

**The Scenario**

The Development 2050 scenario assumes greater reliance on market-oriented approaches to land and water use, with attendant emphasis on short-term economic gain in making land and water use decisions. It assumes recent trends in the relaxation of land use laws continue, resulting in fewer restrictions on where intensive land management may occur. The map at right represents the landscape patterns corresponding to these assumptions. Urban and rural residential uses expand significantly, with 1990 forest and agricultural lands making way for these expansions. Development 2050 and the two other future scenarios are intended not as predictions, but rather to bracket a range of plausible options for future land and water use in the WRB.

The primary determinants of the patterns shown in the map at right are commuting times from major employment centers, anticipated forest management mandates under more market-oriented assumptions, existing water rights, and projected crop patterns. Changes are projected in the amount, location, and pattern of urban, rural residential, agricultural, forest, and native vegetation land uses. Changes in water use are projected as the existing water rights associated with changing land uses are exercised. Federal reservoir management assumes the ca. 1990 operational pattern: reservoirs store as much water as possible in the winter and spring, release it in the summer to meet existing stream-flow targets along the mainstem of the Willamette River. The assumptions employed regarding each broad type of land and water use are described below.

**Urban**

As with each of the three future scenarios, the projected population for Development 2050 is 3.9 million people, approximately double the 1990 population of the WRB. The Development scenario assumes 87% of these people will live inside urban growth boundaries, which have by 2050 expanded 129,000 acres beyond their 1990 extent. Of the 573,000 total acres within Development 2050 UGBs, over 81% are developed as homes, stores, roads, and other built features, with less than 19% of the area inside 2050 UGBs vegetated. This dramatic UGB expansion over 60 years assumes new homes are built at densities somewhat higher than exists in 1990 (6.2 homes per acre basinwide for homes constructed 1990-2050 as compared to approximately 4.2 homes per acre basinwide existing in 1990), and by redeveloping and infilling only 5% (Table 35, p. 106) of 1990 urban residential areas at this slightly higher density.

In 1990, UGBs occupied approximately 6% of the WRB. In Development 2050 they occupy 7.8%, an average increase of over 2,100 acres basinwide per year for the 60-year period. The majority of this expansion occurs in the northern portion of the basin.

**Rural Residential**

A key assumption of Development 2050 concerns a significant increase in the total number of people living in rural areas. Consistent with this, Development 2050 assumes a general relaxing of restrictions on where new rural residences may occur. This is accomplished by excluding fewer areas from new rural development in this scenario than in the other two future alternatives. For example, new rural residences are not excluded from areas of Class I or II soils (pp. 10-11), nor from riparian areas (pp. 40-43), nor from wetlands smaller than 5 acres in Development 2050. They are however excluded from the Federal Emergency Management Agency (FEMA) floodway (an area smaller than the FEMA 100 year floodplain), from industrial forestry parcels except when human population density exceeds 70 people per square mile, from parcels less than 1 acre in size and from parcels with less than 5 percent of their area or less than 1/4-acre suited for septic systems. The resulting pattern of 2050 rural residential land uses departs notably from trends experienced since the late 1970s (p. 108).

**Agriculture**

Development 2050 agricultural land use declines in area relative to 1990 conditions due to dramatic increases in land area of urban and rural residential uses. While irrigated crop, grain, and hay uses decline basinwide in this scenario, other agricultural trends vary among the north, middle, and

south basin counties. Grass seed uses increase in the north and middle basin, but drop by more than half in the south basin. Pasture uses increase in the north and south basin but drop by nearly one-third in the middle basin. The total area of land in agricultural production declines to 1.291 million acres in Development 2050, which equals approximately 17% of total basin area. Approximately 181,000 acres of 1990 agricultural lands are converted to other uses by 2050 under this scenario, with most of these converting to rural residential and urban uses or fragmenting into areas too small to farm.

**Forestry and Natural Vegetation**

An important assumption of Development 2050 regarding private forest lands is that, as population density reaches 70 persons per square mile, industrial forest parcels shift to become non-industrial forest parcels with attendant increases in rural residential land uses. There is also significant change in riparian vegetation policy, with 150-foot protection zones for large streams on federally managed forest lands, but no mandated riparian protection zones on state or private lands. Timber harvest rotation schedules are based on average annual cutting rates from 1973 to 1995 published in the May 1997 "Timber Harvesting Practices on Private Forest Land in Western Oregon,"<sup>115</sup> which equates to 60 years for private industrial and 128 years for non-industrial. The harvest schedule for State forest lands is based on a 100-yr. rotation, or 50% harvest probability. Modeled harvest units are 30 acres in size for federal, state, and private industrial lands, 5.6 acres in size for private non-industrial lands.

With forestlands continuing to occupy more than two-thirds of the basin, natural vegetation remains extensive under Development 2050 assumptions. While no explicit assumptions were stated in Development 2050 regarding non-forest natural vegetation, land use and management, primarily through land conversion to urban and rural residential uses, affect these areas of natural vegetation directly and indirectly. Willamette River mainstem channel complexity decreases due to river straightening (Fig. 173, p. 133).

**Water Availability**

Increases in the demand for surface water through 2050 reflect population and economic growth, as well as land conversion patterns, with per capita municipal demands assumed to be 12.5% greater in Development 2050 than in the Plan Trend 2050 scenario. Most increases in water demand occur within the constraints of existing ca. 1990 water rights and permits, with new permits available only for small self-supplied rural users and along the mainstems of the lower McKenzic and Willamette Rivers.

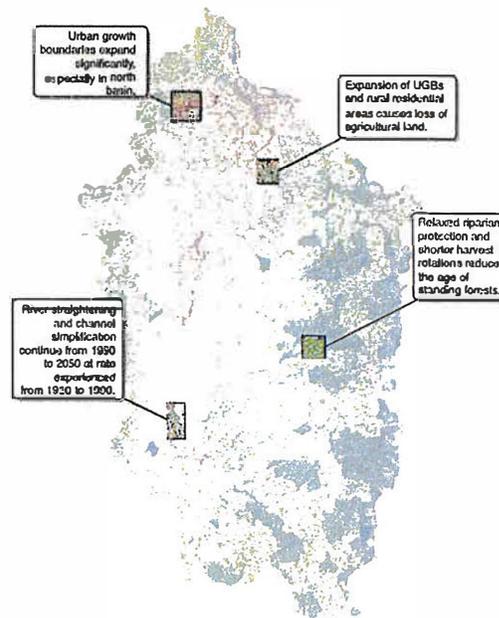
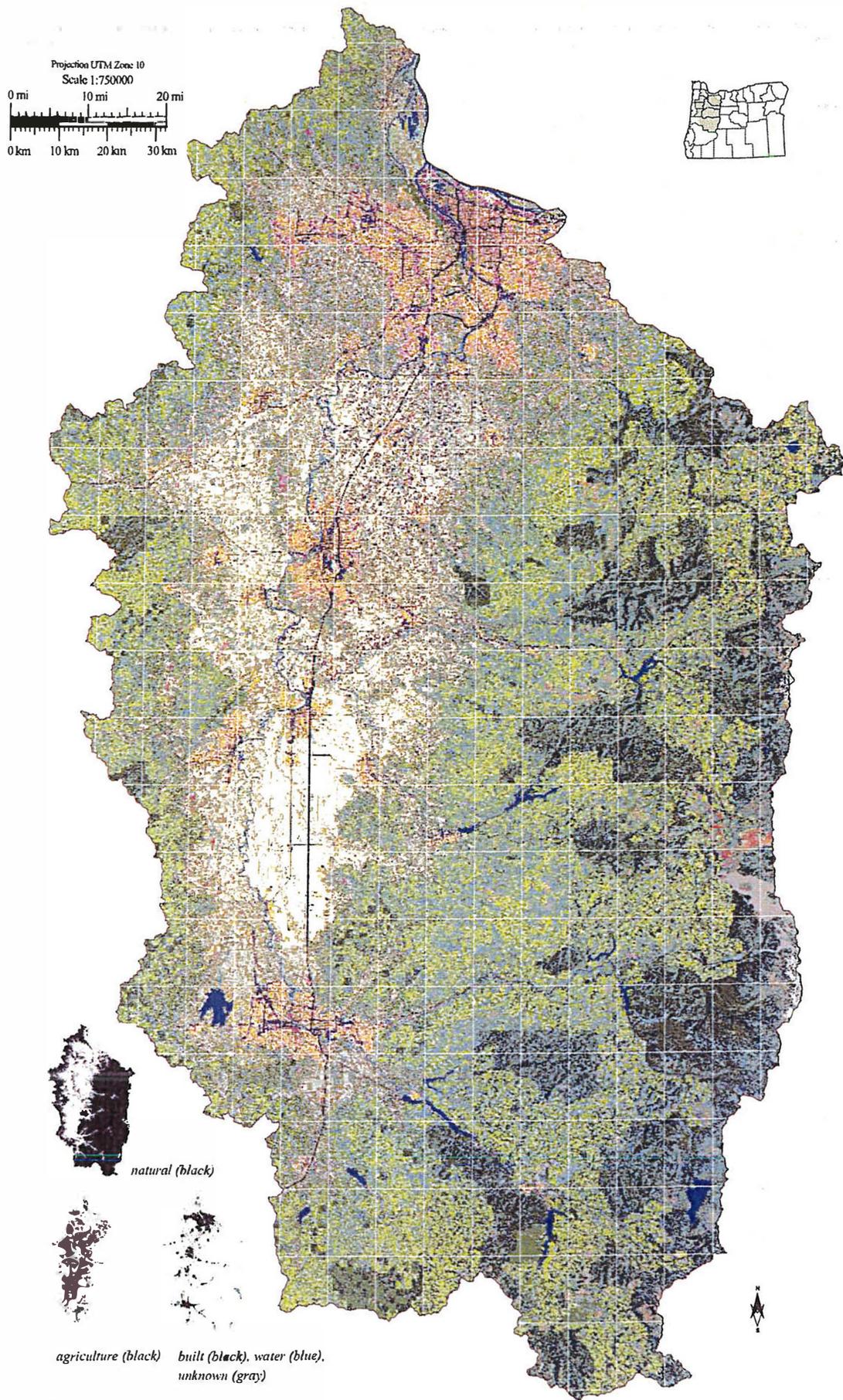


Figure 102. A diagram of the Development 2050 alternative, highlighting some key features.



Note: Legend for this map is the same as Land Use / Land Cover ca. 1990 on p. 78

**The Scenario**

Plan Trend 2050 assumes existing long-term plans and policies (e.g. the federal Northwest Forest Plan<sup>112</sup> and Oregon's land use planning system<sup>113,114</sup>) will be fully implemented. Where explicit long-term plans are unavailable, Plan Trend projects recent trends in human population growth, land, and water use to the year 2050. By combining long-term policies and recent trends, it depicts forest and agricultural practices, as well as residential, industrial, and commercial development. The map at right represents the landscape patterns corresponding to these assumptions.

The primary determinants of the patterns shown are comprehensive plans acknowledged at the time of this study, agency stated policies on land management, existing water rights, and projected crop patterns. All three 2050 future alternatives start from the same initial landscape configuration, represented by Map 24, Land Use / Land Cover ca. 1990, p. 79. Changes are projected using LULC ca. 1990 as a base in the amount, location, and pattern of urban, rural residential, agricultural, forest, and natural vegetation land uses. Changes in water use are projected as the existing water rights associated with changing land uses are exercised. Federal reservoir management assumes the ca. 1990 operational pattern: i.e., reservoirs store as much water as possible in the winter and spring, release it in the summer to meet existing stream-flow targets along the mainstem of the Willamette River. Each broad type of land and water use is described below.

**Urban**

As with each of the three future scenarios, the projected population for Plan Trend 2050 is 3.9 million people, approximately double the 1990 population of the WRB. By compiling comprehensive plans and incorporating long-range county population projections, Plan Trend shows 93% of the 2050 population living inside compact urban growth boundaries (UGBs), where residential densities increase significantly over 1990 levels, especially at the periphery of major cities. To accommodate this larger number of people, 2050 UGBs have expanded 51,000 acres beyond their 1990 extent. Of the 495,000 total acres within Plan Trend 2050 UGBs, over 80% are developed as homes, stores, roads, and other built features, with less than 20% of the area inside 2050 UGBs vegetated and available for future urban development. No explicit assumptions were stated regarding natural vegetation in urban areas under Plan Trend.

The comparatively small Plan Trend UGB expansion over 60 years is accomplished by showing new homes at higher densities (7.9 homes per acre basinwide for homes constructed 1990-2050 as compared to approximately 4.2 homes per acre basinwide existing in 1990), and by redeveloping and infilling from 10-13% (Table 35, p. 106) of 1990 urban residential areas at higher densities. In 1990, UGBs occupied approximately 6% of the WRB. In Plan Trend 2050 they occupy 6.7%, an average annual increase of 850 acres basinwide for the 60-year period. Nearly two thirds of this expansion occurs in the cities of Portland, Salem, Eugene/Springfield, Albany, and Corvallis.

**Rural Residential**

Consistent with current long-range plans, no new rural residential zones (RRZ) are assumed in Plan Trend 2050, but new rural residences built after 1990 are located within the vacant rural parcels in existing 1990 rural residential zones. These so-called "grandfathered" parcels were platted prior to adoption of Oregon's Land Use Planning system in the early 1970s. Using density assumptions consistent with each county's zoning, Plan Trend 2050 shows complete build out of all 1990 RRZs in the WRB by 2020.

In 1990 there were over 253,000 acres of rural residential zones spread throughout all counties of the WRB, with 65,200 acres in Clackamas County and 63,600 acres in Lane County. As UGBs expand under Plan Trend assumptions, some former rural residential zones are incorporated into urban areas. This occurs in over 25,700 1990 RRZ acres in Plan Trend 2050, with over 14,000 of these acres being converted from rural residential to low density urban uses in Clackamas County alone.

**Agriculture**

In striving to retain prime farmland in farm uses, Plan Trend 2050 agricultural land use remains similar to 1990 conditions. With the assumption that irrigation demands for water will be given top priority, Plan Trend 2050

shows increases in the nursery sector and in hybrid poplar. Grass seed remains a major crop, with orchards, berries, and Christmas trees in stable production. Riparian vegetation along currently regulated (Oregon Senate Bill 1010 and Clean Water Act section 303d) water-quality limited streams increases in area in agricultural lands by approximately 10% over 1990 conditions, and consists of woody vegetation and grass filter-strips. The total area of land in agricultural production remains at approximately 20% of the WRB in Plan Trend 2050. Approximately 40,000 acres of 1990 agricultural lands are converted to other uses by 2050 under this alternative, with most of these acres converting to urban land uses in areas adjacent to 1990 UGBs.

**Forestry and Natural Vegetation**

Federally managed public forest lands in this scenario follow the Northwest Forest Plan and its management prescriptions, including 300 ft. riparian vegetation zones. Late Successional Reserves defined by the Northwest Forest Plan as areas of old growth forest are aged by 60 years from 1990 conditions. Concentration of late successional forests on federal lands continues. No change is assumed in the management of the National Wildlife refuges. State and private forest lands in this scenario follow the 1995 Oregon Forest Practices Act where average 70-100 ft. riparian zones exist and timber harvest rotation schedules are based on average annual cutting rates from 1973 to 1995<sup>115</sup> which equates to 60 years for private industrial and 128 years for non-industrial forest lands. The harvest schedule for State forest lands is based on a 100-yr. rotation, or 50% harvest probability. Modeled harvest units are 30 acres in size for federal, state, and private industrial lands, 5.6 acres in size for private non-industrial lands. Assumptions regarding Willamette National Forest and Mt. Hood National Forest clear-cutting are based on the decadal harvest rates specified in the respective USFS management plans.

With forestlands continuing to occupy more than two-thirds of the basin, upland natural vegetation remains extensive under Plan Trend 2050 assumptions. While few explicit assumptions were stated in Plan Trend regarding natural vegetation outside state and federally managed forest lands, land and water use and management affect natural vegetation throughout the WRB, primarily through land conversion to urban uses, agricultural activity, reservoir management, and forest management.

**Water Availability**

Increases in Plan Trend 2050 surface water demand reflect population and economic growth, with municipal demands nearly doubling from the year 2000, and increased demand for agricultural irrigation, all of which are met. Per capita municipal use of water is projected to decline somewhat in the Portland area but remains at 1990 levels elsewhere. Demand increases occur within the constraints of existing rights, with new surface water permits available only for self-supplied rural uses and along the lower McKenzie and Willamette Rivers.

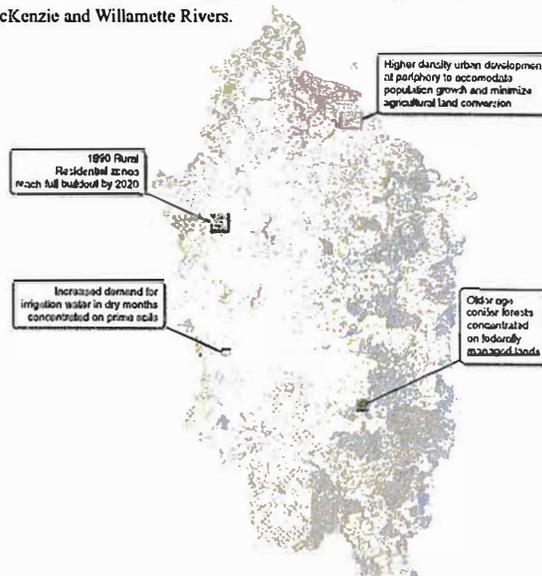
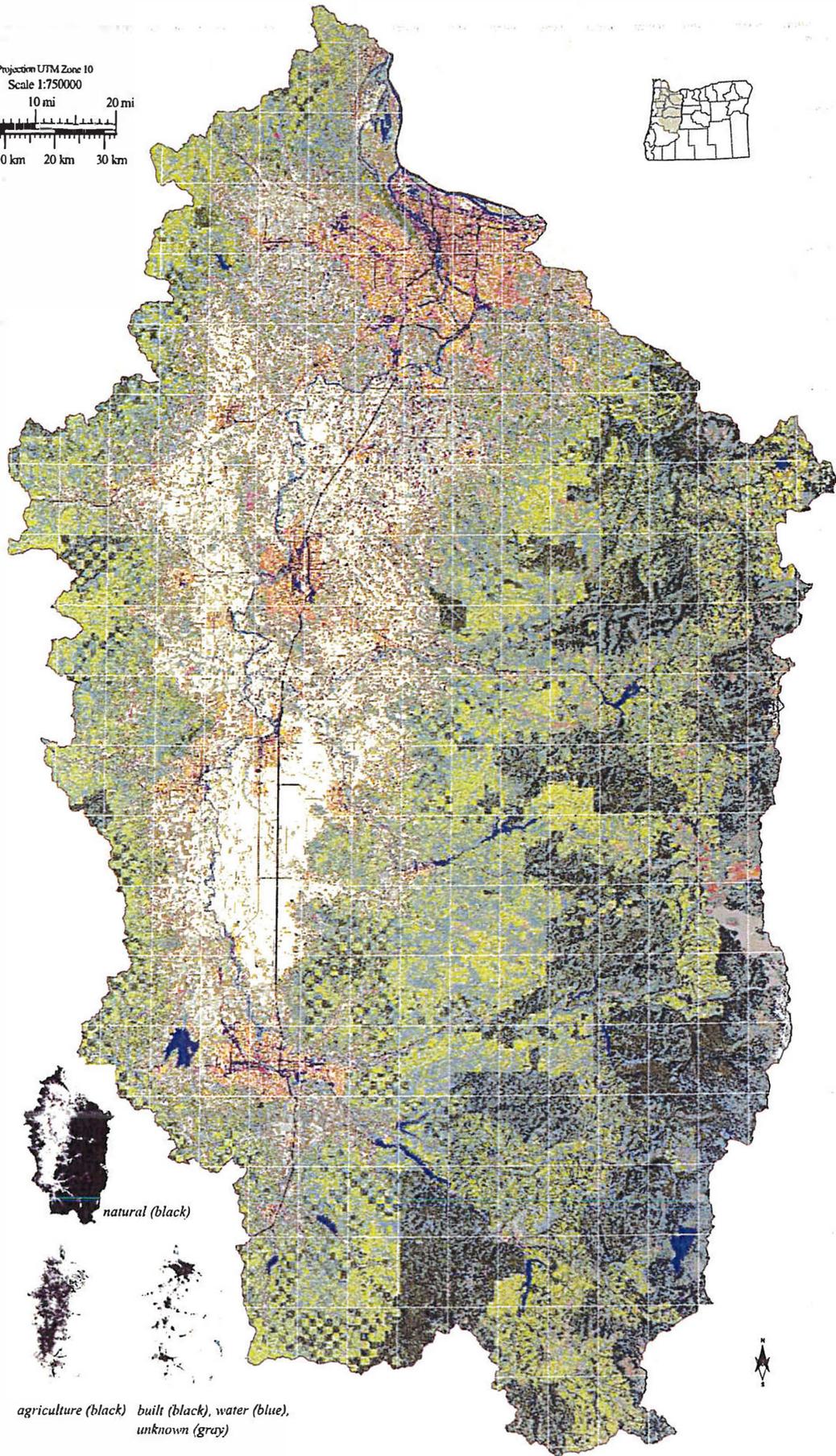


Figure 101. A diagram of the Plan Trend 2050 alternative, highlighting some key features.

Projection UTM Zone 10  
Scale 1:750000  
0 mi 10 mi 20 mi  
0 km 10 km 20 km 30 km



natural (black)  
agriculture (black) built (black), water (blue),  
unknown (gray)

Note: Legend for this map is the same as Land Use / Land Cover ca. 1990 on p. 78

**The Scenario**

Conservation 2050 projects changes in land and water use patterns to prioritize ecological services to the year 2050. Trends in the protection of aquatic life and native habitats result in resource conservation and restoration of river floodplain and upland habitat functions, with commensurate changes in urban, forest, and agricultural practices. The map at right represents the landscape patterns corresponding to these trends. The primary determinants are assumptions that conservation and restoration of native habitats and the species dependent on them will be increasingly important. Assumptions were made by the PFWG with technical input from others regarding how, where, and when more conservation-oriented land and water use occur. One of the most significant assumptions is that choices will be made first regarding which areas are conservation and restoration priorities, with future land and water use minimizing adverse effects at these locations. Two tiers of conservation and restoration lands are depicted as being phased in to 2050. Tier 1 lands are managed with priority given to achieving a naturally functioning landscape (Fig. 103). Tier 2 lands are managed for sustainable production of goods and services compatible with habitat conservation values. The changes corresponding to these assumptions are projected in the amount, location, and pattern of urban, rural residential, agricultural, forest, and native vegetation land uses. Water uses are projected as water rights associated with changing land uses are exercised and, in this alternative, at times converted from out-of-stream (e.g., irrigation) to in-stream (e.g., providing fish habitat) uses. Operations of federal reservoirs assume natural flows are passed through the dams in March through April every year. Each broad type of land and water use is described below.

**Urban**

Assumptions regarding increased urban densities lead to 94% of the 2050 population of 3.9 million people residing inside Conservation 2050 urban growth boundaries, which have expanded 54,000 acres beyond their 1990 extent. Of the 498,000 total Conservation 2050 UGB acres, 79% are developed and more than 20% are vegetated. This UGB expansion, larger than Plan Trend's due to protection of riparian vegetation inside UGBs, is accomplished by having new homes at higher densities (9.3 homes per acre within UGBs basinwide for homes constructed 1990-2050 as compared to 4.2 homes per acre within UGBs basinwide existing in 1990), and by redeveloping 12-15% of 1990 urban residential areas at higher densities (Table 35, p. 106). UGBs occupy 6.8% of the basin in Conservation 2050, an average annual increase of 900 acres over 1990 conditions for the 60-year period.

**Rural Residential**

Within the 253,000 acres of 1990 rural residential zones (RRZ), slightly more than 26,000 of these acres were covered by rural buildings in 1990. As UGBs expand under Conservation 2050 assumptions, some 1990 RRZs are incorporated into 2050 urban areas. This results in a decline in the number of rural structures from 1990 to 2050 in this scenario. Countering this decline, this scenario assumes new rural dwellings will be created between 1990 and 2050, and that some of these will occur outside 1990 RRZs. Approximately half of these new rural dwellings will be clustered into groups on parcels 20 acres or larger in size, in areas adjacent to 1990 RRZs and well suited as Tier 1 native habitat. The clustered patterns of these dwellings allow a larger portion of rural residential parcels to remain as native habitat, with the assumption that land developers and residential owners will respond to financial, tax, and regulatory changes encouraging this pattern of rural residential development (Fig. 131, p. 109).

**Agriculture**

Conservation 2050 agricultural land use remains similar in crop mix to 1990 conditions while total agricultural land area decreases significantly. Regional increases occur in the nursery sector and in grasses that appear more frequently as filter strips near wetlands. Riparian vegetation increases along streams in agricultural areas, with priority to re-vegetating water-quality limited streams on public lands. In the privately dominated lowlands, public lands are insufficient to meet assumptions, and some lower-productivity private lands are shown as restored to natural vegetation. Of the 1.37 million acres of 1990 private agricultural land, 3.7% are restored to Tier 1 riparian

areas by 2050, 1.2% are restored to bottomland forest, 1.5% to native prairie and 2.4% to wetlands. In total, 12.25% of 1990 private agricultural lands are restored to native vegetation in Conservation 2050 following assumptions that sufficient incentives will exist to sponsor such restoration. Water rights used to irrigate 1990 fields restored by 2050 to native vegetation are assumed converted to in-stream rights. The total area of land in agricultural production in Conservation 2050, defined by land use/land cover, is 1.16 million acres, a decrease of 248,000 acres from 1990 conditions. Less than a fourth of these converted 1990 agricultural acres are in urban or rural residential uses by 2050, with the balance restored to native vegetation.

**Forestry and Natural Vegetation**

Federal forest lands in this scenario limit harvesting to young stands on a 60-year rotation to achieve forest age structure more comparable to natural conditions. Most federally managed forest lands are in reserves. Conservation 2050 assumes National Wildlife refuge lands leased ca. 1990 for agriculture are converted to native habitat. State forest lands have approximately half the land base in reserves, with harvesting applied to young stands on a 120-year rotation. Private industrial forest lands in this scenario show 3% of holdings reaching late successional (old growth) stages by 2050 through legacy tree management, using a 65-100-year variable harvest rotation. By 2050 the percentage of coniferous industrial forest ownership older than 80 years more than doubles from 1990 levels. Private non-industrial lands are shown managed on a 150-year average rotation. Riparian zones are shown as on federal forest lands 300 feet each side all streams, state forest lands 200 feet each side all streams, and private lands 100 feet each side all streams with additional riparian vegetation in Tier 1 areas. Willamette River mainstem channel complexity increases, especially in the historically more complex southern reaches of the river (Fig. 173, p. 133). This results in more extensive floodplain forests on flood-prone lands and near major tributary junctions.

With significant changes in the lower elevations, and forestlands occupying more than two-thirds of the basin, natural vegetation becomes more extensive in Conservation 2050. As Figure 103 shows, this alternative is organized around a set of strategic choices regarding what to conserve and restore, how much to conserve and restore, where and when to do it.

**Water Availability**

Agricultural and municipal water conservation practices result in a 10% increase over 1990 levels in in-stream water rights by 2050. This is obtained by: transfer of irrigation allotment at the time of agricultural field conversion to Tier 1, improved cultivars, enhanced irrigation efficiencies, and an 8% reduction in municipal per capita water consumption rates relative to Plan Trend 2050.

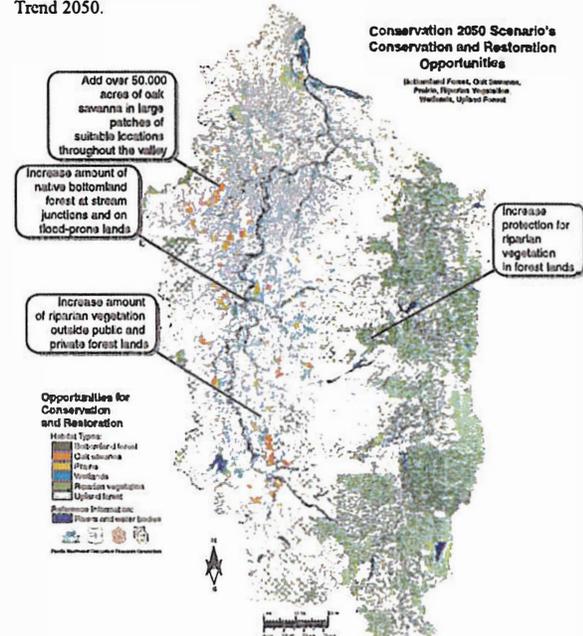
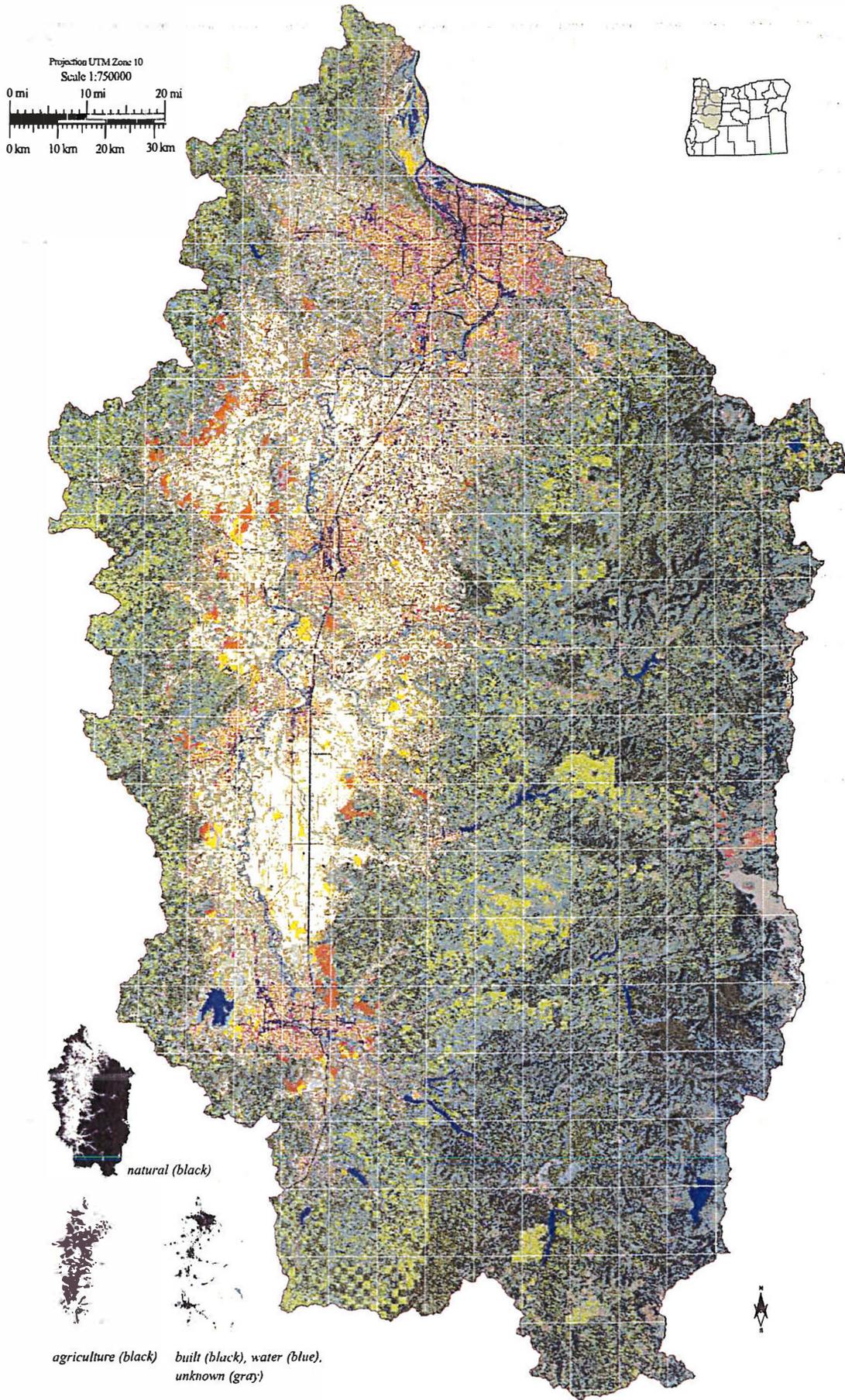


Figure 103. The Conservation and Restoration Opportunities Map depicts the Tier 1 and 2 priority areas. These areas were incorporated into the map at right in the corresponding land cover types.



Note: Legend for this map is the same as Land Use / Land Cover ca. 1990 on p. 78