Introduction

The rural landscape of the WRB (i.e., the area outside UGBs) is an interweaving of agricultural, forestry, and rural residential land uses reflecting the history of both natural processes and human settlement. Rural residential development has the potential to affect resource lands by occupying productive areas and interacting with farm and forestry practices. Further, such development has the potential to present special challenges to UGB expansions: punctuating open space and natural areas with expansion of roads and infrastructure, bringing traffic, noise, air, water, and light pollution. The patterns and locations of future rural development can thus affect both rural and urban residents of the WRB. Different rural development policies are expressed in the three 2050 alternative futures; this section compares some of the results.

Allocating Rural Land Use in the Alternative Futures

As in urban land use modeling (p. 106), the amount and location of new rural residential land uses were based on published data, stakeholder input, and computer modeling. There were three phases: estimating the rural population, describing and mapping the areas in which new rural housing could be located, and siting the new dwellings within those areas. Spatial mapping was performed at 10-year intervals from 2000 to 2050; results of each time step depended on the landscape modeled for the prior decade.

Population and new dwelling estimates

The rural populations in each decade for each county were estimated within the process of defining 2050 WRB and urban populations (p. 85, p. 106). For all scenarios, the rural *proportion* of the WRB population declines below that of 1990 (p. 85). Under the Plan Trend scenario, rural populations increase through 2020 and then decrease or remain constant through 2050, with the exception of the Metro counties (Clackamas, Multnomah, and Washington) where rural populations *decrease* from 1990 through 2050. For Conservation 2050, rural populations increase each decade through 2050, again with the exception of the declining rural populations in the Metro counties. For Development 2050, rural populations increase in all counties through 2050.

Using 1990 US Census Bureau data[74] and Metro forecasts,[128] estimates were made of average 1990 rural household sizes for each county and the rate of decrease with time (2.6-2.9 persons/household in 1990 declining to 2.4-2.7 persons/household by 2050).

Household size and rural population changes were used to estimate the number of new rural dwellings to be sited in each decade by county. These numbers were then adjusted to compensate for the rural dwellings that were incorporated into expanding UGBs. A net negative rural dwelling count represents rural housing vacancies, available for occupancy in the next decade.

Locating areas for new rural housing

Stakeholders defined the policies to be used in siting areas for new rural dwellings. Scenario-dependent unbuildable areas were excluded from consideration (see p. 106). Under Plan Trend 2050, all new rural dwellings were placed in 1990 rural residential zones (RRZs; see Map 18, p. 73); planners with expert local knowledge estimated that build-out would occur by 2020. Under the Conservation scenario 50% of the new rural dwellings were placed within existing 1990 RRZs with new subdivision allowed to a minimum parcel size of 5 acres. The remaining 50% were sited in rural clusters on parcels of more than 64 acres that adjoined both RRZs and Tier 1 conservation areas (p. 90). For the Development scenario, subdivision of existing parcels within 1500 ft of a road was permitted if the area was suitable for septic systems. New lot sizes were assigned according to the 1990 distribution (Fig. 127), subject to county-specified minimum lot sizes (2-5 acres), and were located based on environmental conditions of slope and septic suitability, travel time from the nearest major urban center (Fig. 128), and existing rural housing density. Parcels closest to roads and to water were more highly preferred. Development on existing parcels smaller than the assigned lot size occurred if soil conditions were suitable. While industrial forest lands were subject to subdivision only if adjacent population densities were sufficiently high (p. 105) no such restrictions were placed on non-industrial forest parcels. Although subdivision of high productivity agricultural lands was not favored, it did occur.

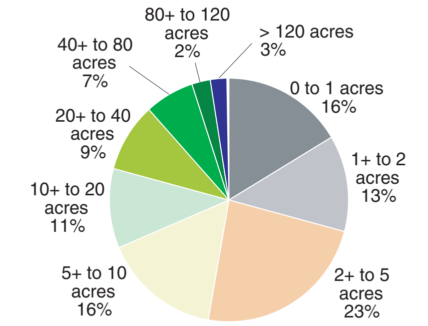

Figure 127. *Percentage of built rural parcels in 1990 in different acreage groups within the WRB.* *All counties except Yamhill and Columbia are represented.*

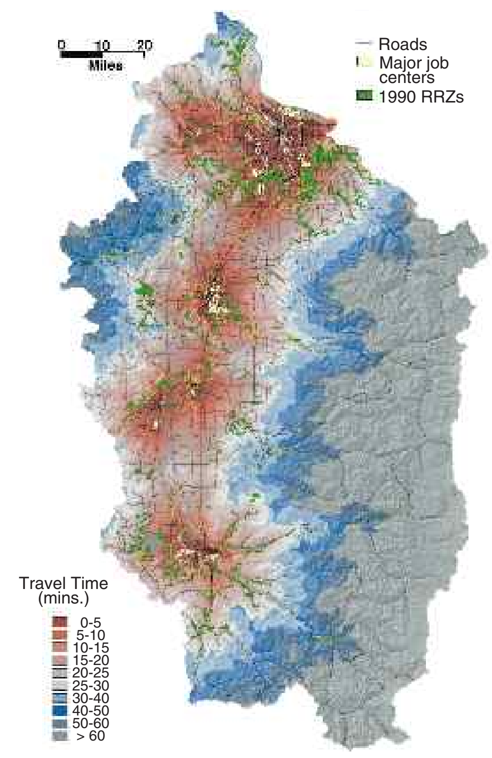

Figure 128. *Travel time to nearest major urban employment center, in minutes.*

Comparing Results of the Rural Residential Alternative Futures

Fig. 129 compares the spatial distribution of the rural structures for ca. 1990 and all 2050 alternative futures. Table 38 compares density statistics across the past, 1990, and 2050 scenarios; Table 39 shows the location of rural structures with respect to various factors. The statistics for 1990 in Table 39 use all 1990 structures and thus reflect landscape patterns derived over 150 years with only the last 20 years under Oregon's land use planning system (pp. 72-75). The statistics for 2050 are based on the siting of new structures only (i.e., those added between 1990 and 2050). Differences

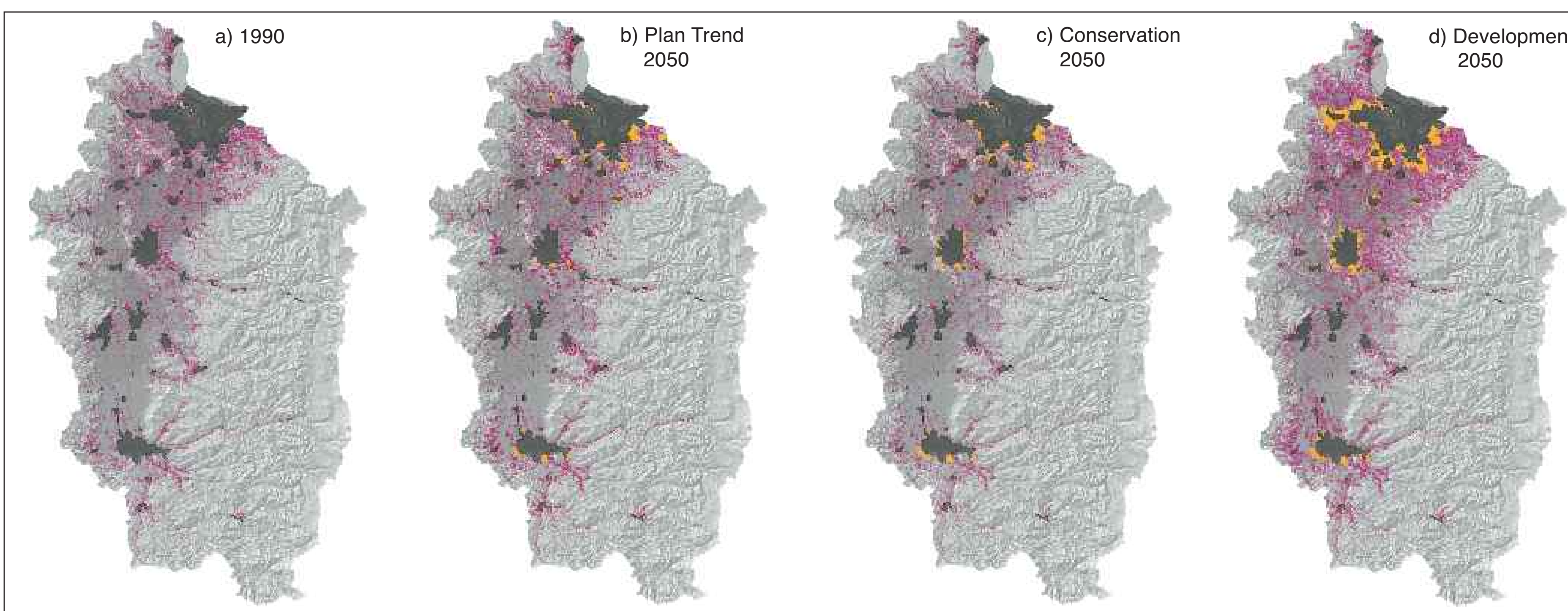

Figure 129. *Comparison of rural structure density and urban growth expansion between 1990 conditions and 2050 alternative futures.*
Pink shows the locations of rural structures; yellow represents areas of UGB expansion; dark grey is the area within 1990 UGBs.

	ca. 1850	LULC 1990	Plan Trend 2050	Conservation 2050	Development 2050
Total Rural Structures	1,505	117,691	122,843	116,372	214,259
New structures added 1990-2050[a]			12,382	5,204	108,070
Rural Valley Area (sq. mi.)[b]	5,085	4,409	4,333	4,327	4,211
Avg. Density of Rural Population[c]					
people / sq. mi.	2.2	63	65	58	124
acres / person	291	10	10	11	5
Local Maximum Density[d]					
structures / sq. mi	7	495	333	334	399
acres/structure	91	1.3	1.9	1.9	1.6
Mean Structure Density:					
structures / sq. mi.	3	74	65	64	106
acres/structure	213	9	10	10	6

[a] New structures are those added from 1990-2050; some existing 1990 rural structures are absorbed into UGBs, and are no longer rural in 2050.
[b] Computed using the area within the Willamette Valley ecoregion outside UGBs.
[c] Computed using rural population and rural valley area
[d] Density in area of maximum concentration of structures (computed using 1.2 sq.mi sliding circular window)

Table 38. *Comparison of rural structure statistics for each alternative future.*

between 1990 and 2050 statistics reflect scenario differences or changes in the available land base.

Rural structure density fell in both Plan Trend 2050 and Conservation 2050 as a result of the absorption of areas with high densities of small rural residential lots into expanding UGBs. However, rural density increased in Development 2050 due to the offsetting creation of newly subdivided small acreages outside RRZs (Table 38).

Rural development most directly affects the land cover in the immediate vicinity of building, here assumed to be within 2 acres of a rural structure (a circle of approximately 165 ft radius, or a square with 295 ft. sides), an area occupied by driveways, gardens, out-buildings, septic fields, etc. However, rural development can also force changes in adjacent areas by fragmenting large parcels and diminishing their usefulness for certain activities. (See also pp. 102-103, and p. 105.) New infrastructure such as roads and utility easements is needed to support development. Thus, while the 2-acre area of influence of a structure is used here, it is a conservative estimate of the full effects of rural development.

By 1990, 178,200 acres were affected by rural development (measured as above). In Development 2050, a *further* 121,500 acres of land were affected compared with 20,500 acres in Plan Trend 2050 and 4,500 acres in Conservation 2050 (calculated using the area within 2 acres of a 2050 rural structure that was not within 2 acres of a 1990 rural structure). Situations in which dwellings were clustered (as in Conservation 2050), or were sited on narrow lots adjacent to a common feature such as a road, for example, caused the least disturbance. Dwellings that were spaced apart from others affected the largest area under this measure. Additionally, because of the concentration of development within the valley floor (due to the historic legacy of roads and development patterns) and the predominance of agriculture within the preferred commute distance, rural structures affected agriculture more than forestry in all alternative futures (Fig. 130). In Plan Trend 2050 and Conservation 2050, natural and native vegetation (mixed forest, shrub, marshes) were the most impacted land cover categories due to the siting of dwellings in RRZs in which agriculture and forest land uses are minimal. In Development 2050, while farmland underwent the greatest conversion, natural and native vegetation were also strongly affected. Marginal lands may be an important refuge for biodiversity in highly altered areas of the valley. Guiding rural development to these areas may thus adversely affect plants and animals unless measures are taken to facilitate co-existence of conservation and development. Clustering new rural development (Fig. 131) offers one possible approach.

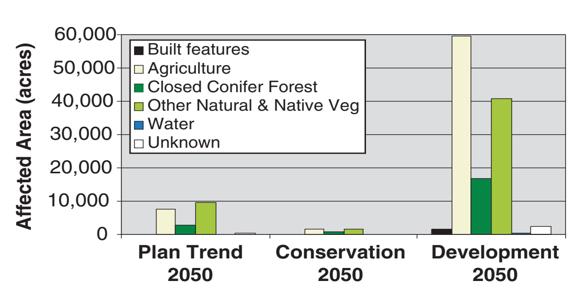

Figure 130. *Land cover in 1990 affected by 2050 rural development in each alternative future.*

	1990 All Rural Structures		Plan Trend 2050 New Rural Structures		Conservation 2050 New Rural Structures		Development 2050 New Rural Structures	
	%	Number	%	Number	%	Number	%	Number
In 100-yr floodplain	7.6	8,950	6.2	762	0	0	7.7	8,361
Within 300 ft. of water	15.9	18,800	13.1	1,624	8.2	428	15.7	17,016
Total Water Frontage[a]		*1050 mi.*		*91 mi.*		*24 mi.*		*951 mi.*
Development on soils[b]								
class I	4.6	5,500	3.8	472	4.9	254	5.7	6,120
area of class I soil[c]		*7,700 ac.*		*675 ac.*		*189 ac.*		*6,075 ac.*
class II	49.1	57,800	26.4	3,264	26.1	1,356	43.1	46,559
area of class II soil		*81,400 ac.*		*5,157 ac.*		*1,061 ac.*		*49,763 ac.*
class III	27.1	31,900	35.7	4,422	39.4	2,051	27.1	29,234
area of class III soil		*49,900 ac.*		*7,376 ac.*		*1,792 ac.*		*33,755 ac.*
Distance from 1990 improved road[d]								
0 - 100 ft.	37.2	35,700	11.9	1,469	24.3	1,263	25.9	27,952
0 - 0.25 mi.	94.3	111,000	89.7	11,104	77.0	4,007	79.1	85,499
Within 30 minutes travel time of a 1990 major UGB.	86.3	101,584	84.6	10,475	95.2	4,953	86.9	93,943

[a] Computed assuming each structure has 2 acre area of influence with 295 ft. frontage (295 ft. x 295 ft. = 2 ac.)
[b] These are non-irrigated classes from USDA; see section "Soils," pp. 10-11.
[c] Calculated assuming 2 acre area of influence; in Development 2050 and Conservation 2050, the area around each structure may be constrained by parcel boundaries
[d] No new roads were simulated in the alternative futures; high structure densities are assumed to indicate road construction to service the area.

Table 39. *Statistics on location of rural structures with respect to selected environmental and built features.*

Only in Conservation 2050 were new structures excluded from the FEMA 100-yr floodplain. In Development 2050, a combination of the desire to situate near a water body and an aversion to flood danger resulted in a continuation of the trend shown in 1990 whereby about 8% of rural structures are found in this hazard zone (Table 39).

Under Conservation 2050, new development was also excluded from designated riparian areas. This resulted in a smaller proportion of new structures being found close to water bodies. In Development 2050, the assumptions regarding residents' desire to experience the aesthetics of living adjacent to water doubled the total number of structures found in riparian areas, and new structures within 300 ft. of a water body were estimated to impact an additional 950 miles of water edge (Table 39).

Because of the large proportion of rich soils in the valley, a significant percentage of buildings sited without regard to soil class can be expected to fall on "high quality" soils. Of the soils in the rural area of the Willamette Valley ecoregion (approximately the area below the 1000 ft. elevation contour), 63% are in the USDA non-irrigated capability classes I-III (pp. 10-11). Building within RRZs has less effect on high quality soils, as shown in Plan Trend 2050 and Conservation 2050 (Table 39). Under Development 2050 assumptions, while building was discouraged on highly productive agricultural soils, other siting factors such as commute times were preeminent. The result mirrors that shown for 1990, reflective of historic building trends. About 56,000 additional acres of class I and II soils were, under Development 2050, impacted by rural development, compared with 6,000 additional acres under Plan Trend 2050 and 1,200 additional acres under Conservation 2050 assumptions (Table 39).

Unsurprisingly, all future alternatives indicate that more road building will be required to service new rural dwellings. Under both Plan Trend 2050 and Conservation 2050, 1,200 structures were more than 1/4 mile from a 1990 improved road; under Development 2050, 21,000 were so sited (Table 39). The results shown here preferenced sites within a 30-minute commute zone to major UGBs. Over 90% of the valley is within this commute zone. Future advances in communications may allow a larger proportion of the populace to work from their homes rather than commuting; this would increase the residential attractiveness of more distant rural lands.

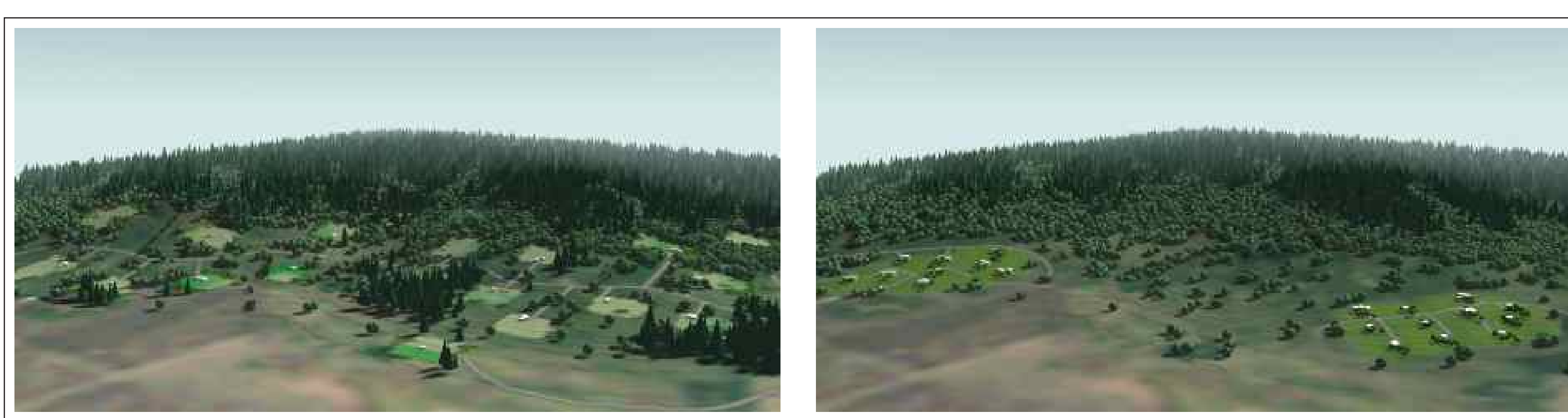

Figure 131. *Simulations of rural landscapes in the foothills of the Willamette Valley, showing the same number of rural homes under (left) conventional parcelization, and (right) cluster development with oak restoration. (Visualization by: D. Diethelm)*