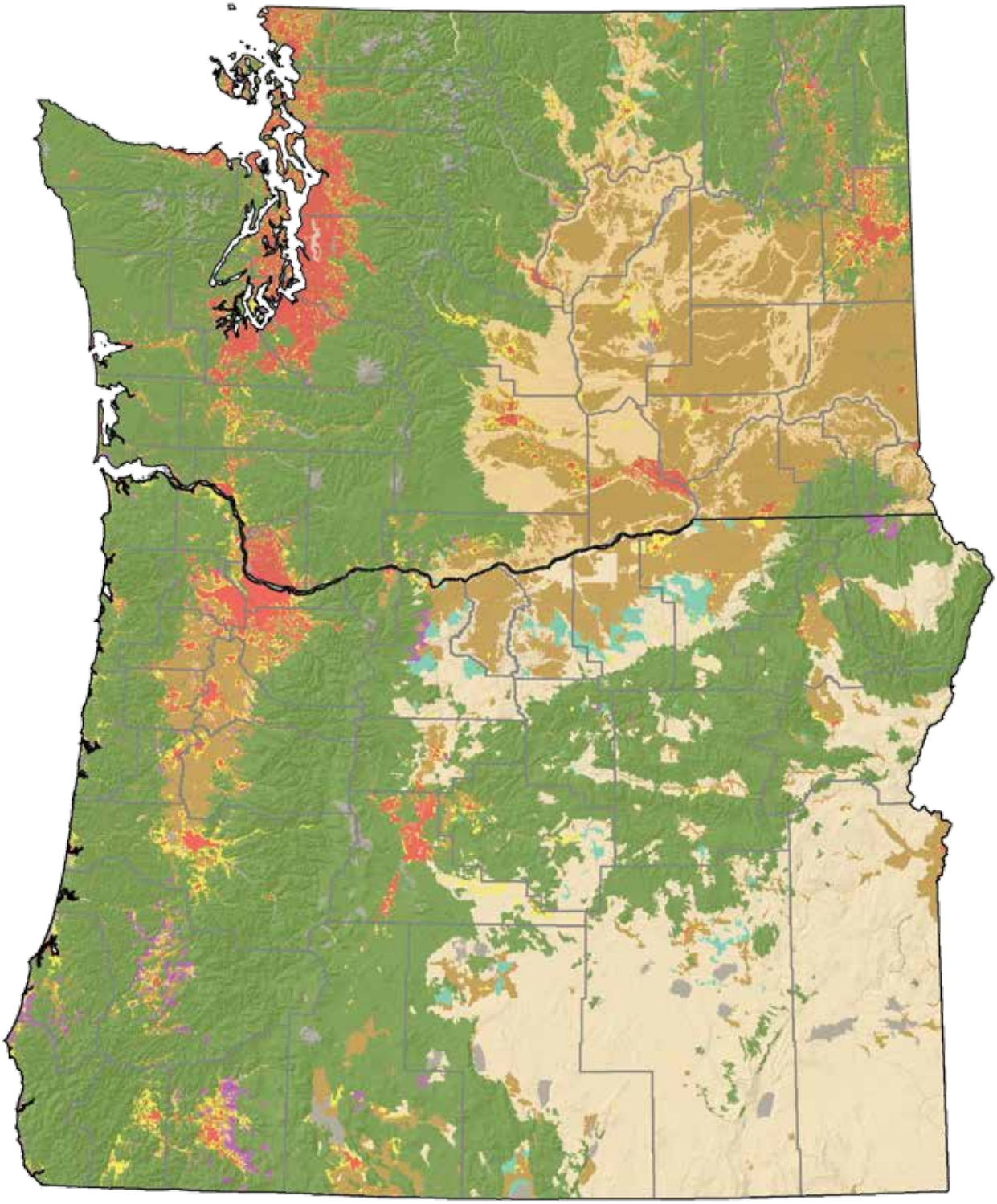
Figure 8 — Current and Projected Land Use in Oregon and Washington

Land Use: Washington 2006 and Oregon 2009



Data source: USDA Forest Service Forest Inventory and Analysis Program, and Oregon Department of Forestry Resources Planning Program. Prepared by Oregon Department of Forestry 08/27/2013

Projected Land Use in 2065



Data source: USDA Forest Service Forest Inventory and Analysis Program, and Oregon Department of Forestry Resources Planning Program. Prepared by Oregon Department of Forestry 08/21/2013

- In the next 30 years, Oregon's population is projected to increase by 1,438,000 people (37 percent) and Washington's population, by 2,080,000 people (31 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 in the number of structures affect the use and management of land, private and public, remaining in resource land uses?

  As a start to answering these questions, Figure 8 shows current (Oregon, 2009; Washington, 2006) and projected (2065) patterns of land use across the two states. Figure 8 is based on the population projections shown above, on land use policies, and on development trends highlighted in this publication.

  Future collection and analysis of data consistent with the data used in this report and reports cited on the next page would help answer these questions.

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 Oregon 1973-2009 (Lettman and others 2011) is available at http://www.oregon.gov/odf/state_forests/frp/docs/forestfarmspeople2009.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.

Projections of Future Land Use in Oregon and Washington are available from the Forest Resources Planning Program, Oregon Department of Forestry.


FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE


OREGON
DEPARTMENT OF FORESTRY