Introduction

Of the 1,970,000 people who lived within the WRB in 1990, 86% (about 1,692,000) lived within 69 UGBs.[72] By 2050, the basinwide population is projected to reach 3,900,000.[125,126] Where this burgeoning population lives and works will affect the whole basin, particularly resource lands, wildlife habitat, and water resources. Moreover, the public's quality of life will be greatly influenced by the built urban landscape. This section describes how urban land uses of the alternative futures were allocated and sited, and compares some consequences.

Allocating Urban Land Use in the Alternative Futures

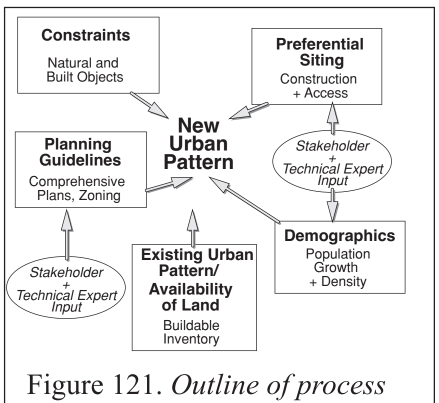

Figure 121. *Outline of process used to allocate urban land use.*

To examine effects of different urban policies, residential, commercial, and industrial land uses associated with increasing population were spatially located based on expert stakeholder opinion and computer modeling. There were three phases to this process: estimating populations and employment, determining new urban boundaries, and distributing new and redeveloped land uses within those boundaries (Fig. 121).

Population and employment estimates

County population forecasts from the Oregon Department of Administrative Services (DAS) were extrapolated to 2050, and adjusted to the WRB boundary.[125,126] All three alternative futures used these same estimates. For Plan Trend, population forecasts for each UGB were based on data from the Center for Population Research & Census [127] supplemented by forecasts from city and county governments. The 1990 urban proportions of each county population and of the entire basin were then calculated and used as the basis for Plan Trend 2050. This number was used as a reference by the PFWG in setting the basin-wide urban percentage for Conservation 2050 and Development 2050 (Table 26, p.85). The 1990 urban populations were then extrapolated for these two futures using county-specific proportions so that the 2050 urban population targets for each city, county and for the basin were achieved (Table 35).

Parameter	1990	Plan Trend 2050	Conservation 2050	Development 2050
WRB population	1,970,000[a]	3,900,000[a]	3,900,000	3,900,000
WRB % urban population	86%[a]	93%[a]	94%	87%
WRB average household size	2.66, 2.58[a]	2.66 - 2.59	2.58 - 2.4	2.58 - 2.4
Residential redevelopment and infill as % of 1990 residential area		10-13%	12-15%	5%
Commercial & industrial (C&I) re-development as % of 1990 C&I area		10%	10%	10%
WRB gross density (du/ac) for **new** residential development	4.2[a] *(approx. existing)*	7.9	9.3	6.2
Employees/acre for **new** C&I areas, county-specific	15-24[a] *(existing)*	22-35	22-35	15-24

[a] indicates values calculated from Bibliography references 72, 125-130 and from land use data (p. 79); all other values were estimated by stakeholders; du/ac = dwelling units/acre.

Table 35. *Parameters defining urban land use requirements for each future.*

Urban household sizes (persons/household) were assumed to decline from 1990[72] through 2050 due to changing demography.[128,129] Using these values, the increase in each city population was translated into a housing demand. Some demand was met through infill and redevelopment which occurred at different rates for each scenario.[126] The rest was then apportioned to each of four gross residential density land use categories (Fig. 122) so that the basinwide density of all *new* residential development met PFWG targets (Tables 35, 36).

New commercial and industrial (C&I) areas for each county were estimated from DAS-projected county employment trends,[125] the projected trend of employees per C&I acre for each county, and an assumed redevelopment rate.

CITY	Alternative Future	% of new residential dwellings: 0 to 4 du/ac.	4+ to 9 du/ac.	9+ to 16 du/ac.	> 16 du/ac.	Gross Density[b] of new residential areas (du/ac.)
Albany	Plan Trend 2050	36%	42%	17%	5%	6.3
	Conservation 2050	34%	42%	20%	5%	6.8
	Development 2050	85%	9%	5%	1%	4.4
Corvallis	Plan Trend 2050	35%	25%	30%	10%	6.9
	Conservation 2050	27%	32%	31%	10%	7.9
	Development 2050	50%	35%	10%	5%	5.6
Eugene/ Springfld	Plan Trend 2050	29%	37%	24%	10%	7.1
	Conservation 2050	27%	32%	31%	10%	7.9
	Development 2050	50%	37%	8%	5%	5.5
Salem/ Keizer	Plan Trend 2050[a]	2%	68%	17%	13%	9.2
	Conservation 2050	28%	32%	30%	10%	7.8
	Development 2050	50%	44%	5%	2%	5.5
METRO	Plan Trend 2050	3%	50%	28%	19%	10.1
	Conservation 2050	2%	40%	30%	28%	12.8
	Development 2050	28%	35%	22%	15%	7.7
Other	Plan Trend 2050	47%	37%	15%	1%	5.7
	Conservation 2050	39%	44%	16%	1%	5.7
	Development 2050	78%	19%	2%	1%	3.7
ALL	Plan Trend 2050	18%	47%	23%	12%	7.9
	Conservation 2050	15%	38%	28%	18%	9.3
	Development 2050	41%	34%	16%	10%	6.2

Note: these percentages may not add to 100% because of rounding. du/ac = dwelling units/acre
[a]These numbers differ from other alternative futures due to a clarification of the low and medium residential density designations in the comprehensive plan following completion of Plan Trend 2050.
[b]Gross residential density is the number of houses per acre of land with roads, sidewalks, neighborhood parks and schools. Public facilities are assumed to be sited among the houses but are not explicitly mapped. It is assumed that 65-70% of the area is actually occupied by houses and yards.

Table 36. *Proportion of new urban dwellings built in each residential density category over the period 1990 – 2050.*

The new areas were apportioned to each city based on that city's proportion of C&I land in 1990 (obtained from the ca. 1990 Land Use / Land Cover data, p. 79).

New urban boundaries and distribution of new urban land uses

No new cities were created; all urban growth was within enlarged 1990 UGBs. The expansion acreage for each UGB was calculated using the projected residential density mix (Table 36), estimated new C&I acres (Table 35), and circa 1990 urbanizable lands (Table 37). The spatial configurations of these expansions were defined in two ways. For Plan Trend 2050, planning professionals with expert local knowledge consulted comprehensive plans and growth management studies including the Metro 2040 Plan.[130] With maps showing 1990 UGBs, prime soils, transportation systems, rural residential zones, and slope, they drew new boundaries for each city accommodating projected 2050 growth. For Conservation 2050 and Development 2050, the expansion area of each UGB was computer modeled. At each 10-year time step, parcels were selected for inclusion into the UGB based on their distance from 1990 roads, travel time to the UGB, nearby rural structure density, and agricultural productivity. The area within the proposed new UGB was then tested for sufficient buildable space to accommodate the projected growth at the stated densities, and the process of parcel selection repeated until the space need was met.

Vacant land within UGBs was defined by circa 1990 tax-assessor data,[92] and by vegetative land cover. Some of this land was unbuildable due to scenario-specific policies. In all alternative futures no new development was permitted on certain designated wetlands [131-133] and in floodways.[134] Additionally, under Conservation 2050, buildable lands were further constrained by excluding the FEMA 100-yr floodplain,[134] riparian zones, and slopes greater than 25%. Buildable land was developed by distributing each type of future urban land use according to scenario-specific siting rules based on environmental factors (slope, depth to bedrock, depth to water table) and existing built conditions (distance to nearest road and railroad, distance to nearest commercial center). When possible, comprehensive plans were followed; rezoning to less intense land use was allowed when an excess of buildable space zoned for more intense land use was available (e.g., industrially zoned land could be down-zoned to commercial) and a scenario-specific portion of the 1990 residential area within each UGB was considered to be redeveloped and infilled (Table 35).

Figure 122. *Illustrations of residences within residential density categories used in urban modeling.*

Comparing Results of the Urban Alternative Futures

The UGBs for each alternative future are shown in Figure 129, p. 108. While these urban areas occupy only 6.7% to 7.8% of the entire WRB area in 2050, 87% to 93% of the basin population lives within these boundaries. The area within UGBs expands by 29% in Development 2050 compared to 1990, 12% under Conservation 2050, and 11% under Plan Trend 2050. Plan Trend 2050 shows the most efficient use of land with the lowest rate of increase in urban area per new resident, while Development 2050 shows a three times greater land consumption rate. Despite higher residential densities, UGB areas increase more under Conservation 2050 than Plan Trend 2050 due to increased unbuildable lands (Table 37).

Although residential land use constitutes 73% - 75% by area of new development in *all* scenarios, the differences in housing densities and the rates of infill and redevelopment (Tables 35, 36) result in substantial differences in the urban pattern of each alternative future. In particular, the amount of housing from infill and redevelopment is 9% in Development 2050 compared with over 25% in Conservation 2050 (Table 37). Although Plan Trend 2050 has the lowest rate of expansion, more vacant land within 1990 UGBs is urbanized in Plan Trend 2050 than in Conservation 2050. Development 2050 has the least efficient urbanization rate due primarily to a comparatively low residential density (Tables 36, 37).

Inside UGBs	LULC 90	Plan Trend 2050	Cons. 2050	Devel. 2050
Increase in urban population	*1,691,600*[a]	1,924,700	1,957,500	1,685,500
Increase in UGB area (acres)	*444,000*	51,000	54,000	129,000
Urban residents/acre	*3.8*	7.3	7.3	5.9
Increase in UGB area per new resident (acres/person)		0.026	0.028	0.077
Increase in urbanized area (acres)	*313,000*	100,200	82,000	152,000
% Housing need filled by infill and redevelopment		19%	26%	9%
Increase in urbanized area per new resident (acres/person)		0.052	0.042	0.090
Vacant Area (acres): Unbuildable	44,000[b]	57,000	84,000	60,000
Vacant Area (acres): Buildable	87,000[b]	23,800	19,000	48,000
Required 20 yr. buildable supply (acres)		22,100	18,300	42,100
Residents/acre: Unbuildable land	*38.4*	63.4	43.4	56.3
Residents/acre: All vacant land	*12.9*	44.8	35.4	31.3

[a]italicized numbers represent status in 1990;[b]under Plan Trend assumptions

Table 37. *Some urban population and land use modeling results comparing circa 1990 and 2050 alternative futures.*

Two measures of open space are considered: the amount of all vacant land, and the amount of unbuildable land. Under all scenarios, both of these quantities *per resident* decrease substantially by 2050 (Table 37) Exclusion of development on riparian lands, floodplains, and steep slopes within UGBs and a more expansive definition of protected wetlands result in more unbuildable space in Conservation 2050 than with the more permissive assumptions of Development 2050. However, under Plan Trend 2050, the constraint of compact UGBs *without* more restrictive environmental protocols results in the least amount of unbuilt open space per resident. If *all* vacant lands are considered, Development 2050 provides the greatest amount per resident because of its much larger 20-year supply of buildable land. (Table 37).

Figure 123 (a-c) compares areas of rural 1990 LULC incorporated within the 2050 UGBs. Although, under all scenarios, agriculture and forest lands were preferentially avoided when new UGBs were drawn, the 1990 transportation network influenced which areas were selected. Resource lands, as a result, comprise over 50% of the expansion areas. The location of the existing 1990 UGBs within the WRB landscape predispose these percentages (Fig. 123(d)): e.g., agriculture occupies 63% of potentially buildable private lands within 1 mi. of 1990 UGBs. Plan Trend and Conservation 2050 UGBs affect agriculture least because of their compact growth and stronger avoidance of productive lands. In all scenarios, this latter policy disproportionately shifts the emphasis to non-resource lands, which are important for wildlife habitat.

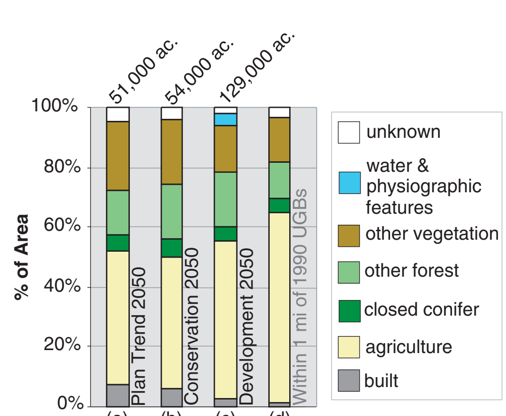

Figure 123. *1990 LULC within (a-c) 2050 UGB expansion areas, and (d) potentially buildable rural areas within 1 mile of 1990 UGBs.*

Figure 124 (a-d) compares the areas of each soil class brought into the 2050 UGBs with the inventory within 1990 UGBs. Over 60% of the soils within the valley ecoregion and over 74% of the potentially buildable area within 1 mi. of 1990 UGBs are in soil classes I-III (Fig. 124(e)). Conservation 2050 is the most protective of the best soils, while Development 2050, both because of low density development and less restrictive growth policies, urbanizes the most.

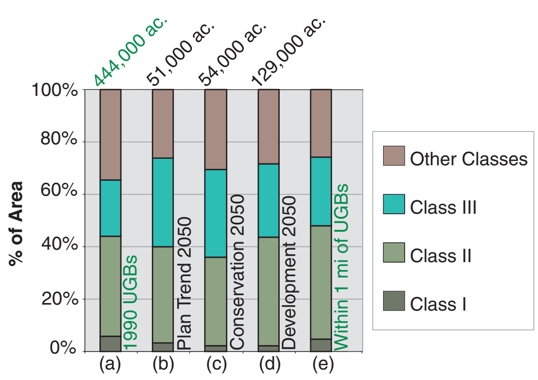

Figure 124. *Comparison of soil capability classes in (a) 1990 UGBs, (b-d) 2050 UGB expansion areas, and (e) potentially buildable rural areas within 1 mi of 1990 UGBs. (See pg. 10 for soil class definitions).*

As UGBs expand, river length within urban areas increases (Fig. 125). About 45% of all river edge miles inside 1990 UGBs are in a built LULC category. While none of the alternative scenarios *removes* buildings in riparian areas, Conservation 2050 retains natural vegetation and revegetates former agricultural lands. Under Development 2050, not only does the number of miles of urban stream increase but the proportion that is built upon increases to 59%, increasing the risk to stream habitat from degraded riparian functioning.

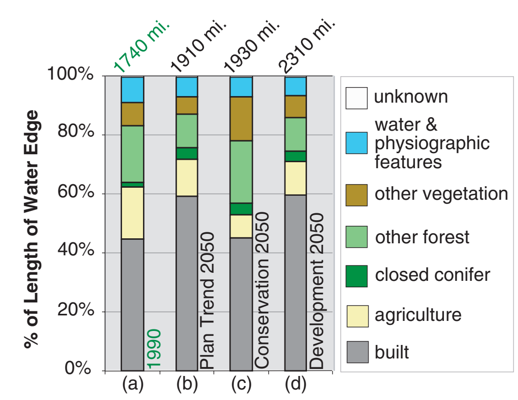

Figure 125. *LULC along the edges of water bodies within (a) 1990 UGBs, and (b-d) 2050 UGBs. Miles of water edge are shown above. All stream orders and lakes are included.*

Development 2050 shows the greatest increase in urbanized acres, 49% over 1990, while Conservation 2050 and Plan Trend 2050 show increases of 26% and 28%, respectively. However, 68% of new residential areas in Development 2050 are low density housing (0-4 du/ac), compared with 36-37% in Plan Trend and Conservation 2050 (Fig. 126). On-site treatment of stormwater runoff is easier in areas of lower built density where more space is available for the installation of best management practices. Thus, increasing housing density within UGBs, such as in Plan Trend and Conservation 2050 futures, requires increased effort if runoff is to be treated before it reaches waterways.

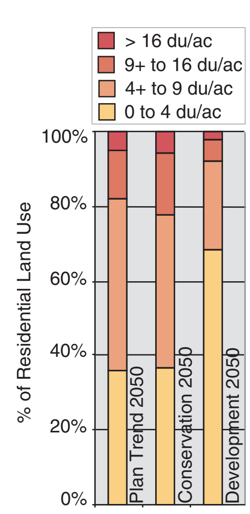

Figure 126. *Comparison of the area of new residential land use density categories between the 2050 alternative futures.*

Photos: Center for Housing Innovation, University of Oregon.