

Considerations for Decision-making: Human Impacts

Estimated Population Density 27

This map displays population density, or the number of persons per square mile of land, for the Clackamas River watershed. Demographers at Metro used block-level data from the 1990 U.S. census to estimate 1995 population numbers. Census blocks are the smallest geographic units used by the U.S. Census Bureau to report summary census data. Census blocks are delineated along major roads and other physical features and typically do not coincide with watersheds or other geographic units. Towns and communities are often split into several blocks.

Estimating population totals in the Clackamas watershed was difficult because census blocks often overlapped the watershed boundary. Demographers calculated population density by taking the proportion of each census block falling within the watershed and estimating a percentage of the total block population. This analysis assumes that populations are evenly distributed within census blocks, yet population is usually clustered in urban areas. Based on this method, the total 1995 population within the watershed was estimated to be 63,702.

Impervious Area 28

An impervious surface is any surface that cannot be easily penetrated by water. Impervious surfaces include paved areas such as streets and parking lots, as well as building roofs. Even areas with compacted or hard soils, gravel roads and certain crops or vegetation can form a partially impervious surface, allowing water to run off to nearby storm drains or streams.

When land becomes more impervious through paving and building, water can no longer soak slowly into the ground after a rain storm. Instead, the water flows quickly into waterways, where it can raise water flows and cause flooding. The runoff water can also

transport pollutants such as oil from streets and parking lots to waterways. Several studies have shown a link between the percent impervious area and watershed health (Watershed Protection Techniques, 1994).

This map shows the percent of total impervious surface based on land-use categories from the property classification for assessment (PCA) codes in the Clackamas County assessor's database. PCA codes represent land use as recorded at the time of the last tax assessor's appraisal. To estimate impervious area, each land-use type was assigned a percentage of imperviousness, listed in Table 7. All roads were assigned an impervious value of 90 percent. As development occurs, land use and the amount of impervious surface will change.

Figure 8 (see next page) estimates the current percent of impervious surface area in each subwatershed, compared to what the subwatershed is expected to have in the future. The percent impervious surface area was calculated in one of two ways, depending on whether the subwatershed was primarily developed or primarily forested.

Developed subwatersheds: For these urban or rural residential areas, shown on the bottom of the graph, we estimated the current percent of impervious surface area using the values shown in Table 7. Each subwatershed's overall percent impervious area was weighted. In other words, if 10 percent of a watershed is rural residential, 30 percent is commercial and 60 percent is single-family residential, the overall imperviousness value is based on the amount of land within that subwatershed that is made up of each land-use type.

Figure 8 also estimates how the percent impervious area for each subwatershed could change in the future, based on land-use classifications in each jurisdiction's comprehensive plans (see also the Future Land-Use Plan map). Because these comprehensive plans have not been updated to reflect new

urban reserves in the Rock Creek and Richardson Creek subwatersheds, these areas will likely see larger increases in impervious area than shown on this graph. Comprehensive plans are also somewhat general and do not include designations for future roads.

Forested or non-developed subwatersheds: For these areas, found mostly in the upper Clackamas watershed, the percent impervious surface was estimated using a formula of one percent impervious area per mile of road per square mile (Booth). Thus, two forested areas could have different percentages of impervious surface. For example, we estimated that the Roaring River subwatershed, a nearly roadless area, has only one percent impervious area. The Fish Creek subwatershed, with a greater road density, has three percent impervious area. In the Eagle Creek subwatershed, the more developed areas near Estacada are partially balanced by the Salmon-Huckleberry Wilderness, giving this subwatershed an overall impervious area of nine percent.

We were not able to estimate any changes in percent impervious surface for the forested or non-urban subwatersheds, as they are not subject to local comprehensive plans. However, any future road building would raise the percent impervious area.

Current Zoning 29

This map shows zoning designations, which are the legally established, permitted uses of land. Zoning is administered by each local government, and individual cities and counties define their own unique zoning codes. To provide compatibility among data from different jurisdictions, the map groups zoning types into general categories.

Note: The forestry/forest management zoning category consists of several different uses, including timber harvest, recreation and wildlife habitat.

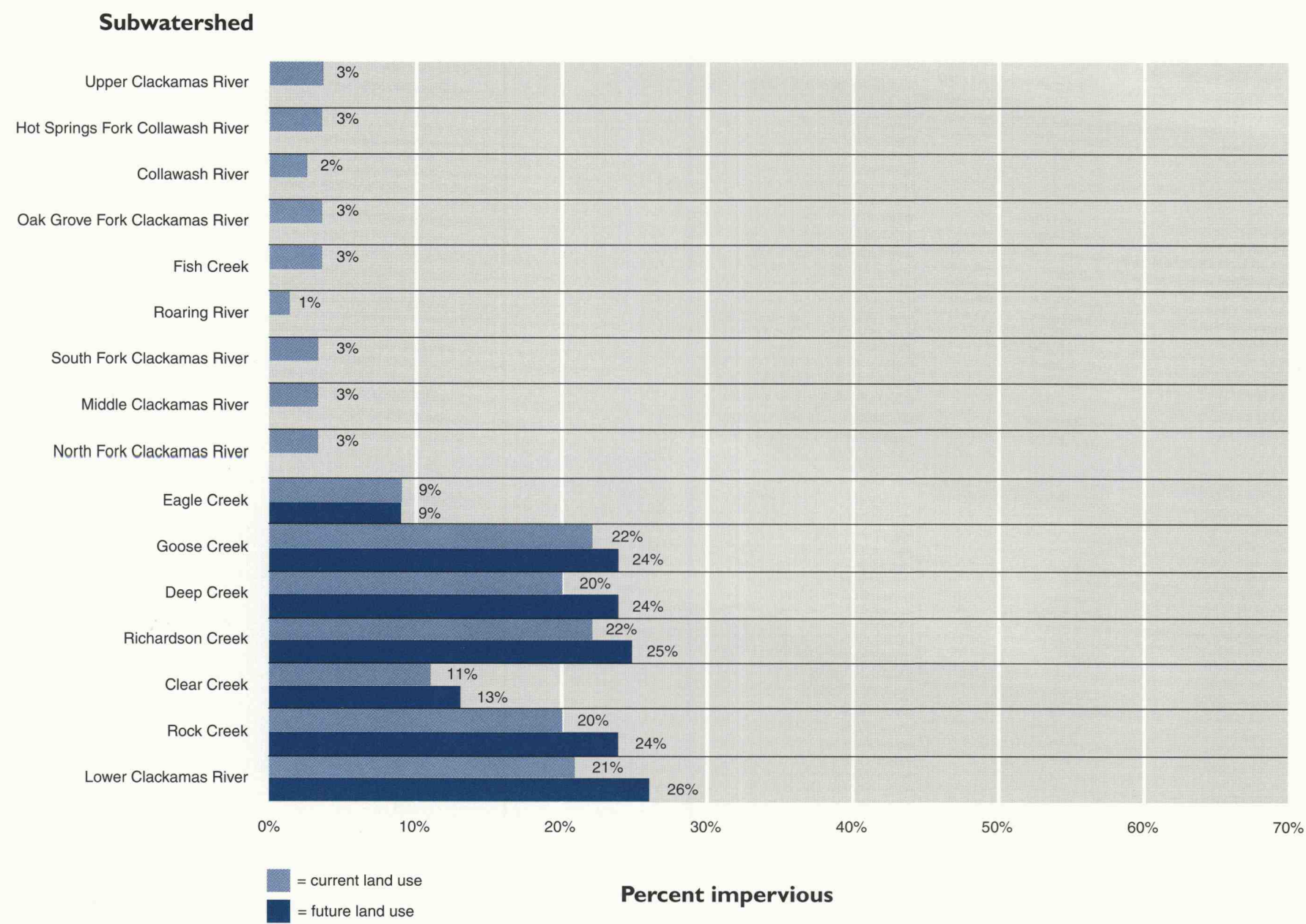
Table 7

Estimated percent of impervious surface by land-use* type

Property class description	% impervious ²
Open space	5%
Single-family residential, vacant	5%
Single-family residential, improved	(roads and rights of way are calculated separately)
0 to 0.25 acre	35%
0.26 to 0.5 acre	30%
0.51 to 1.0 acre	25%
greater than 1.0 acre	20%
average	27.5%
Commercial land, vacant	5%
Commercial land, improved	90%
Industrial land, vacant	5%
Industrial land, improved	90%
Department of Revenue appraised industrial	90%
Tract land, vacant	5%
Tract land, improved	20%
Farm land, vacant	20%
Farm land, improved	20%
Forest land, vacant	5%
Forest land, improved	2%
Multi-family residential, vacant	5%
Multi-family residential, improved	65%
Mobile home parks	60%
Recreation land, vacant	5%
Recreation land, improved	20%
Miscellaneous	20%

* Land uses as defined by the Clackamas County property classification for assessment (PCA) system.

Figure 8
Estimated current and future impervious area



Existing Land Use 30

This map displays existing land use based on PCA codes from the Clackamas County assessor. PCA codes represent land use as recorded at the time of the last tax assessor’s appraisal. This information is derived from tax assessor’s data for individual tax lots. Existing land use is not necessarily consistent with zoning, because zoning may be implemented or changed after a land use is already in place on a property.

For U.S. Forest Service and U.S. Bureau of Land Management lands in the upper part of the watershed, existing land uses are defined as those outlined in the Northwest Forest Plan, Mt. Hood National Forest Plan, and Resource Management Plan for the

Bureau of Land Management. A summary of the land allocations, described in detail under the Designated Special Areas map, follows. The type of land allocation determines whether the area will be managed for timber harvest or other values.

Limited or No Timber Harvest Allowed:

Administratively withdrawn areas: recreational and visual areas, back country, and other areas not scheduled for timber harvest.

Late successional reserves: areas designed to serve as habitat for late-successional and old-growth related species, including the northern spotted owl.

Riparian reserves: areas along all streams, wetlands, ponds, lakes and unstable or potentially unstable areas, intended to achieve and maintain riparian and aquatic habitat conditions for the sustained, long-term production of fish, selected wildlife and plant species, and high-quality water.

Congressionally reserved areas: In the Clackamas watershed, the Congressionally reserved areas include the Bull of the Woods Wilderness and the Salmon-Huckleberry Wilderness, as well as Wild and Scenic River segments.

Timber Harvest Allowed:

Matrix lands: lands in northern spotted owl range not designated as protected. The goal of matrix land is to provide lumber, wood fiber and other products on a regulated basis while retaining some forest land to allow wildlife to travel through the area. For more information about specific areas and their designations, refer to the watershed analyses prepared by the U.S. Forest Service.

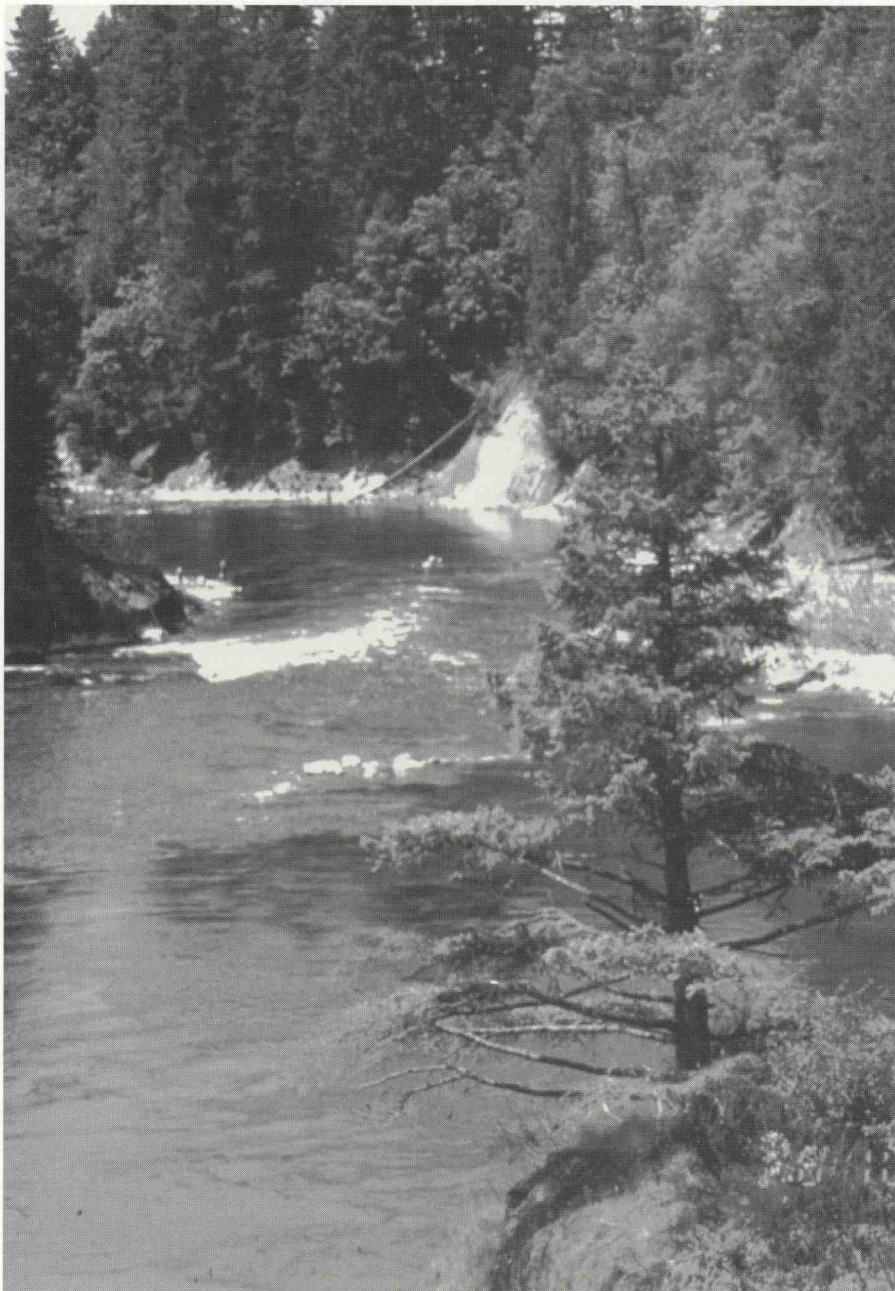
comprehensive plans and to zone in accordance with their plans. Plan designations resemble current zoning. However, these designations also identify areas planned to accommodate future growth.

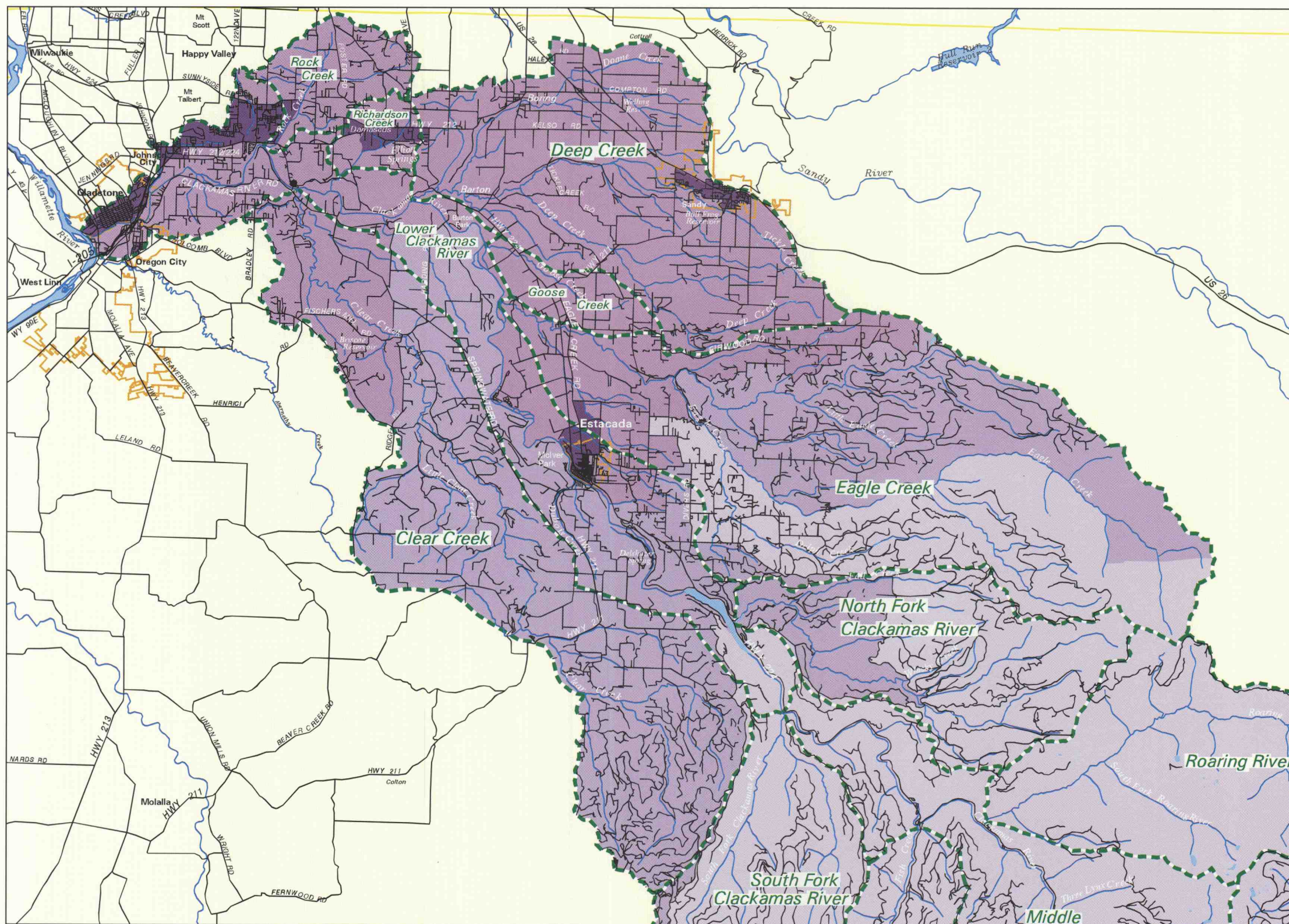
Although comprehensive plans are updated periodically, they do not yet reflect the new urban reserve areas. Because of this, certain areas within the reserves are likely to see changes in land use once they are included inside the urban growth boundary for the Portland metropolitan area.


Future Land-Use Plan 31

This map shows future land use, as designated in local government comprehensive plans. Oregon state law requires cities and counties to develop

The U.S. Forest Service and Bureau of Land Management matrix lands and reserves are also shown on this map. Detailed descriptions of these land uses are provided with the Designated Special Areas map.








Clackamas River

Watershed Project

Estimated Population Density

(in 1995)

600 NORTHEAST GRAND AVENUE | PORTLAND, OREGON 97232 2736
 TEL 503 797 1742 | FAX 503 797 1909
 Internet: drc@metro.dst.or.us



LEGEND

Persons per Square Mile

- | | | | |
|---|-----------|---|--------------------|
|  | 0-10 |  | Subwatersheds |
|  | 11-100 |  | Roads |
|  | 101-1000 |  | Rivers and Streams |
|  | Over 1000 |  | City Limits |
| | |  | County Line |

1995 POPULATION ESTIMATES: Estimates based on 1990 Census Block Group data, derived from US Census Bureau TIGER file. Block Group geography = 1:100,000.

CITY LIMITS: Portland Metropolitan Area Boundary Commission and local jurisdiction, among maps (1996). Scale: 1:2,000 - 1:4,000.

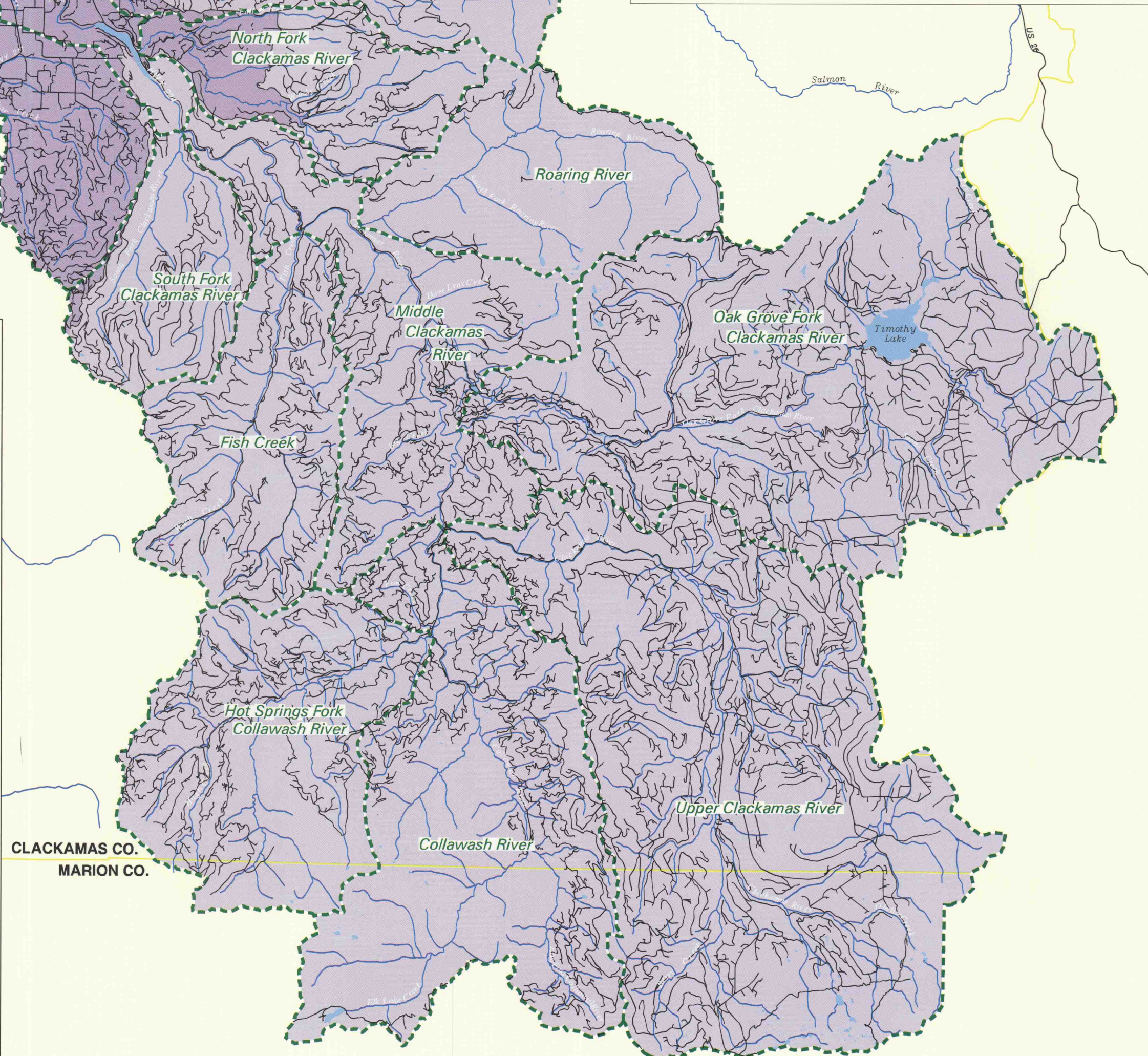
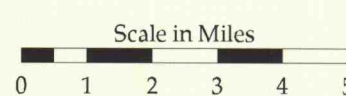
RIVERS AND STREAMS: Oregon Department of Fish and Wildlife (1996), Scale: 1:100,000.

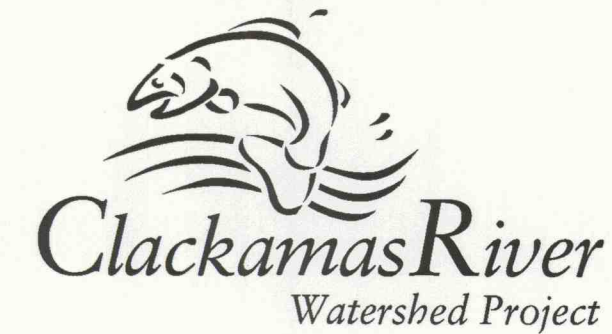
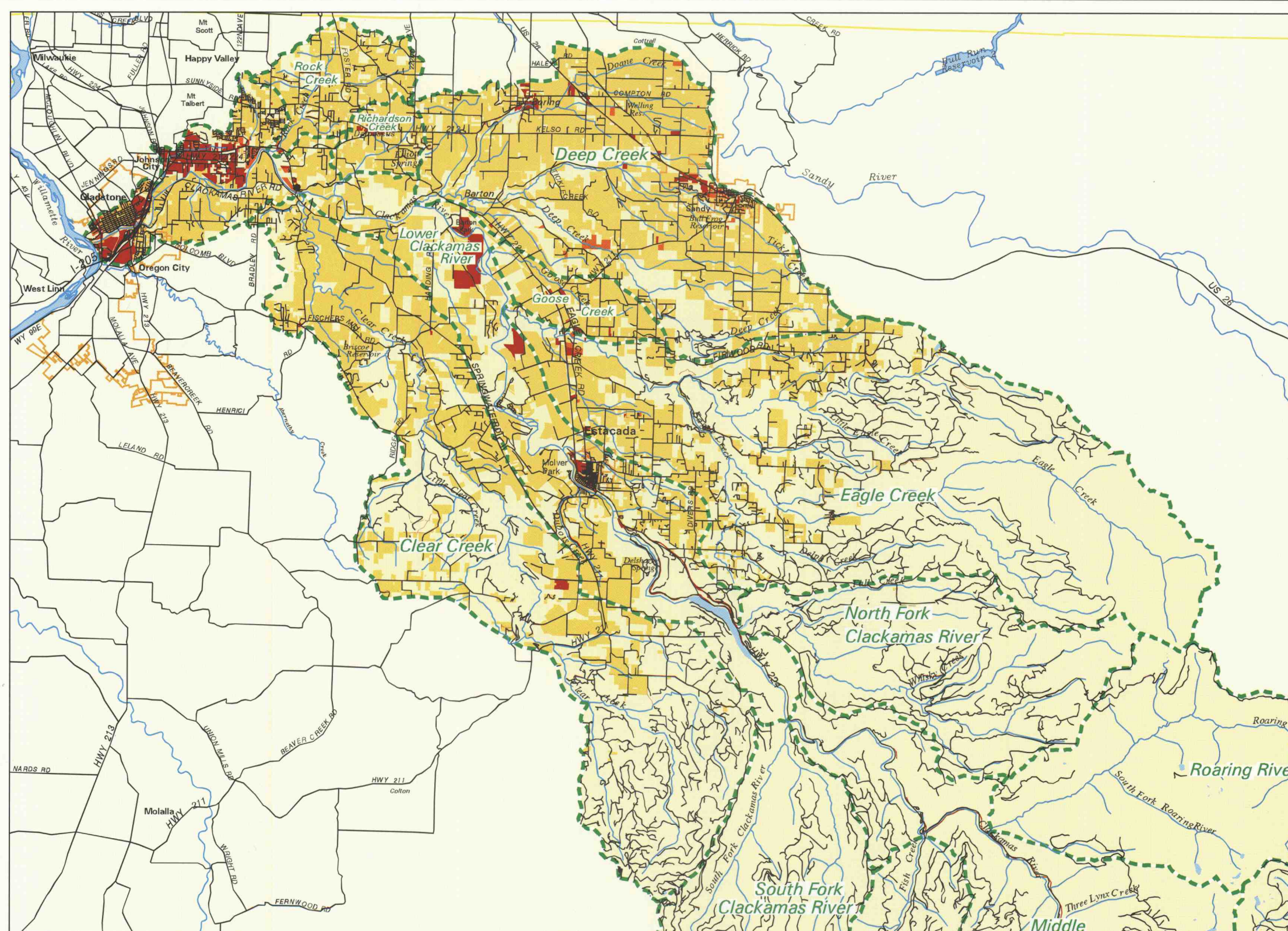
ROADS: US Forest Service (1994) Scale: 1:4,800
 US Bureau of Land Management (1996) Scale: 1:4,800
 USGS (1988) Scale: 1:24,000
 US Census TIGER Line File (1990), updated through 1996 by Metro.

SUBWATERSHEDS: Metro, visual interpretation of USGS topo maps. Scale: 1:24,000
 US Forest Service (1991) Scale: 1:24,000.

NOTE: THIS MAP IS INTENDED TO BE USED TOGETHER WITH THE CORRESPONDING TEXT INCLUDED IN THE CLACKAMAS RIVER WATERSHED ATLAS.

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Impervious Area

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LEGEND

Percent Impervious

- | | | | |
|--|------------|--|--------------------|
| | 0 - 10 % | | Subwatersheds |
| | 11 - 25 % | | Roads |
| | 26 - 50 % | | Rivers and Streams |
| | 51 - 75 % | | City Limits |
| | 76 - 100 % | | County Line |

IMPERVIOUS AREA: Percentages were assigned to Land Use categories from Clackamas Co. Assessor Property Classification Code.

CITY LIMITS: Portland Metropolitan Area Boundary Commission and local jurisdiction zoning maps (1996). Scale: 1:1,100 - 1:4,800.

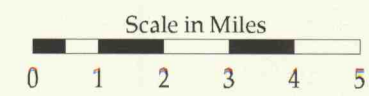
RIVERS AND STREAMS: Oregon Department of Fish and Wildlife (1996). Scale: 1:100,000.

ROADS: US Forest Service (1994) Scale: 1:4,800
US Bureau of Land Management (1996) Scale: 1:4,800
USGS (1988) Scale: 1:24,000
US Census TIGER Line File (1990), updated through 1996 by Metro.

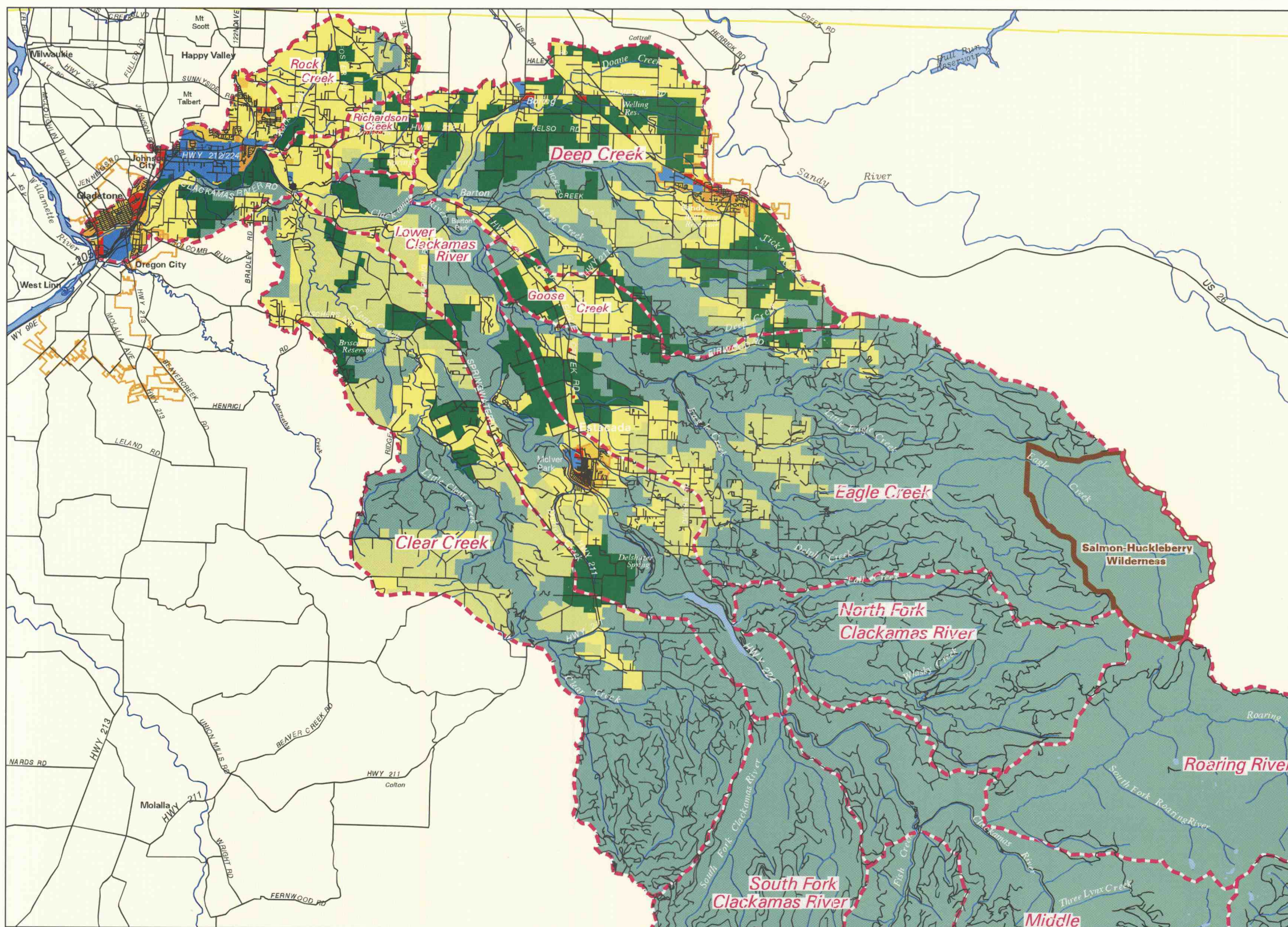
SUBWATERSHEDS: Metro, visual interpretation of USGS topo maps. Scale: 1:24,000
US Forest Service (1991). Scale: 1:24,000.

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MARION CO.



Clackamas River Watershed Project

Current Zoning

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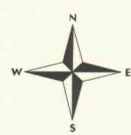
LEGEND

Zoning Designations (Generalized)

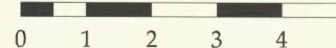
- Exclusive Farm Use
- Agriculture
- Forestry/Forest Management
- Rural
- Single Family Residential
- Multi-Family Residential
- Commercial
- Industrial
- Parks/Open space
- Public Facilities

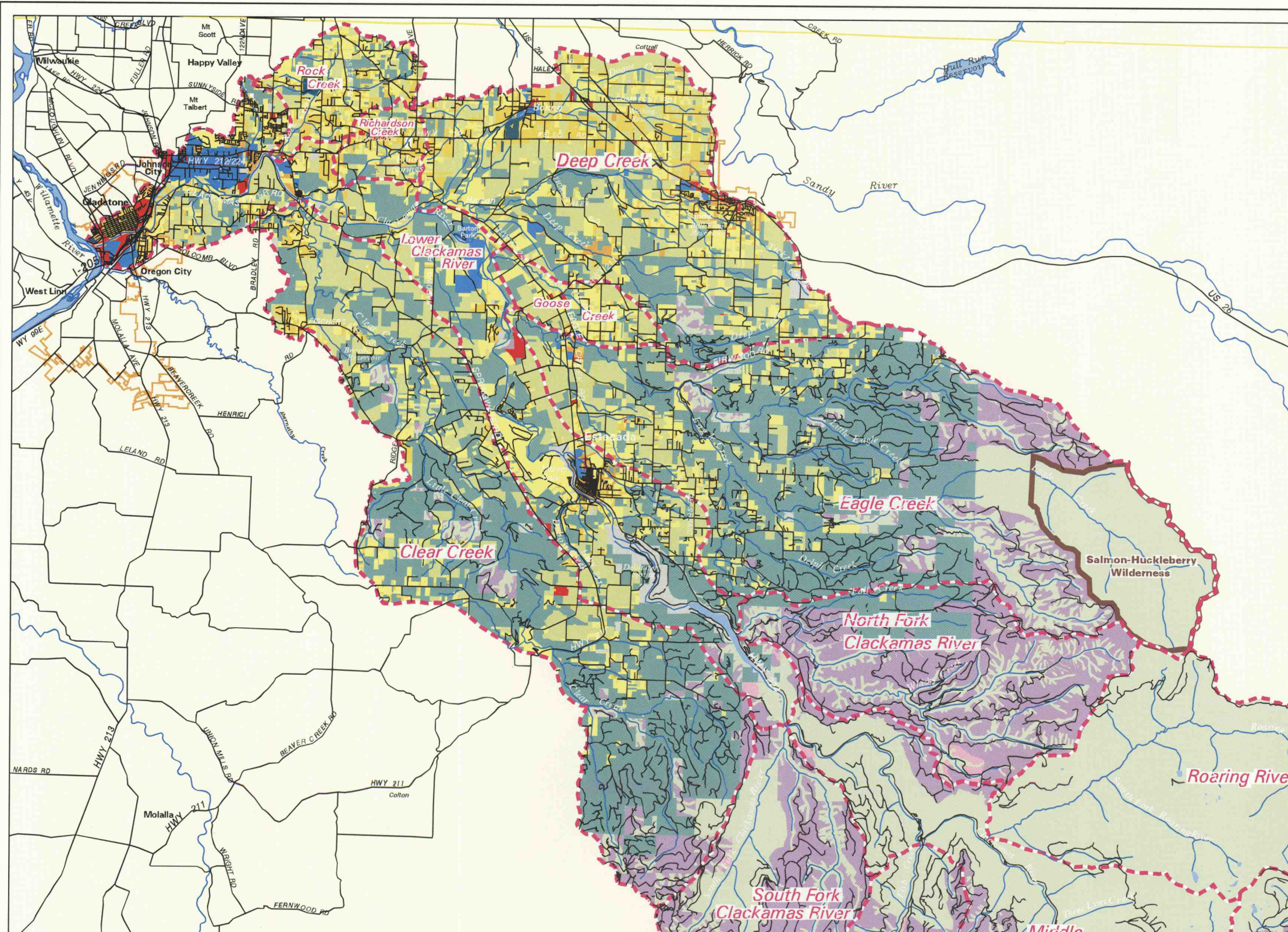
- Designated Wilderness Areas
- Subwatersheds
- Roads
- Rivers and Streams
- City Limits
- County Line

ZONING: Local jurisdiction zoning maps (1996), Scale range 1:3,200 - 1:48,000
WILDERNESS AREAS: Oregon Department of Forestry, (1996), Scale = 1:24,000 - 1:100,000
CITY LIMITS: Portland Metropolitan Area Boundary Commission and local jurisdiction zoning maps (1996), Scale 1:3,200 - 1:4,800
RIVERS AND STREAMS: Oregon Department of Fish and Wildlife (1996), Scale: 1:100,000
ROADS: US Forest Service (1994) Scale: 1:4,800
US Bureau of Land Management (1996) Scale: 1:4,800
USGS (1983) Scale: 1:24,000
US Census TIGER Line File (1990), updated through 1996 by Metro.
SUBWATERSHEDS: Metro, visual interpretation of USGS topo maps. Scale: 1:24,000
US Forest Service (1991) Scale: 1:24,000
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Scale in Miles





Existing Land Use

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LEGEND

County Land-Use Data

- Agriculture
- Forestry/Forest Management
- Rural Tract Land
- Single Family Residential
- Multi-Family Residential
- Commercial
- Industrial
- Parks/Open Space
- Other

USFS & BLM Lands

- Administratively Withdrawn Areas
- Late Successional Reserves, Riparian Reserves, and Congressionally Reserved Areas
- Matrix Lands
- Designated Wilderness Areas
- Subwatersheds
- Roads
- Rivers and Streams
- City Limits
- County Line

EXISTING LAND-USE DESIGNATIONS: Clackamas Co. Assessor Property Classification for Assessment (PCA) Code. Note: Parcel Use data is up to 6 years old, based on the date of the most recent property appraisal. Scale: 1:1,200 - 1:4,800

LATE SUCCESSIONAL RESERVES, RIPARIAN RESERVES, CONGRESSIONALLY WITHDRAWN AREAS, ADMINISTRATIVELY WITHDRAWN AREAS: US Forest Service and US Bureau of Land Management (USFS/BLM) maps. Scale: 1:24,000 - 1:26,720

MATRIX LANDS: US Forest Service and US Bureau of Land Management. Land not within Late Successional Reserves, Riparian Reserves, Designated Wilderness Areas, or Administratively Withdrawn areas. Scale: 1:24,000 - 1:26,720

WILDERNESSES AREAS: Oregon Department of Forestry. Scale: 1:24,000 - 1:26,720

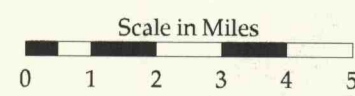
CITY LIMITS: Portland Metropolitan Area Boundary Commission and local jurisdiction zoning maps (1996). Scale: 1:1,200 - 1:4,800

RIVERS AND STREAMS: Oregon Department of Fish and Wildlife (ODFW). Scale: 1:100,000

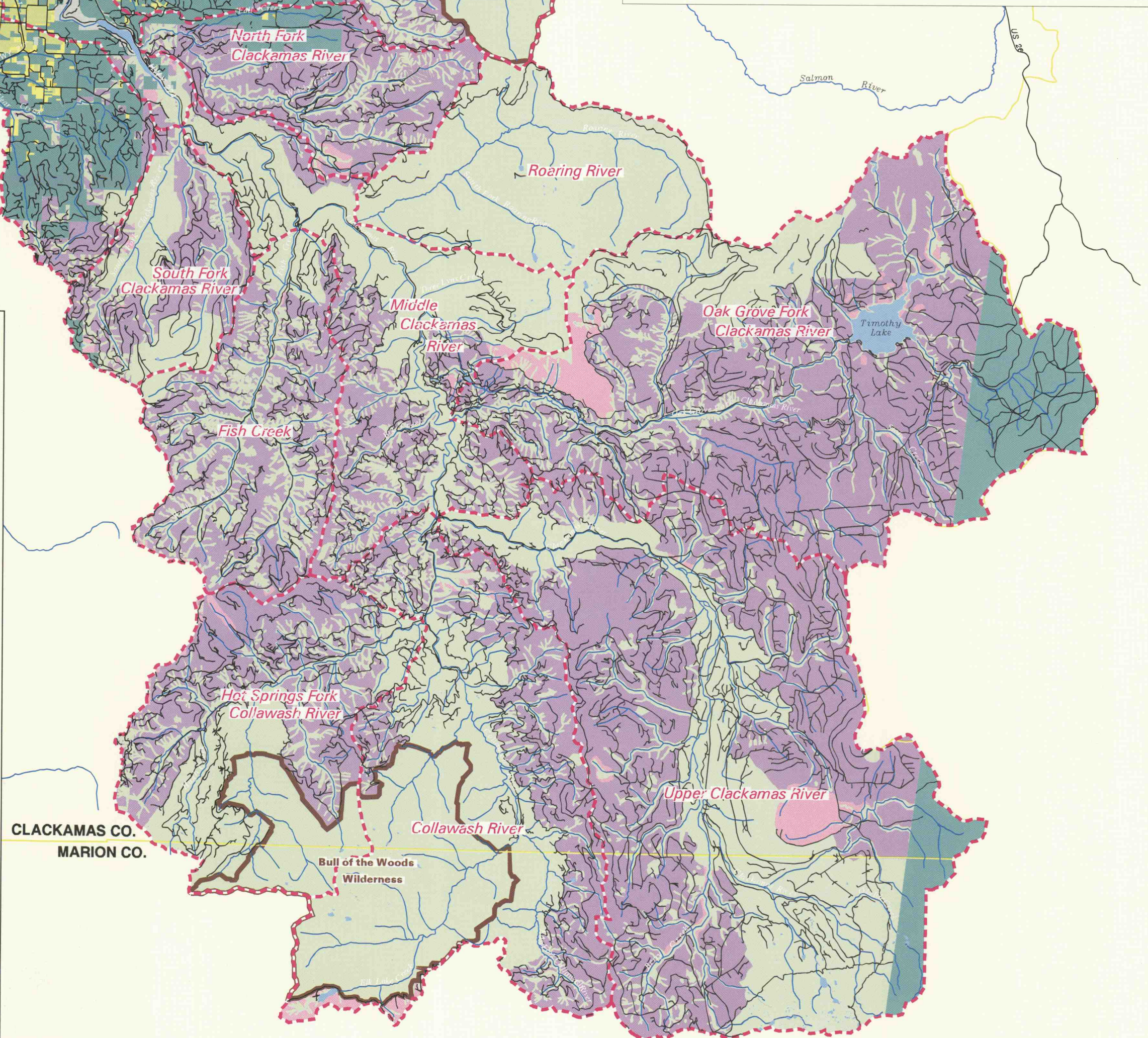
ROADS: US Forest Service (1994). Scale: 1:4,800
US Bureau of Land Management (1996). Scale: 1:4,800
USGS (1985). Scale: 1:24,000
US Census Tiger Line File (1990), updated through 1996 by Metro.

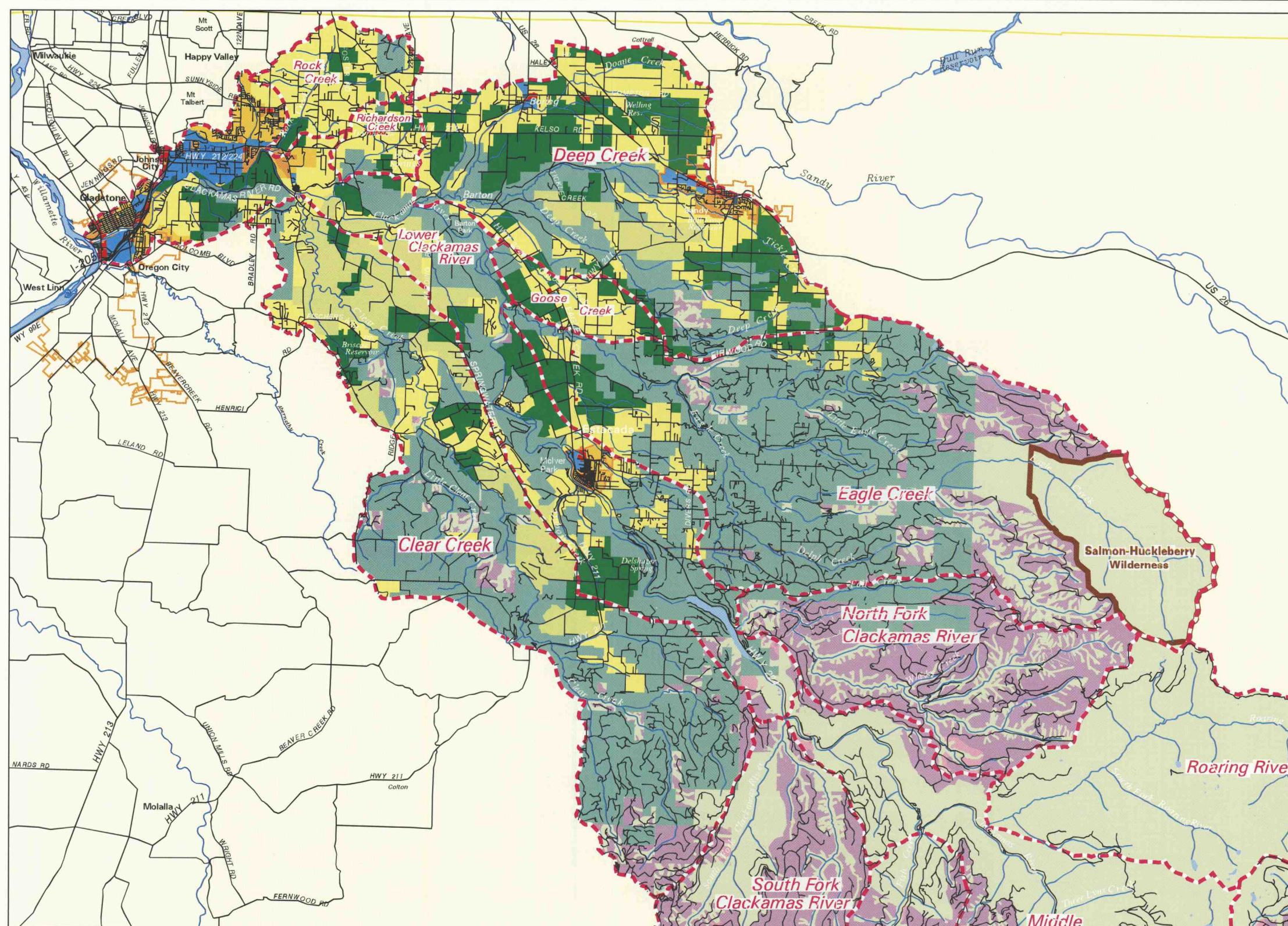
SUBWATERSHEDS: Metro, visual interpretation of USGS topo maps. Scale: 1:24,000
US Forest Service (1994). Scale: 1:24,000

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Future Land-Use Plan

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LEGEND

- | | |
|--|---|
| Comprehensive Plan Data (Generalized) | USFS & BLM Lands |
| Exclusive Farm Use | Administratively Withdrawn Areas |
| Agriculture | Late Successional Reserves, Riparian Reserves, and Congressionally Reserved Areas |
| Forestry/Forest Management | Matrix Lands |
| Rural | Designated Wilderness Areas |
| Single Family Residential | Subwatersheds |
| Multi-Family Residential | Roads |
| Commercial | Rivers and Streams |
| Industrial | City Limits |
| Parks/Open space | County Line |
| Public Facilities | |

COMPREHENSIVE LAND-USE PLAN: Local jurisdiction comprehensive land use plan maps (1996), Scale = 1:3,000 - 1:4,000.

LATE SUCCESSIONAL RESERVES, RIPARIAN RESERVES, CONGRESSIONALLY WITHDRAWN AREAS, ADMINISTRATIVELY WITHDRAWN AREAS: US Forest Service and US Bureau of Land Management (1994/96), Scale = 1:24,000 - 1:316,730.

MATRIX LANDS: US Forest Service and US Bureau of Land Management. Lands not within the Late Successional Reserves, Riparian Reserves, Designated Wilderness Areas, or Administratively Withdrawn areas.

WILDERNESS AREAS: Oregon Department of Forestry, (1996), Scale = 1:24,000 - 1:300,000.

CITY LIMITS: Portland Metropolitan Area Boundary Commission and local jurisdiction zoning maps (1996), Scale 1:1,000 - 1:4,000.

RIVERS AND STREAMS: Oregon Department of Fish and Wildlife (1996), Scale 1:100,000.

ROADS: US Forest Service (1994) Scale 1:4,800
 US Bureau of Land Management (1996) Scale 1:4,800
 USGS (1985) Scale 1:24,000
 US Census TIGER Line File (1990), updated through 1996 by Metro.

SUBWATERSHEDS: Metro, visual interpretation of USGS topo maps. Scale 1:24,000
 US Forest Service (1991) Scale 1:24,000.

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