Introduction

As with the word "riparian" (p. 40), the word "natural" is widely used, broadly understood, and loosely defined. We will use the term to characterize those portions of the WRB where vegetation grows without active and frequent intervention by people. Natural vegetation includes both native and introduced species. We do not distinguish between these vegetation types in the following analysis. The specific land use / land cover categories we use as fitting this definition are listed on page 78.

Coniferous forests cloak the mountainous perimeter of the Willamette River Basin. The lowland valley that forms the heart of the Basin historically was a mosaic of mixed conifer and hardwood forests along streams and rivers, upland hardwood forests, grasslands, and wetlands. Land use practices by agriculture, urbanization, rural residential development, and forestry have altered the natural vegetation and influenced terrestrial and aquatic ecosystems in the Willamette Basin. Classification of land use/land cover from satellite spectral data (pp. 78-81) was used as the basis for vegetation analysis.

This section on trajectories of change in natural vegetation for the five scenarios presents data on composition of land cover expressed as percent of the land base composed of natural grasslands, natural shrublands, hardwood forests, mixed forests, conifer forests, wetlands, agriculture, and development. These categories represent the dominant overstory vegetation as depicted on Map 24, p. 79. As such, they reflect broad vegetation conditions and should not be misinterpreted as fine resolution delineation of habitats, which are needed for certain wetlands. Small wetlands can exist under the overstory of a hardwood forest, for example. Also, these data have not been separated by vegetation age classes. These categories include only the vegetation classes that would be considered natural vegetation in both managed and unmanaged portions of the landscape. Patterns in natural vegetation for the five scenarios are described separately for the Lowland region (WVE), Upland region, and the entire Willamette River Basin.

Lowlands

Historically, the Lowlands of the Willamette Valley contained complex patchworks and networks of prairies, oak woodlands, wetlands, riparian forests, and floodplain forests. Conifer and hardwood forests each accounted for approximately 23% of the valley (Table 27, Fig. 104). Grasslands extended over 23% of the valley as well, and wetlands made up 10% of the land base. Under existing conditions (LULC ca. 90), the natural grasslands and wetlands each have been reduced to less than 1%. Approximately 40% of the conifer forests and 70% of the hardwood forests have been converted to other land cover, but mixed forests have increased from 5% to 10% of the Lowlands. Agriculture and urbanization have been responsible for most of the conversion of natural vegetation to other land cover types or land uses in the valley.

Projected changes in natural vegetation under Plan Trend 2050 and Development 2050 are slight relative to 1990 conditions, though 2-5-fold increases in natural grasslands and wetlands are projected under Conserva-

tion 2050 (Fig. 104). The increases in natural grassland from 0.7% to 3.9% and in wetlands from 0.6% to 1.4% between LULC ca. 1990 and Conservation 2050 may seem trivial. However, these changes reflect increases in 104,226 acres of natural grasslands and 26,056 acres of wetlands.

Within these broad vegetation classes, several other changes are projected to occur. Under the historical scenario, oak savanna occupied 527,447 acres, but this open oak forest type has essentially been eliminated from the valley in LULC ca. 1990. Under Conservation 2050, 49,388 acres of oak savanna would be created through plausible conservation measures. This still represents only 9% of the historical extent of oak savanna, but it is a substantial improvement in a basin with a doubling in human population.

Natural grasslands historically occupied even more of the landscape, amounting to more than 767,000 acres. Such grasslands cover roughly 23,000 acres in LULC ca. 1990, Plan Trend 2050, and Development 2050. However, under Conservation 2050, more than 104,000 acres of natural grassland would be restored.

Approximately 30,000 acres of bottomland floodplain forest occur along the Willamette River in LULC ca. 1990. These floodplain forests more than double under the conservation and restoration practices in Conservation
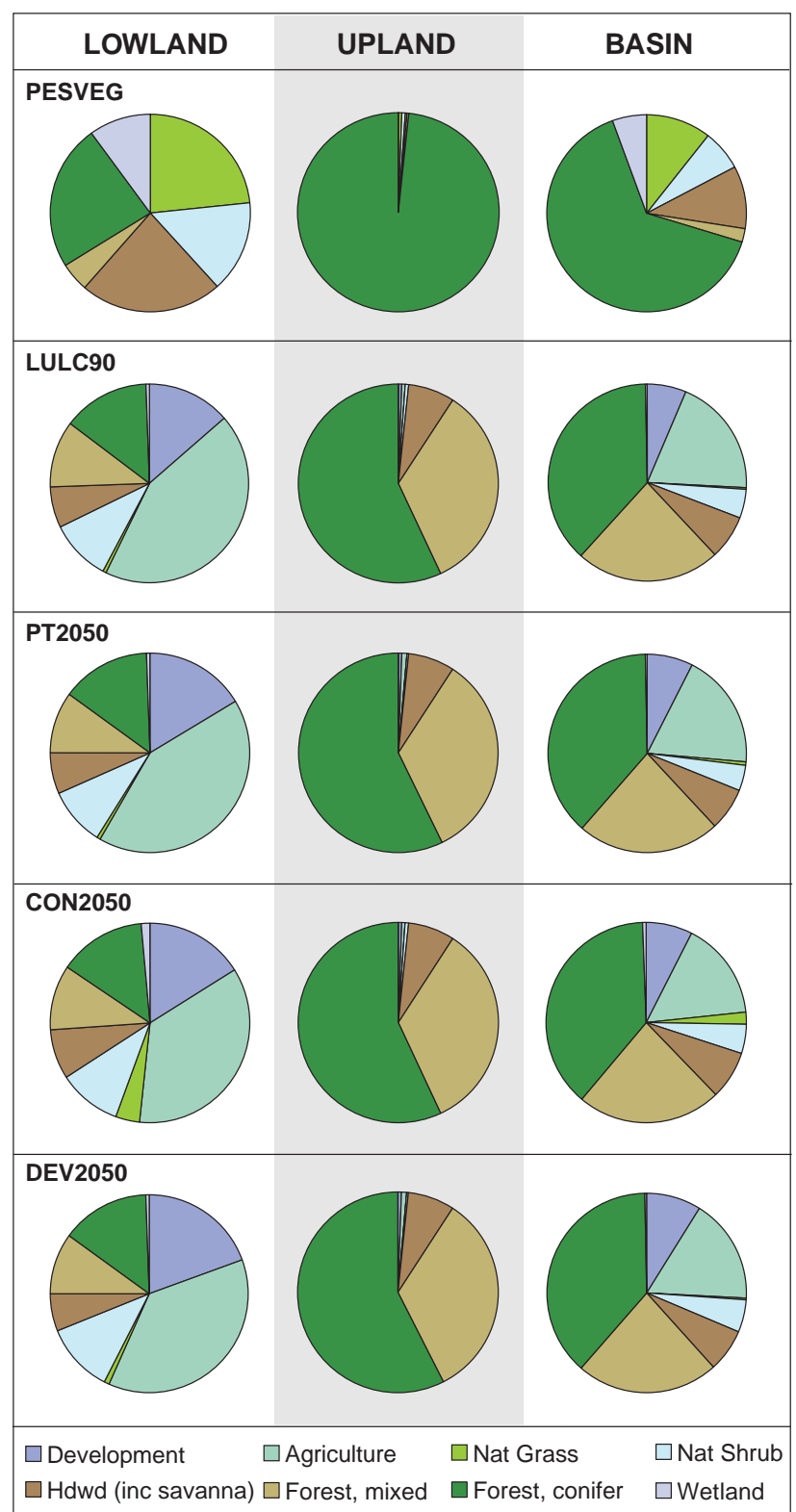

Figure 104. *Percent of land area in natural vegetation categories in the Willamette Basin. Columns represent different ecoregions (Lowlands vs. Uplands) as well as the entire basin. The different scenarios (past, present and 3 futures) are shown in rows. Savanna is combined with hardwood forests due to lack of contemporary data on savannas. Agricultural lands and development are depicted in each pie, but these lands do not represent natural vegetation.*

Lowland Percent Composition							
						Total Lowland	
SCENARIO	NatGrass	Natshrub	Hdwd	Mix For	Conif For	Wetlands	Hectares	Acres
PESVEG	22.9	14.6	22.5	4.8	23.3	9.8	1318179	3257220
LULC90	0.7	9.8	6.5	10.5	13.8	0.6	1318126	3257090
PT2050	0.7	9.2	6.3	9.9	14.1	0.6	1318126	3257090
CON2050	3.9	10.0	7.9	10.2	13.9	1.4	1318126	3257090
DEV2050	0.7	11.2	6.1	9.7	14.1	0.5	1318126	3257090

Table 27. *Percent composition of vegetation types in Willamette Basin Lowlands under different scenarios. Agricultural lands and development have been excluded from the table, thus percentages for any scenario will not equal 100%.*

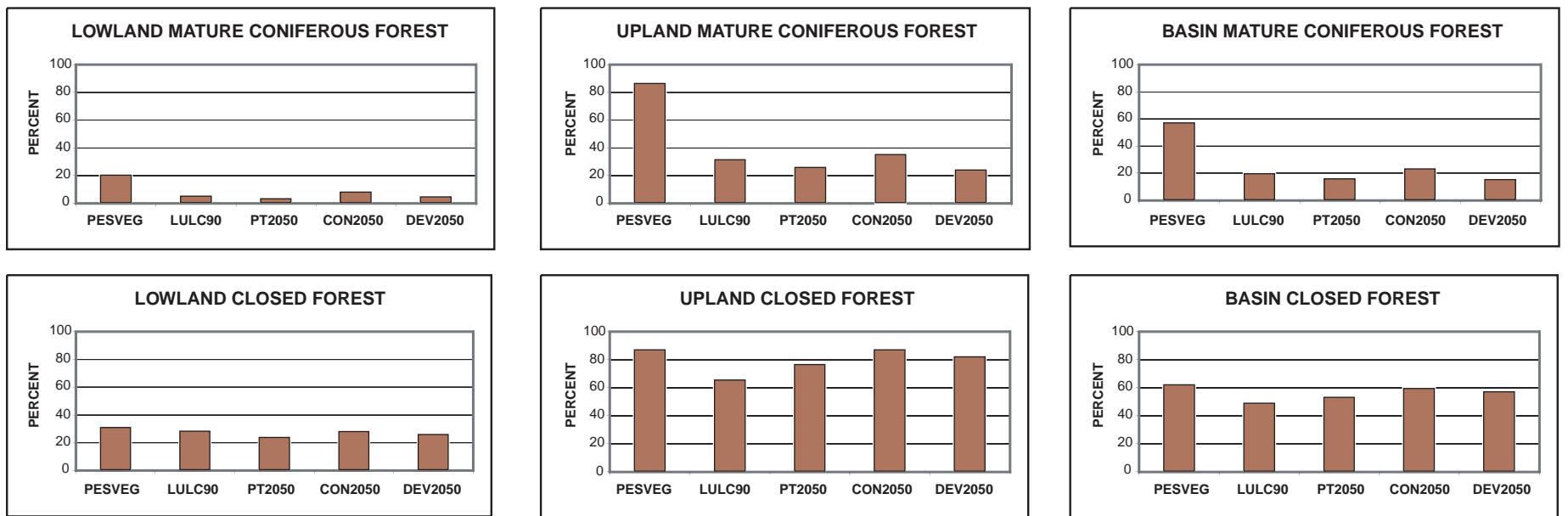| Scenario Acronyms	
PESVEG	Pre-EuroAmerican Scenario
LULC90	Land Use and Land Cover ca. 1990
PT2050	Plan Trend 2050
CON2050	Conservation 2050
DEV2050	Development 2050

Figure 105. *Change in forest types under different scenarios in the Willamette Basin. Ecoregions are presented both separately (Lowland, Upland) and combined (Basin). Forest types are divided into mature conifer (predominantly coniferous forest, greater than 80 years old) and closed forest. The latter forest type can be coniferous, deciduous, or a mixture of the two, but does have a closed canopy (greater than 70% canopy closure).*

2050. These 65,000 acres of bottomland floodplain forest in Conservation 2050 are comprised of 35,000 acres of natural bottomland forest and 30,000 acres of cottonwood plantations. While these plantation forests will not provide all of the ecological functions of a natural floodplain forest, they contribute several important functions, such as young forest structure, soil stabilization, nutrient uptake, and organic inputs to the river as leaves.

Uplands

Conifer forests historically dominated the uplands of the Willamette Basin, accounting for approximately 97% of the land base (Table 28, Fig. 104). More than 40% of this area has been converted to other land uses and cover types, primarily mixed forest. Both mixed forests and hardwood forests have increased, and collectively account for roughly 40% of the Uplands. Interestingly, this increase in hardwood forests has not been observed in riparian areas (see pp. 98-101). Most of the change in the Uplands has been a result of timber harvest. Overall natural vegetation types do not change greatly under any of the future scenarios.

In the Uplands, decline in area of older conifer forests has been greater than the change in area of conifer forests of all ages (Fig. 105). Older conifers now occupy approximately one-third of their historical area in the Uplands. Under Plan Trend 2050 and Development 2050, these proportions continue to decline, but there is a slight increase in older conifers under Conservation 2050. Closed forests increase in area relative to 1990 under all futures, with the greatest increase under Conservation 2050. Older conifer forests historically comprised one-fifth of the Lowland region, but these older forests now make up less than 5% of the valley and foothills. Area of older forests is projected to double under Conservation 2050 but remain relatively constant at 4-5% under Plan Trend 2050 and Development 2050 (Fig. 105).

Upland Percent Composition								
							Total Upland	
SCENARIO	NatGrass	Natshrub	Hdwd	Mix For	Conif For	Wetlands	Hectares	Acres
PESVEG	0.5	0.6	0.2	0.4	97.2	0.0	1654628	4088586
LULC90	0.0	0.3	7.4	33.3	56.1	0.0	1654860	4089159
PT2050	0.0	0.3	7.4	33.0	56.4	0.0	1654860	4089159
CON2050	0.0	0.3	7.4	33.2	55.9	0.0	1654860	4089159
DEV2050	0.0	0.3	7.3	32.9	56.4	0.0	1654860	4089159

Table 28. *Percent composition of natural vegetation in Willamette Basin Uplands (Cascade and Coast Ranges) under 5 different scenarios.*

Total Basin Percent Composition								
							Total Basin	
SCENARIO	NatGrass	Natshrub	Hdwd	Mix For	Conif For	Wetlands	Hectares	Acres
PESVEG	10.4	6.8	10.1	2.4	64.4	4.4	2972807	7345806
LULC90	0.3	4.5	7.0	23.2	37.4	0.2	2972986	7346250
PT2050	0.3	4.3	6.9	22.8	37.6	0.2	2972986	7346250
CON2050	1.7	4.6	7.7	23.0	37.5	0.6	2972986	7346249
DEV2050	0.3	5.2	6.8	22.6	37.7	0.2	2972986	7346249

Table 29. *Natural vegetation percentages for the entire Willamette Basin (Uplands and Lowlands combined).*

Basin

Patterns of natural vegetation across the Willamette Basin reflect the average of the properties of the Lowland and Upland regions (Table 29). Conifer forests historically accounted for two-thirds of the basin, half of which have been converted to other forest types or land uses over the past 150 years. Mixed forests now represent almost a quarter of the WRB, reflecting the conversion of conifer and hardwood forests. Future scenarios depict relatively minor changes in natural vegetation for the basin as a whole. Distributions of major land uses are unlikely to change greatly (changes of > 5-10% of the area). As a result, the magnitudes of change by areal proportion will be relatively minor, with the greatest differences being the age and composition of natural vegetation types and the locations of specific changes. But changes in total acres of land are substantial and important to both ecosystems and the social systems of the Willamette Basin.

Mature conifer forests (> 80 yrs.) once extended over almost 60% of the landscape in the WRB. These older forests now occupy only 20% of the land base and will continue to decline under the Plan Trend 2050 and Development 2050 alternatives. More than 280,000 acres of mature conifer forest would be eliminated in Plan Trend 2050 and more than 320,000 acres in Development 2050. Under Conservation 2050, the decrease of the past 150 years in forest extent would be reversed and the future landscape would contain more than 248,000 additional acres (100,464 hectares) of older forest (80 to > 200 years in age) relative to 1990.

Conclusions

- Land and water uses over the past 150 years have dramatically changed patterns and composition of natural vegetation in the WRB.

- More than 60% of the older conifer forests in the basin have been converted to other land cover types or land uses.

- Approximately half of the conifer forests in the Uplands and two-thirds of the conifer forests in the Lowlands have been converted to other land cover or land use types.

- Under current policies, losses of natural forests will continue but will not be as great as the changes observed over the last 150 years. Natural vegetation patterns on public lands are projected to improve under all future alternatives.

- Older conifer forests will increase under Conservation 2050. More than 248,000 acres of additional older forest land could result from these measures.

- More than 104,000 acres of natural grassland and 26,000 acres of wetlands could be created through plausible conservation measures by 2050.