Statewide Model Application Project

Applying Oregon's Statewide Model to the Study of Willamette Valley Alternative Transportation Futures

Presentation to the Second Oregon Symposium On Integrating Land Use and Transport Modeling

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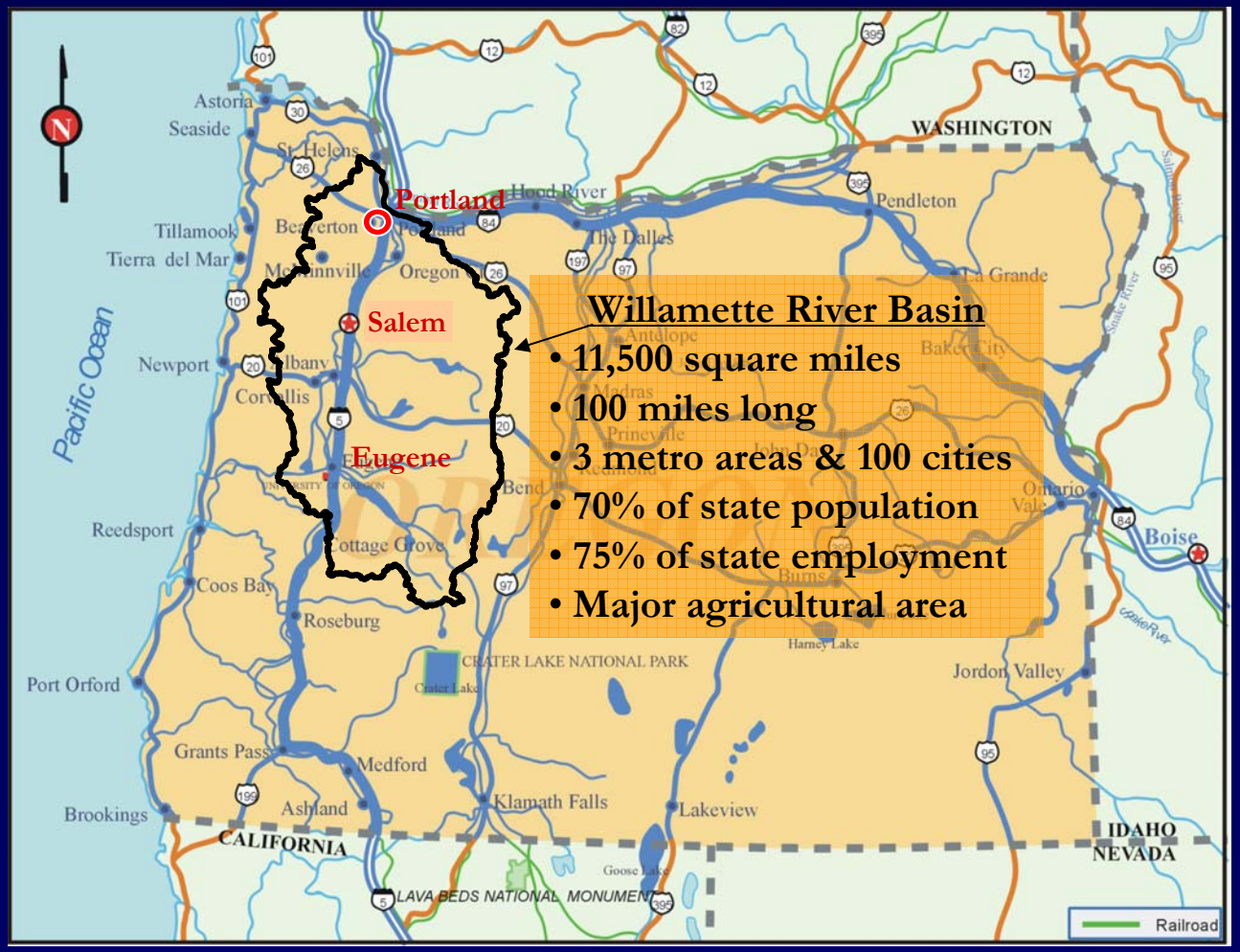
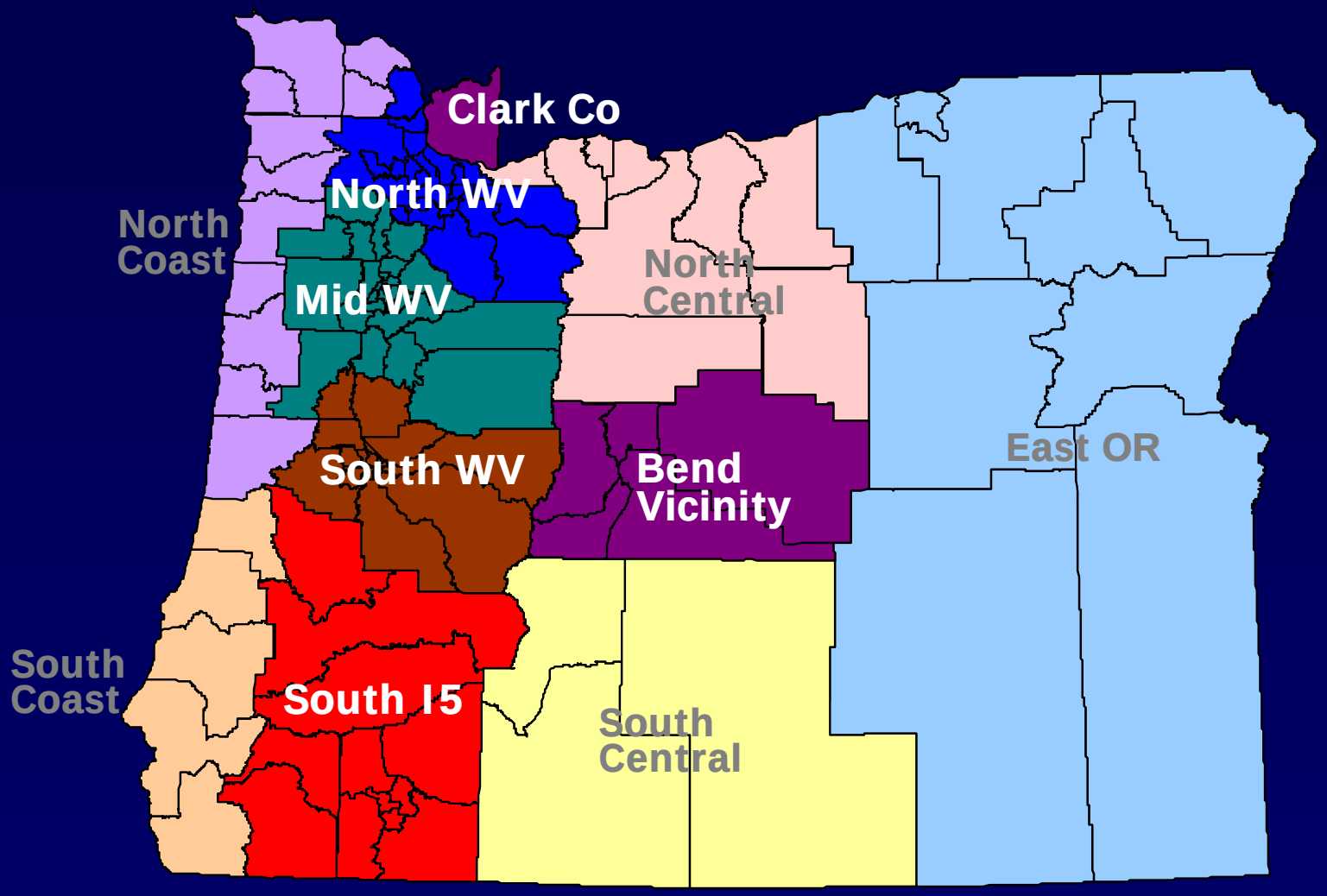
Purposes

- Statewide Model Application Project (SMAP)
  - Provide modeling analysis for the Willamette Valley Alternative Futures Project (WVATF).
  - Provide information about statewide model application to help inform development of the 2nd generation model.
  - Provide statewide model training for ODOT staff.
- WVATF
  - Evaluate and communicate the long-range transportation and land use effects of alternative land use and transportation policies in the Willamette Valley.
  - Sponsored by the Willamette Valley Forum.
  - Coordinated with related studies.

Geographic Setting



Reporting Regions



Scenarios

- Elements
  - Land Use Policy: Land zoned for development
  - Transport Policy: Infrastructure, Taxes
- Naming Convention
  - Land Use/Transport (e.g. Historic/No-Build)
- Two Types
  - Study scenarios
  - Comparison scenarios to help with evaluation

Historic/No-Build Scenario (HNB)

- Official statewide growth forecasts.
  - *About 4 million persons residing in the Willamette Valley in 2050*
- Land zoned for development at recent historical rates.
  - *Zone about 250,000 more acres of land in Willamette Valley for development over 50 years*
- No capacity increases in transport system.

Compact/No-Build Scenario (CNB)

- Official statewide growth forecasts.
- Land zoned for development at lower than historical rates.
  - *Add about 150,000 acres of land for development over 50 years*
- No capacity increases in transport system.

Historic/Highway Scenario (HHWY)

- Official statewide growth forecasts
- Land zoned for development at recent historical rates
- Increases number of highway lanes where congested (used HERS & growth rates)
  - *48 % increase in highway lane miles*
  - *Up to 10 lane freeways in MPO areas*
  - *Up to 8 lane freeways elsewhere*
  - *Up to 6 lane arterials*

Historic/TDM Scenario (HTDM)

- Official statewide growth forecasts
- Land zoned for development at recent historical rates.
- No capacity increases in transport system.
- Fee of $0.20 per mile on road links in Willamette Valley.

Historic/CTC Scenario (HCTC)

- Present transport costs are maintained throughout the analysis period.

  CTC = constant transport costs

- Scenario for comparison purposes to help distinguish land use and transport effects.
- Land zoned for development at recent historical rates.
- Official statewide growth forecasts.

Compact/CTC Scenario (CCTC)

- Present transport costs are maintained throughout the analysis period.

  CTC = constant transport costs

- Scenario for comparison purposes to help distinguish land use and transport effects.
- Land zoned for development at lower than historical rates.
- Statewide growth forecasts.

Results Overall

- The percentage difference in households and employment for the WV and for the Portland metropolitan area is small. (chart)
- The percentage difference for smaller population centers varies considerably among alternatives. (chart)
- The difference in total interzonal trips is minimal for all but the Historic/Highway scenario. (chart)

Results by Scenario

- Historic/No-Build
  - Land Use
  - Transport
- Compact/No-Build
  - Land Use
  - Tranport
- Historic/Highway
  - Land Use
  - Transport
- Historic/TDM
  - Land Use
  - Transport

Note use of Historic/CTC as comparison base.

Historic/No-Build Land Use Results

- Rising congestion: (graph)
  - The growth of the Mid & South WV relative to continuation of present conditions is less;
  - The relative growth of the North WV is greater for a while and then decreases; and
  - The relative growth rates of Clark Co. and the Bend area are greater.
- Increases centralization. (map)

Historic/No-Build Transport Results

- Lowest average speeds. (graph)
- Higher trip suppression. (graph)
- Lower total trips. (graph)
- Lower trip length. (graph)

Compact/No-Build
Land Use Results

- Reducing land supply decreases the relative employment growth of Willamette Valley, especially the North WV. (graph) (map)
- Accentuates long-range regional shifts seen in Historic/No-Build. (graph)
- Land constraints counter centralization pressures of congestion. (map)

Compact/No-Build Transport Results

- Lowest average trip speeds. (graph)
- Greatest trip suppression. (graph)
- Lowest daily passenger trips. (graph)
- Higher average trip length. (graph)
  - More development shifted to other parts of Oregon where interzonal trip lengths are longer.

Historic/Highway Land Use Results

- More growth inside WV and less outside than other scenarios. (chart)
  - Compare Mid-WV and Clark Co. with HNB.
  - Also slightly less growth in the Bend area and slightly more growth in South I-5 than HNB.
- Less centralization of growth than HNB. (map)

Historic/Highway Transport Results

- Least decrease in average trip speeds. (chart)
- Least trip suppression. (chart)
- Highest number of passenger trips. (chart)
- Higher average trip length. (chart)

Historic/TDM
Land Use Results

- Added WV mileage charge causes: (chart)
  - Less growth in North & Mid WV than with HNB. Little change in South WV.
  - Less growth in Clark County than with HNB.
  - More growth in South I-5 and more in Bend.
- More centralization of development than with HNB. (map)
  - Note Portland metro fringe areas.

Historic/TDM Transport Results

- Next highest average trip speeds. (chart)
- Lower trip suppression. (chart)
- Lower daily passenger trips. (chart)
- Lower average trip lengths. (chart)

Conclusions

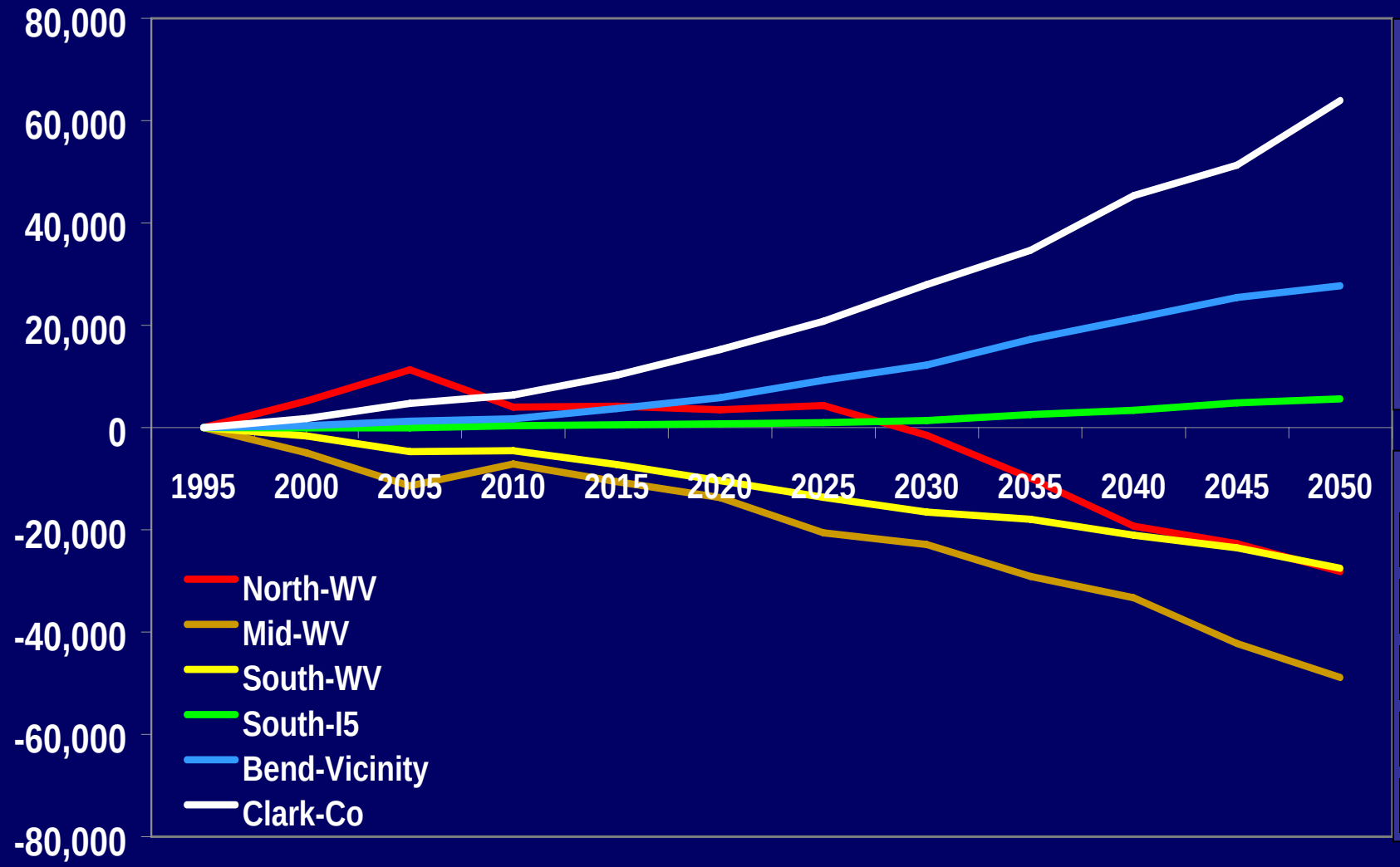
- Activity location and transport results are sensitive to travel time, travel cost and land supply/prices, consistent with economic theory.
- Complex interactions between transport costs, activity locations and prices are evaluated, revealing results that could not be easily determined without such a model.
- The interpretation and communication of the model results is very challenging but critical to getting acceptance of the results.

The End

Employment by Region

- Shows differences in number of employees between each scenario and Historic/CTC.
- Historic/No-Build
- Compact/CTC
- Compact/No-Build
- Historic/Highway
- Historic/TDM

Historic/No-Build Employee Difference



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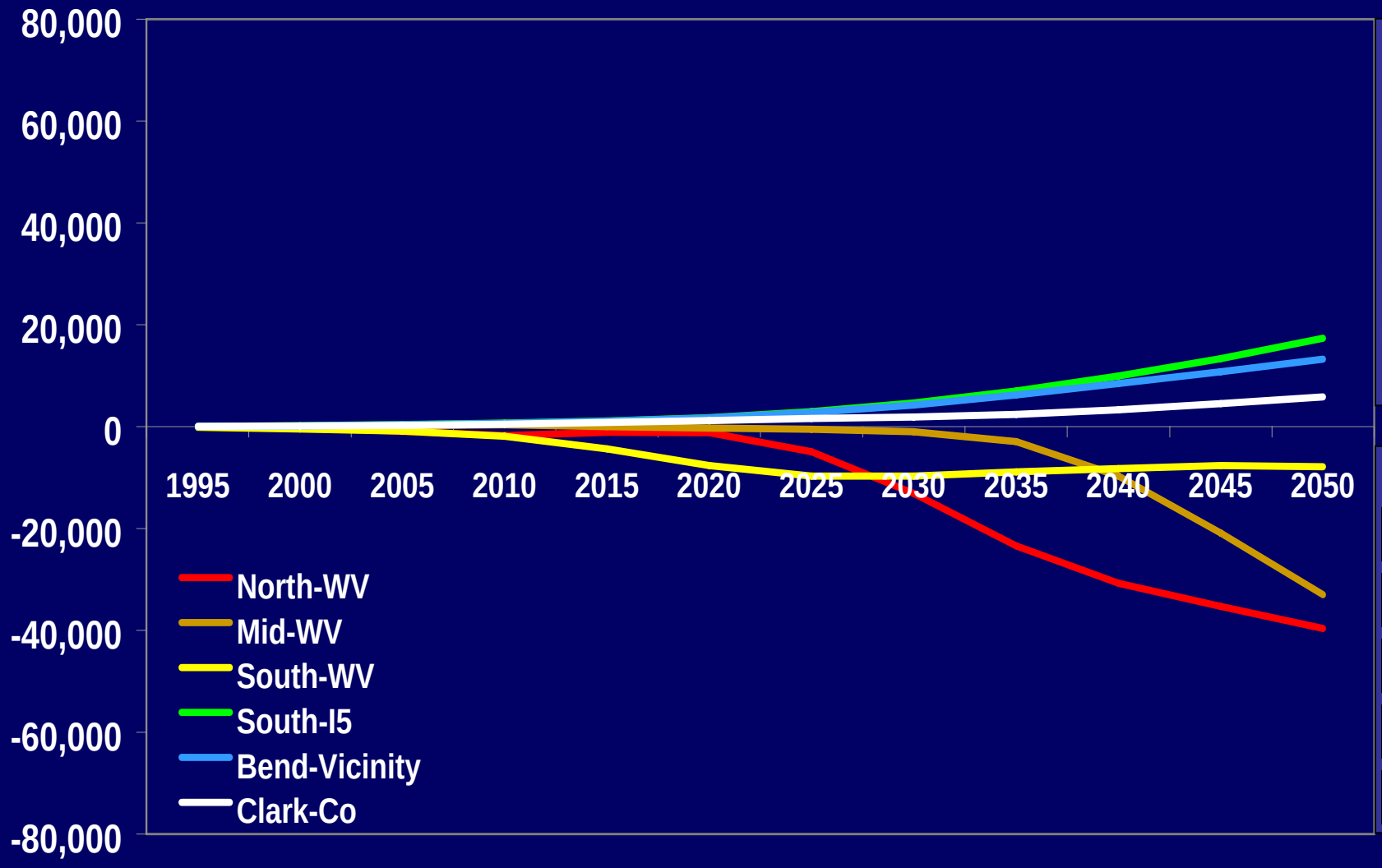
Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

Compact/CTC Employee Difference



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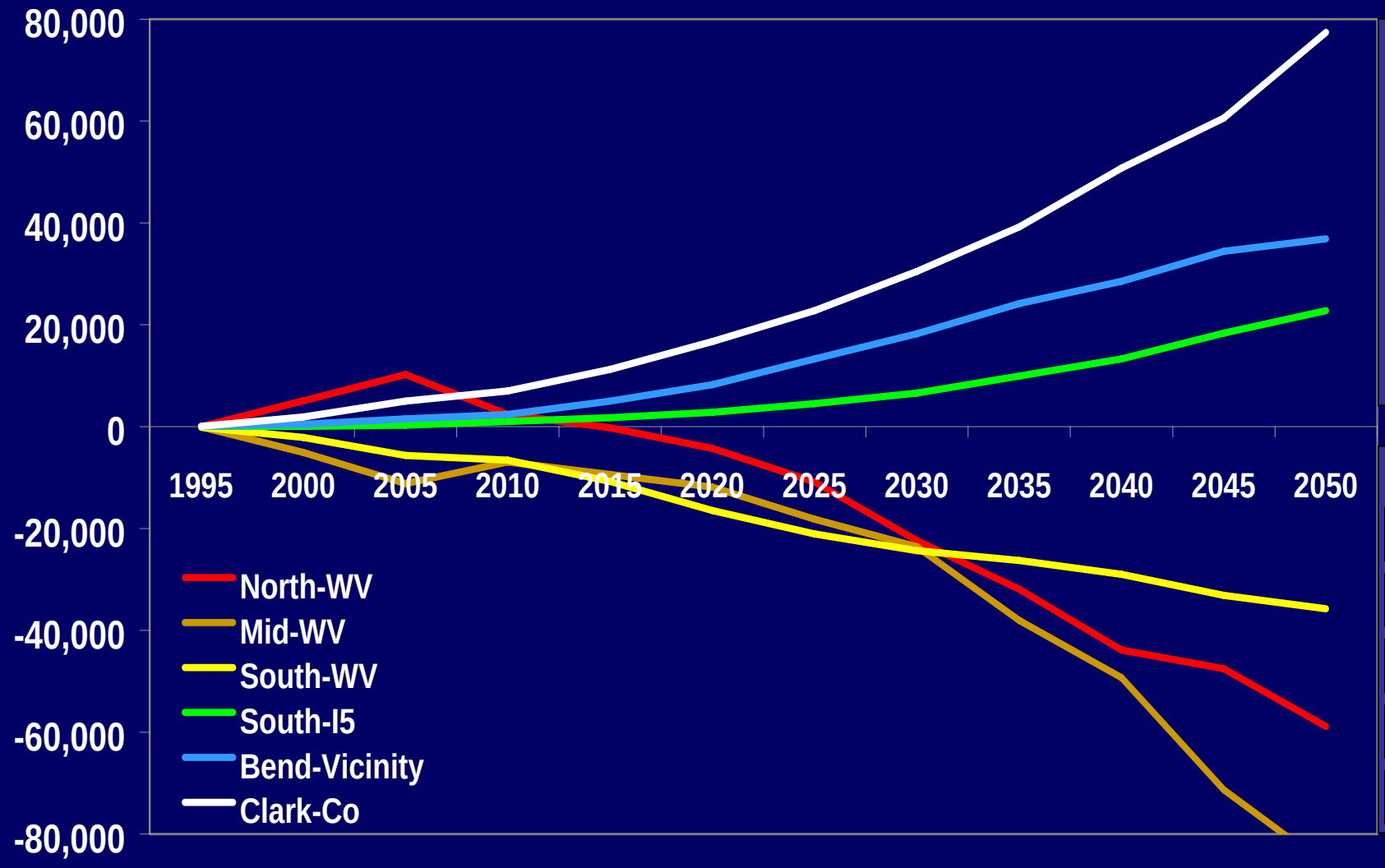

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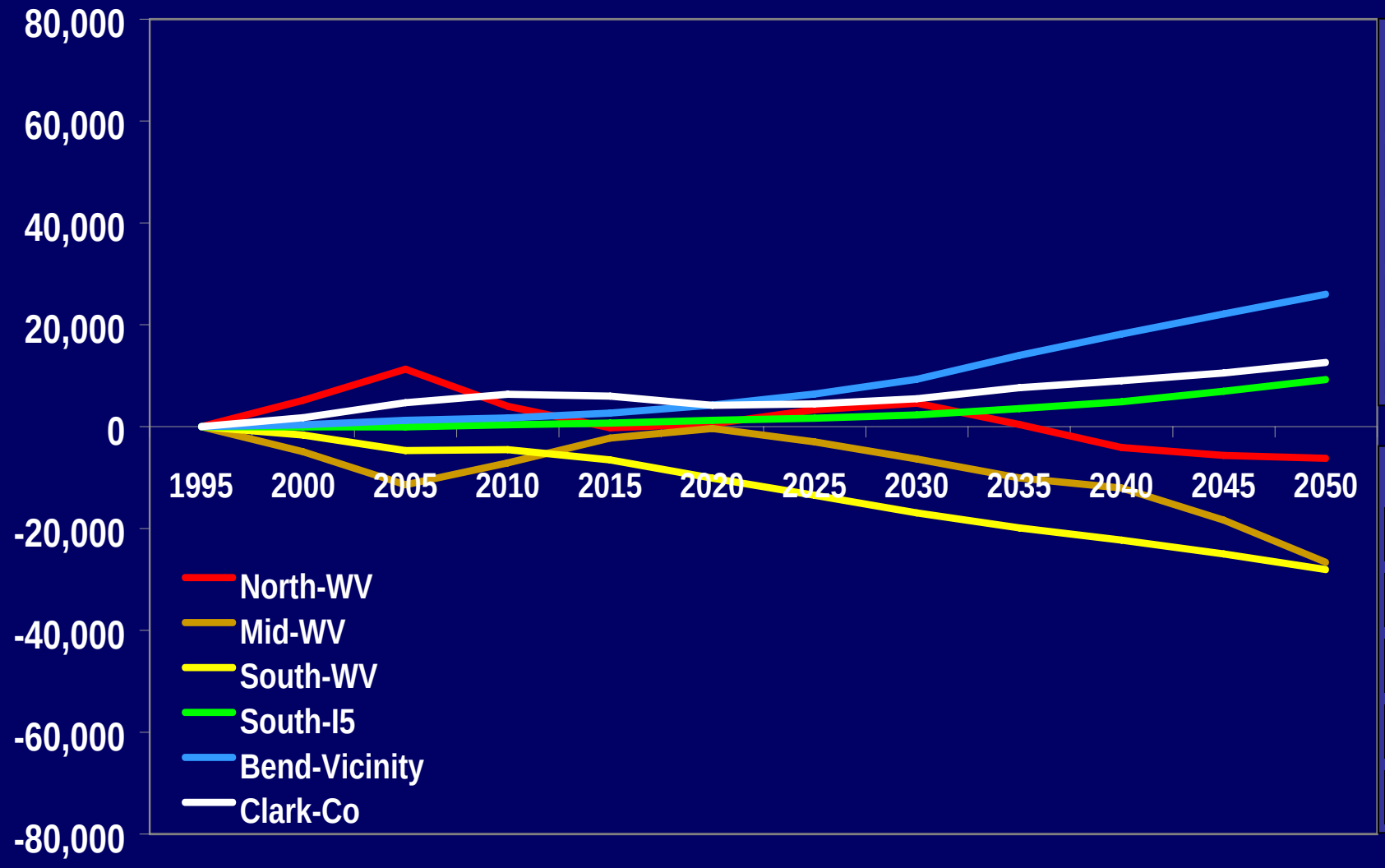

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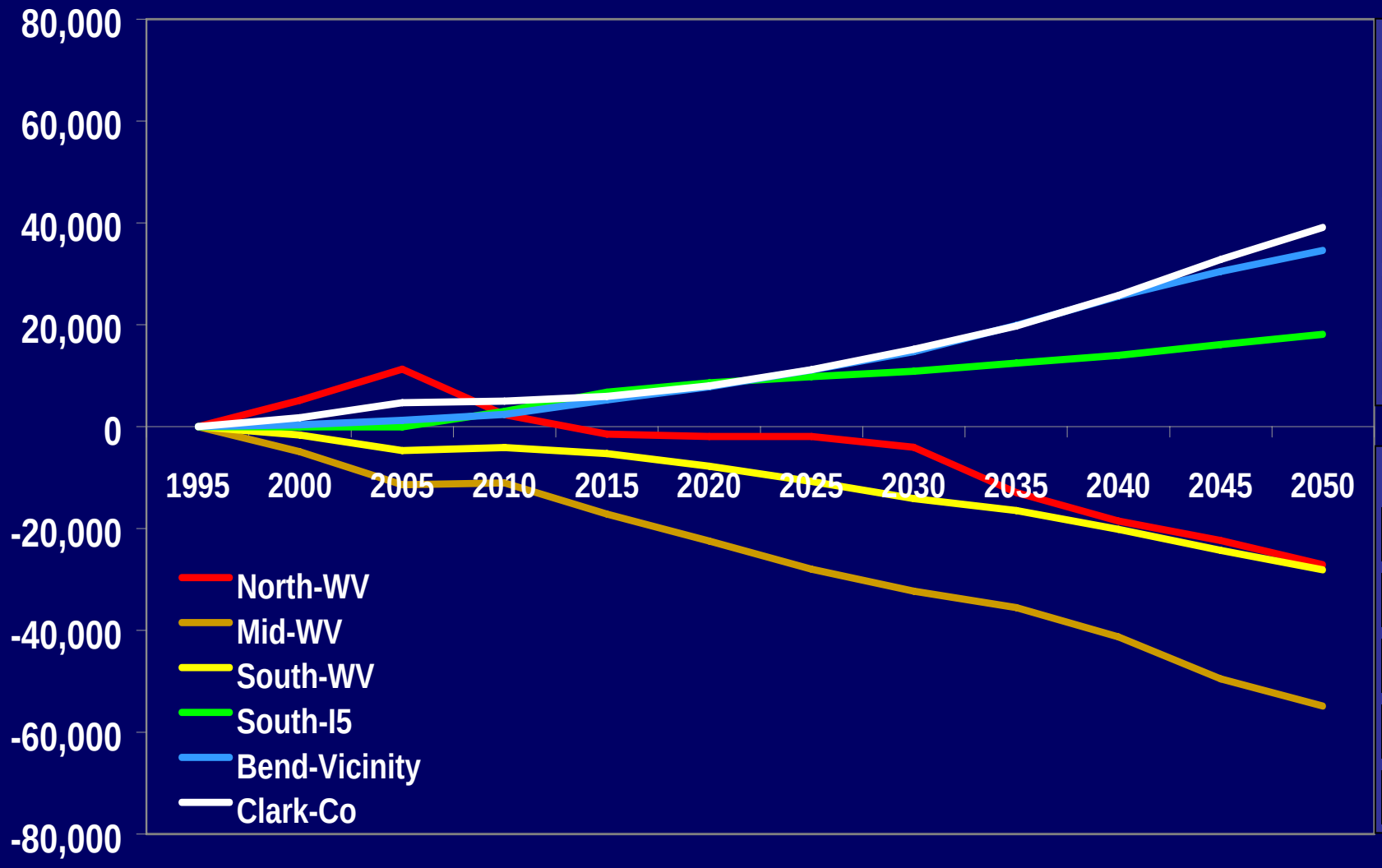
Historic/TDM Employee Difference



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Households by Region

- Shows differences in number of households between each scenario and Historic/CTC.
- Historic/No-Build
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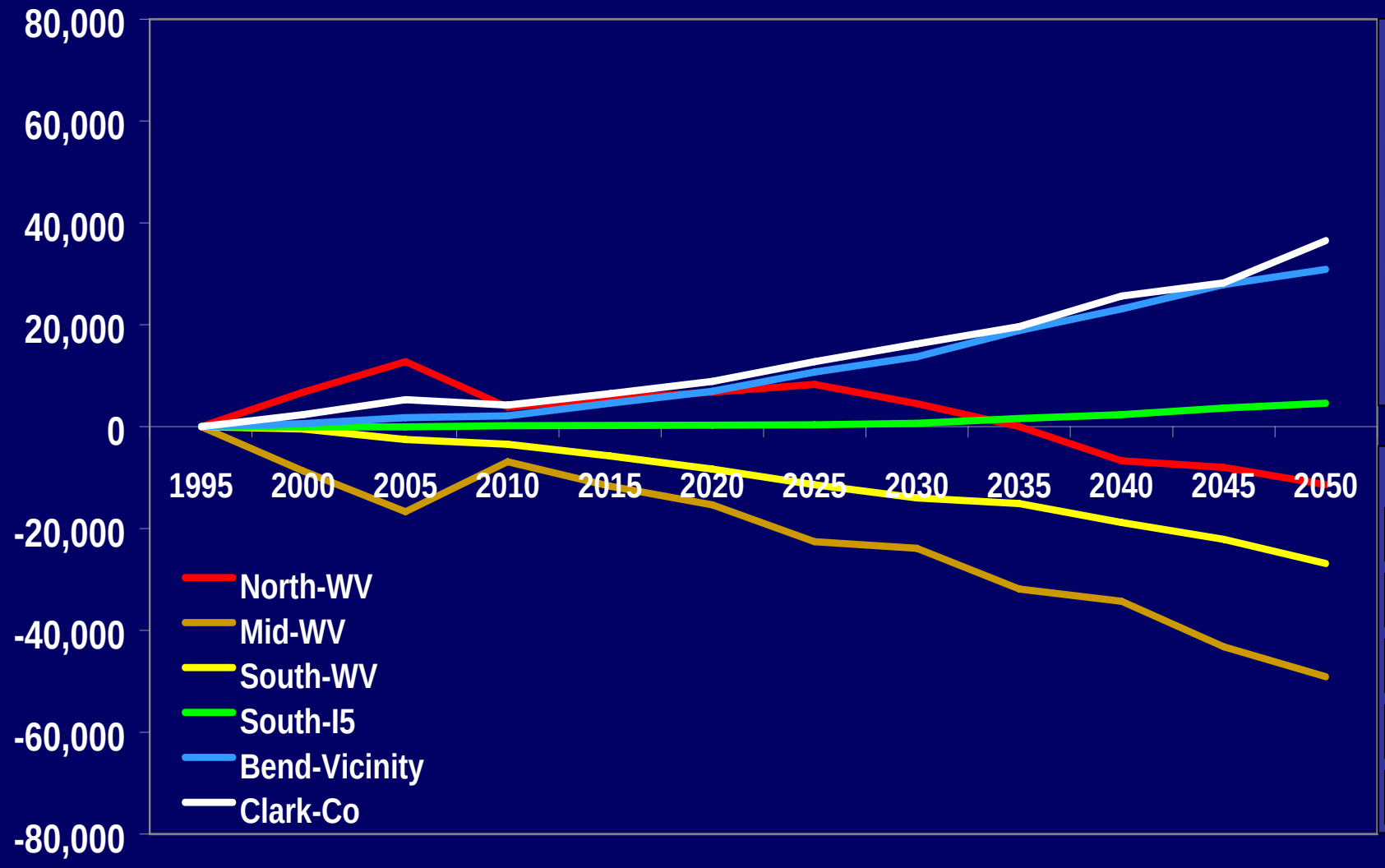
- Historic/TDM

Historic/No-Build Household Difference



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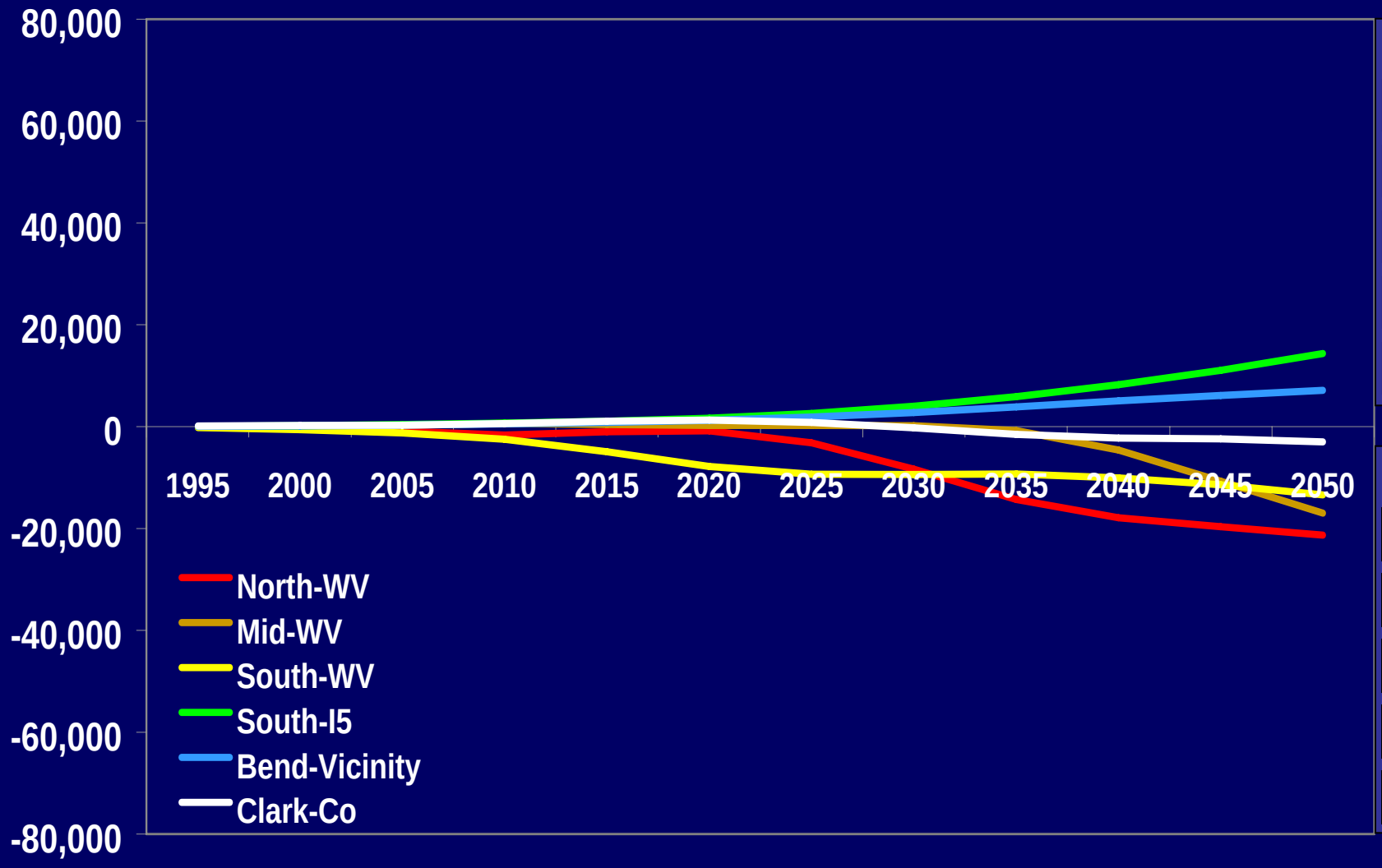

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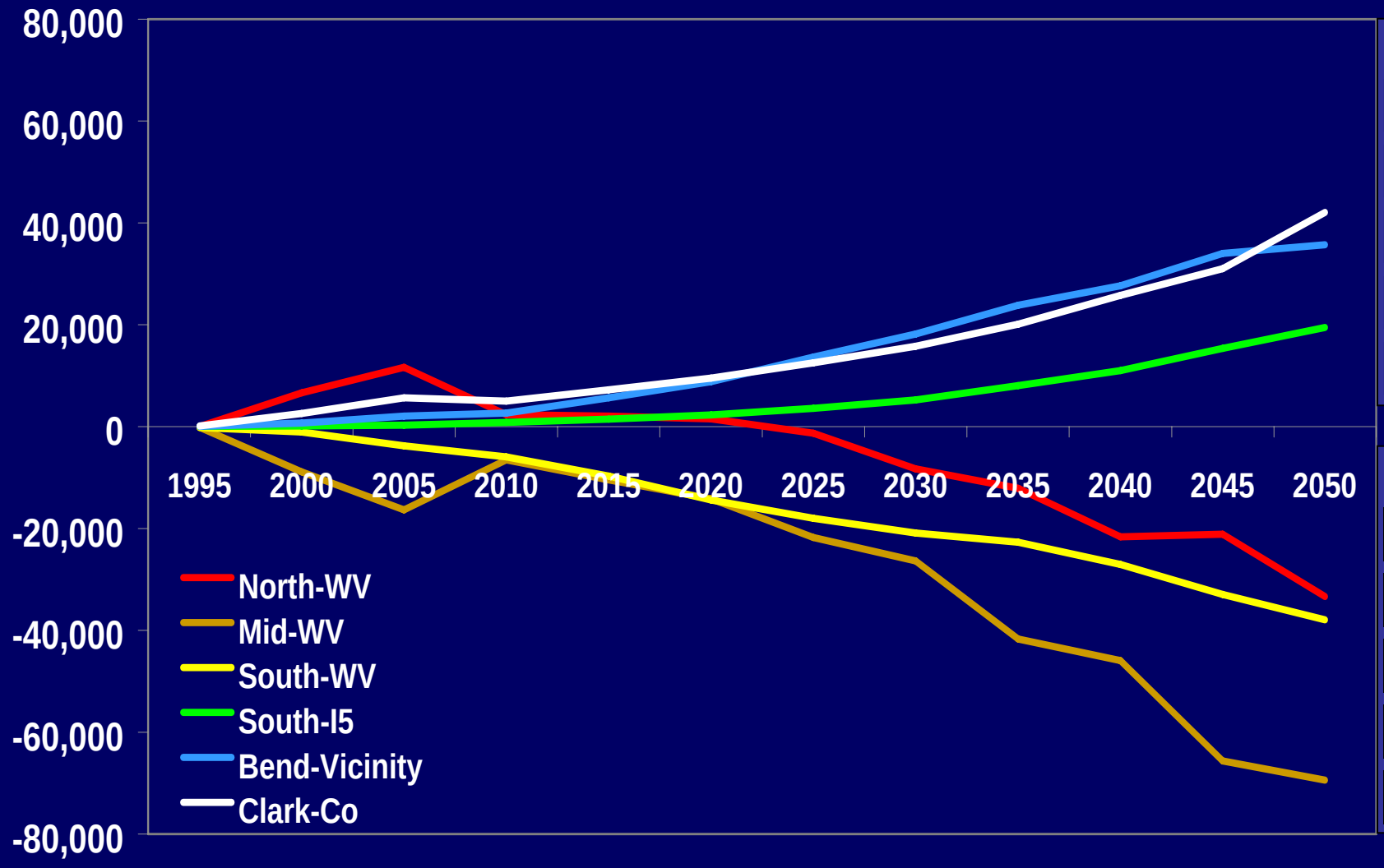

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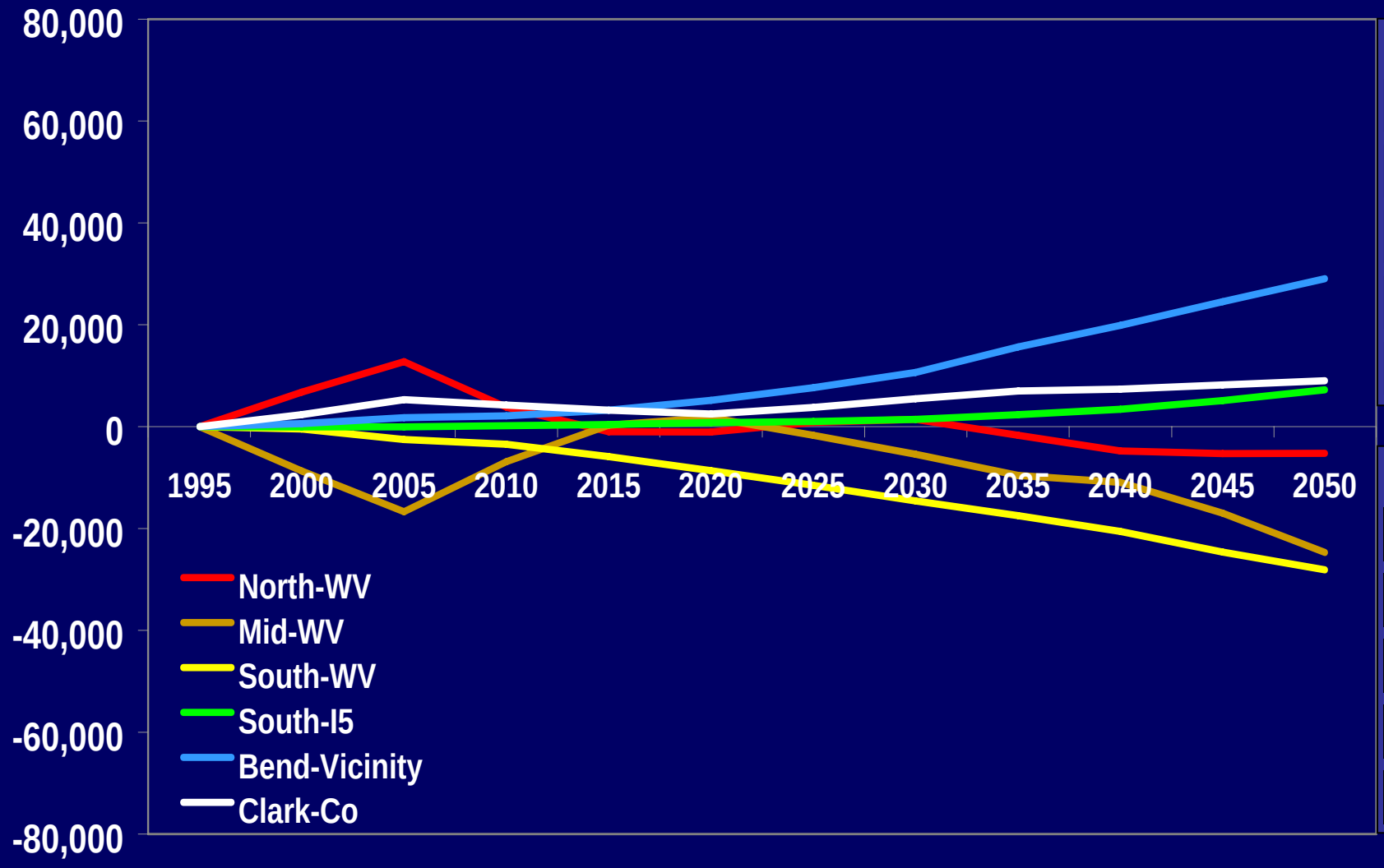
Historic/Highway Household Difference



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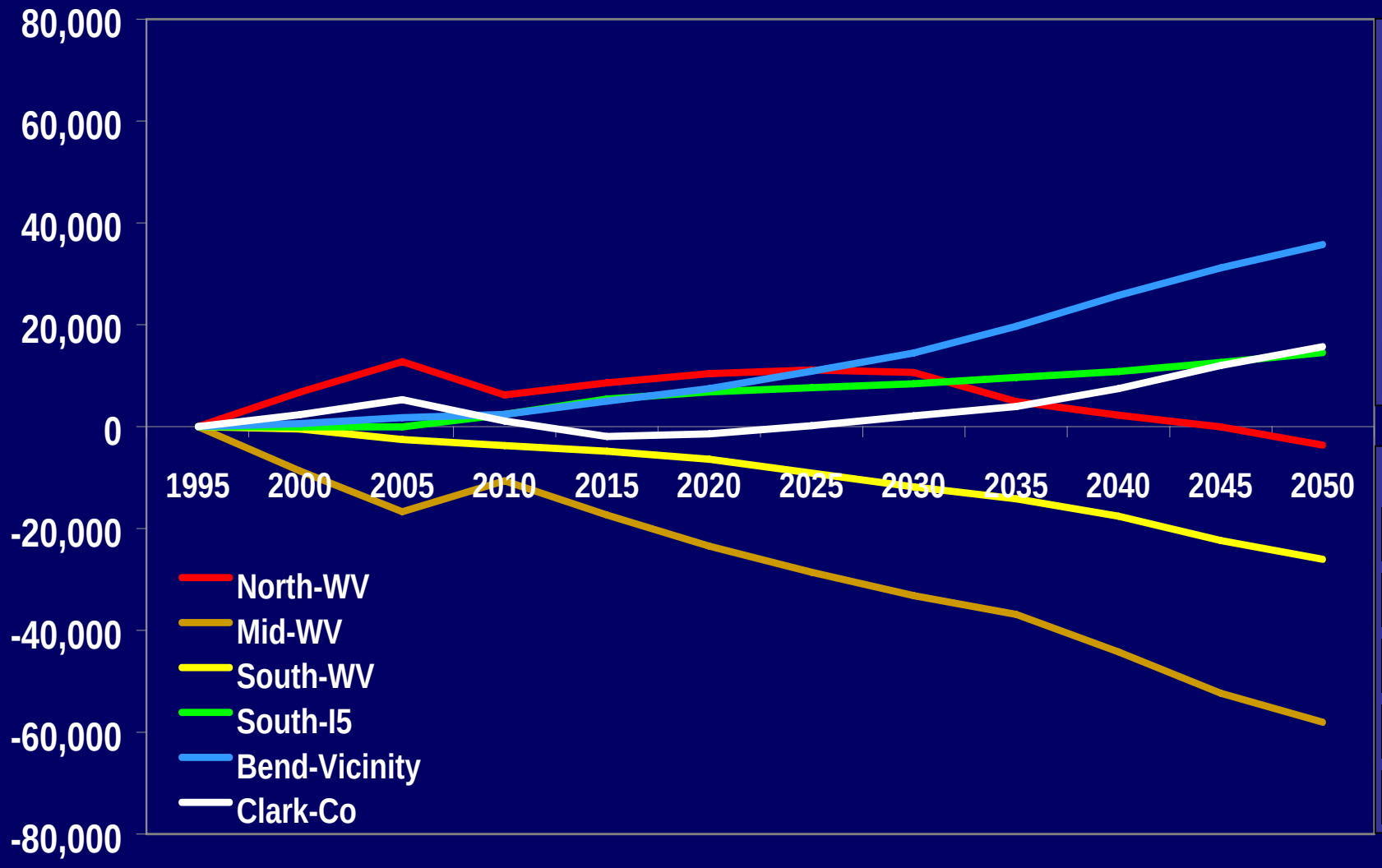
Historic/TDM Household Difference



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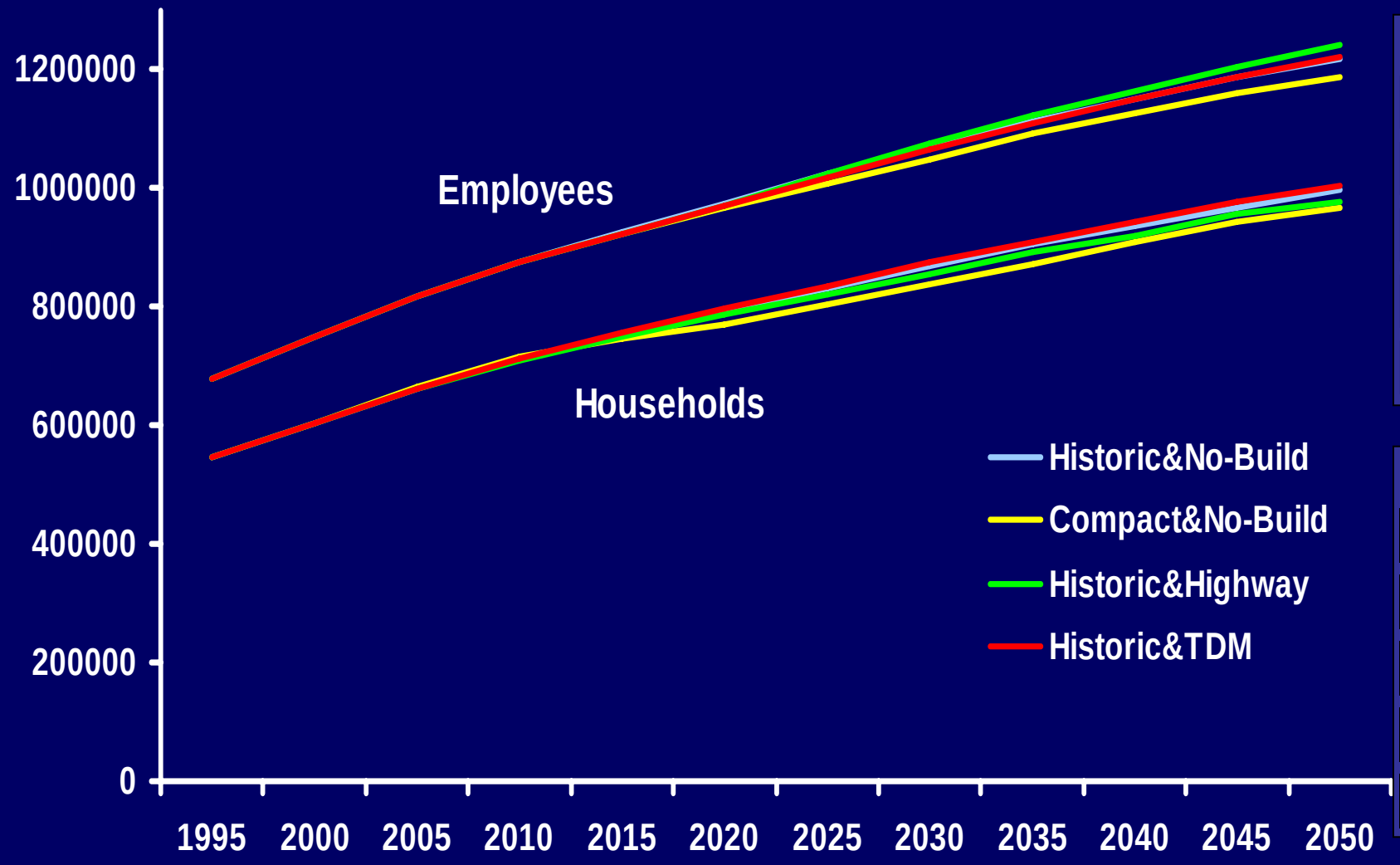
North WV Households and Employees



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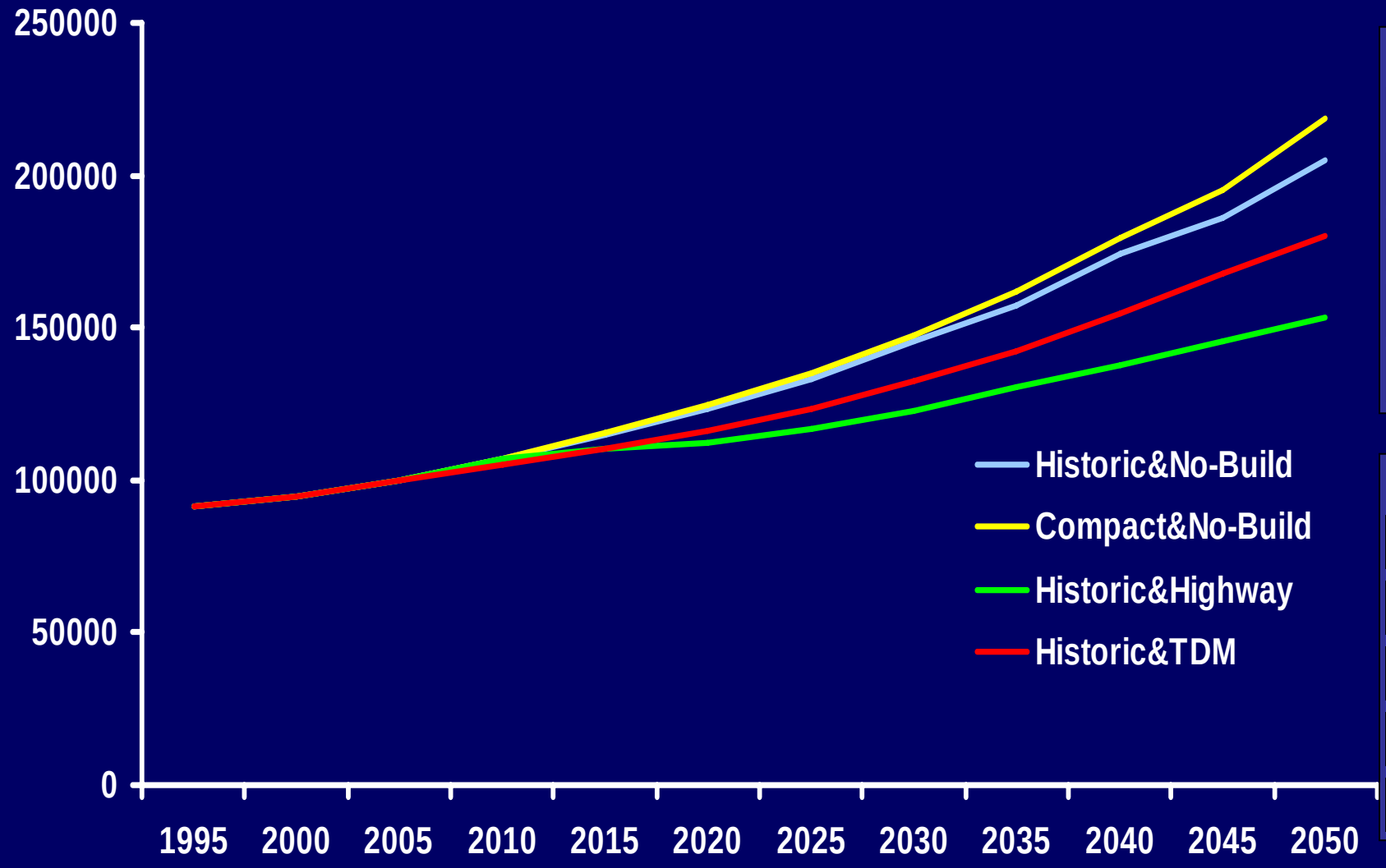
Clark County Employment



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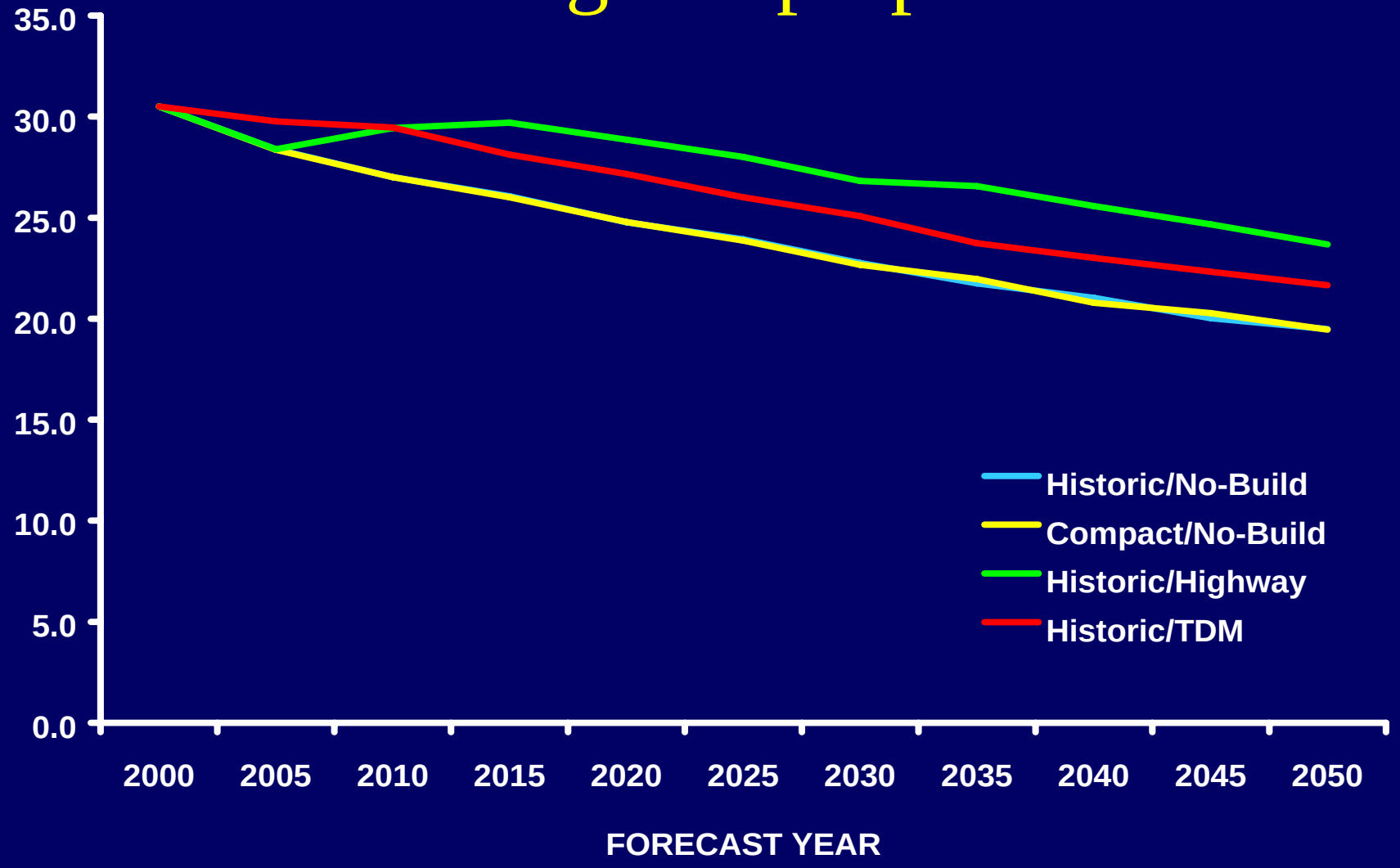
Transport Results

- Only Interzonal Trips
- Average Trip Speed
- Daily Suppressed Trips
- Daily Passenger Trips
- Average Trip Length

Average Trip Speed



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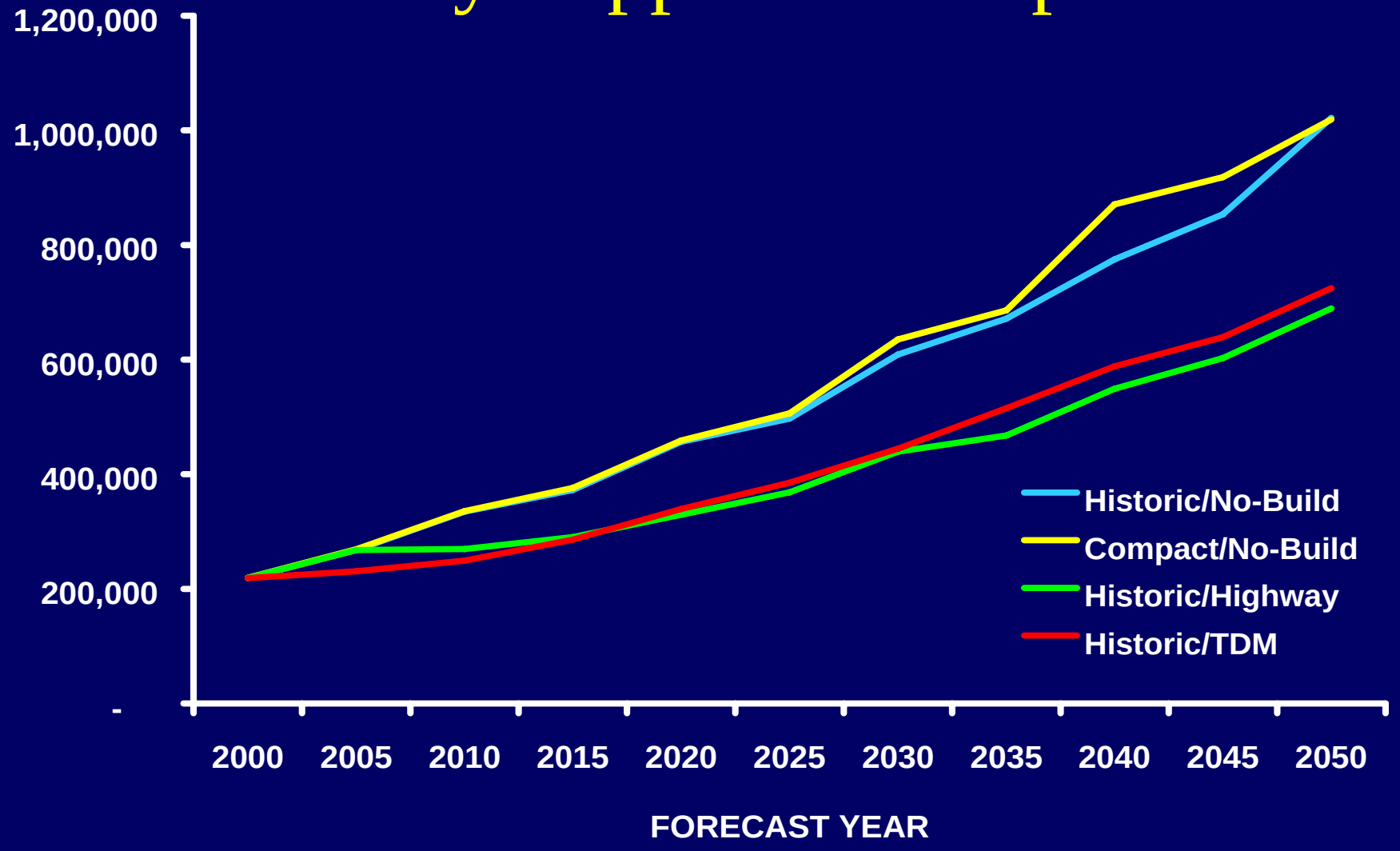
Daily Suppressed Trips



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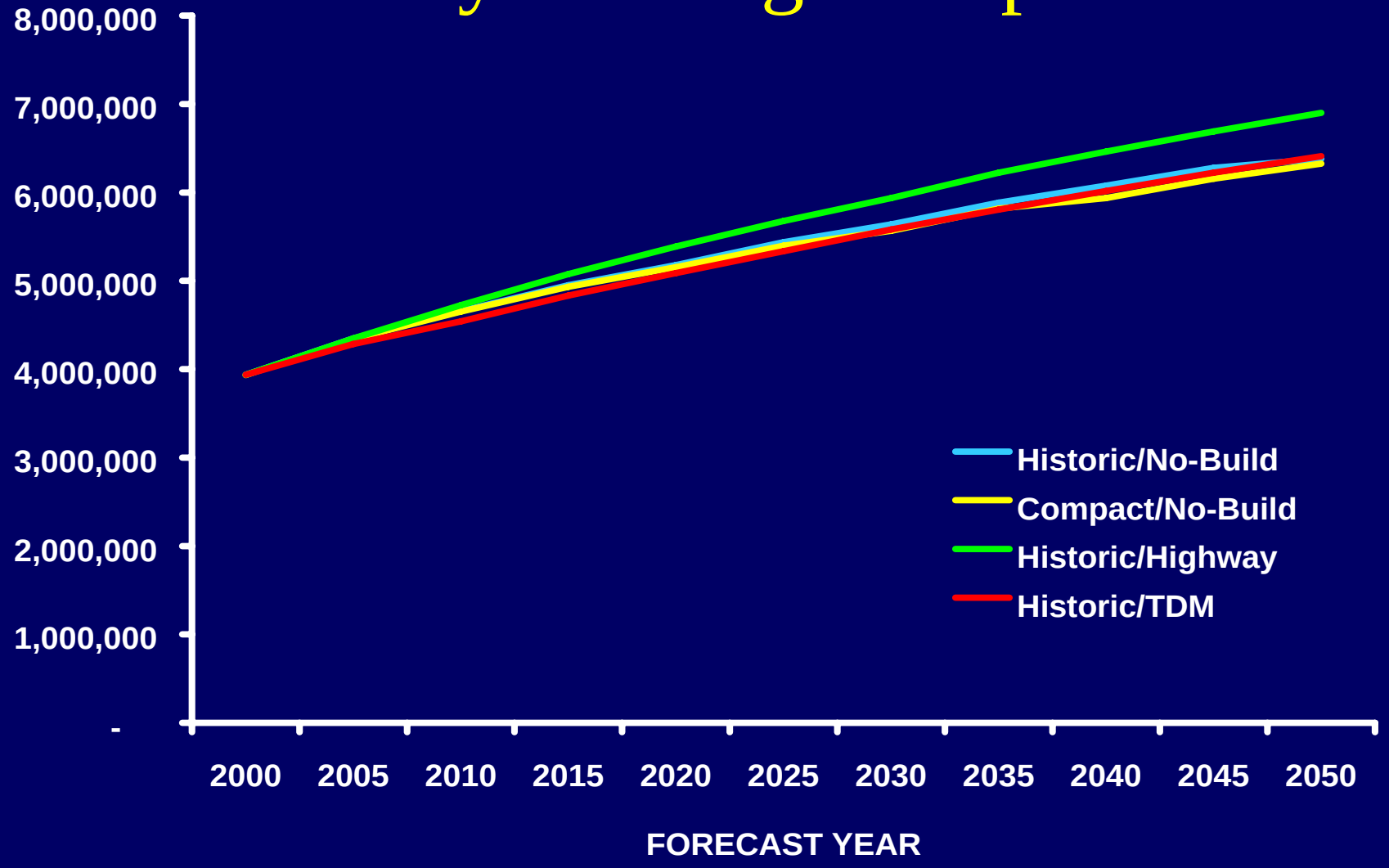
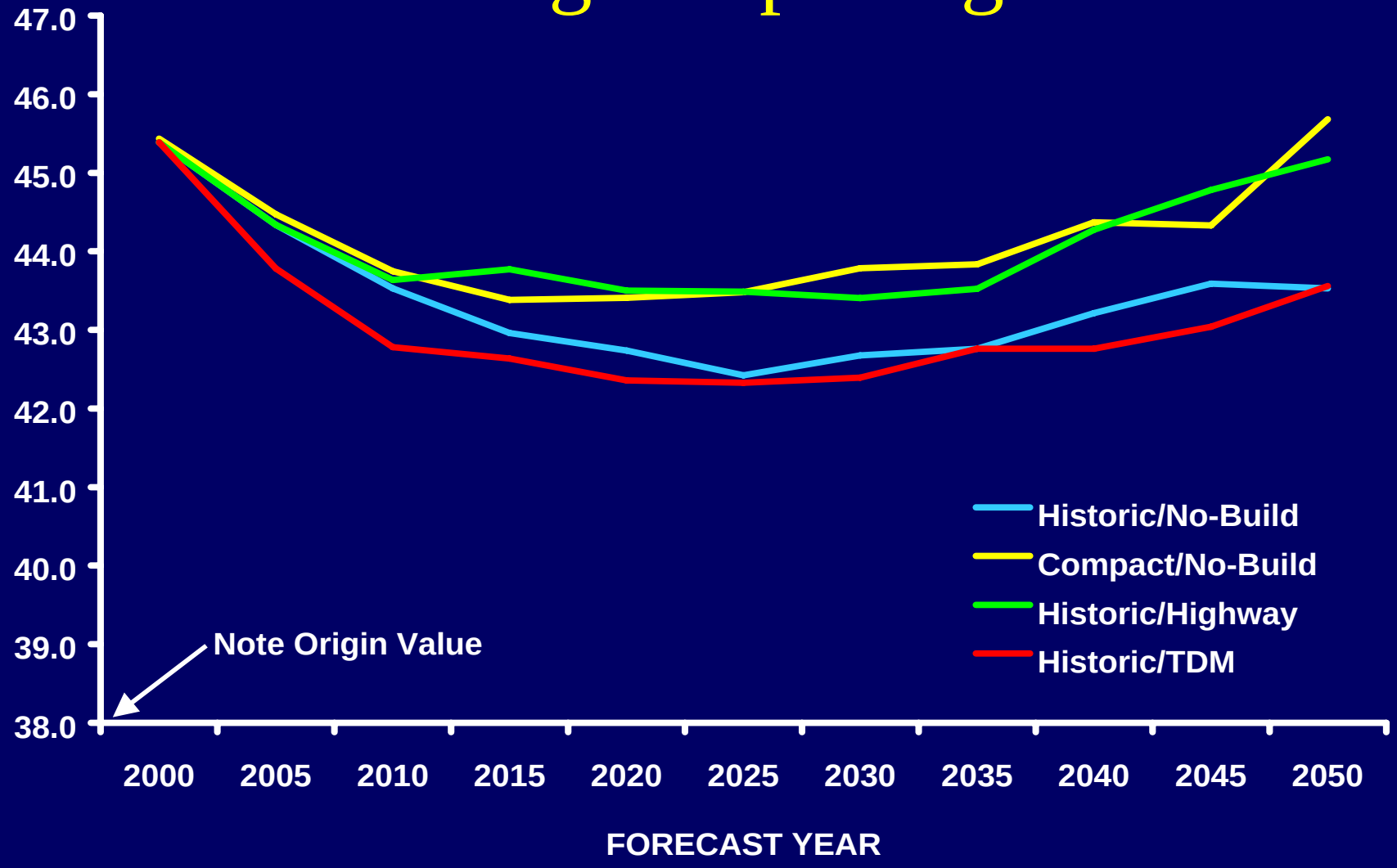
Daily Passenger Trips



Average Trip Length



Region Emp | Region HHs | Transport | Maps

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Employment Maps

- Show the difference in zone employment between each scenario and Historic/CTC.
- Red = Less Blue = More Darker = Greater
- Historic/No-Build
- Compact/CTC
- Compact/No-Build
- Historic/Highway
- Historic/TDM

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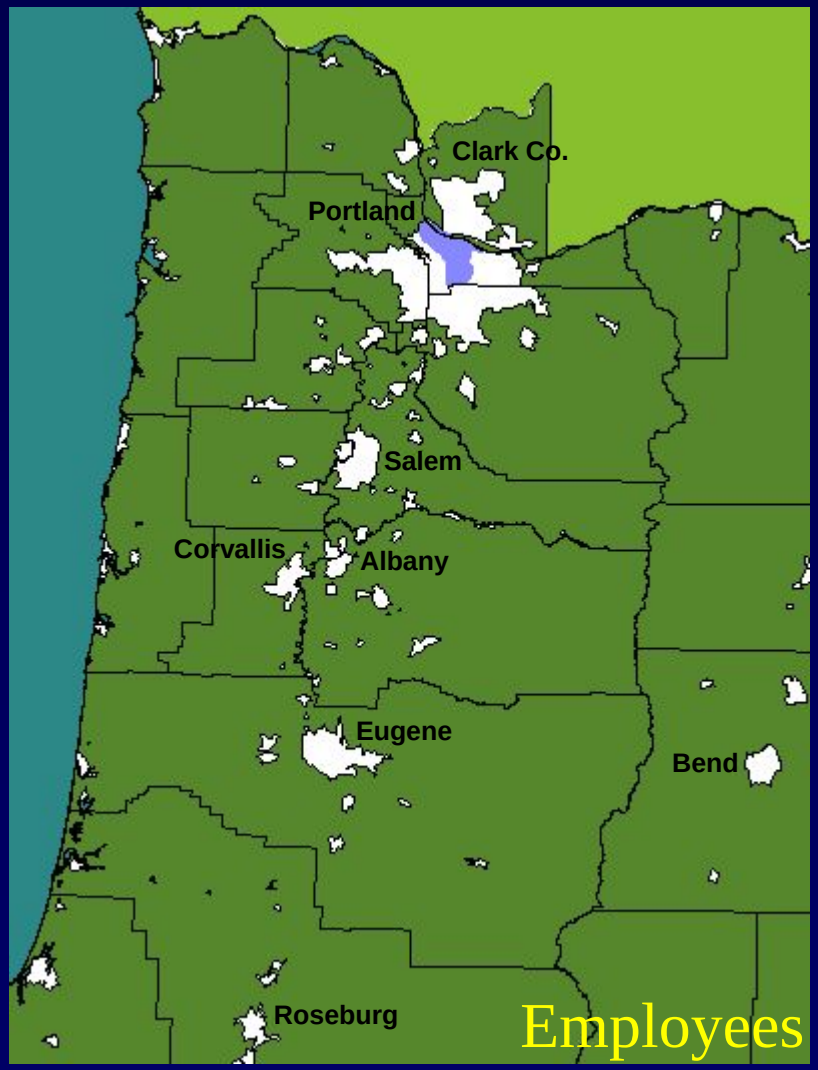
2000 Historic/No-Build Differences



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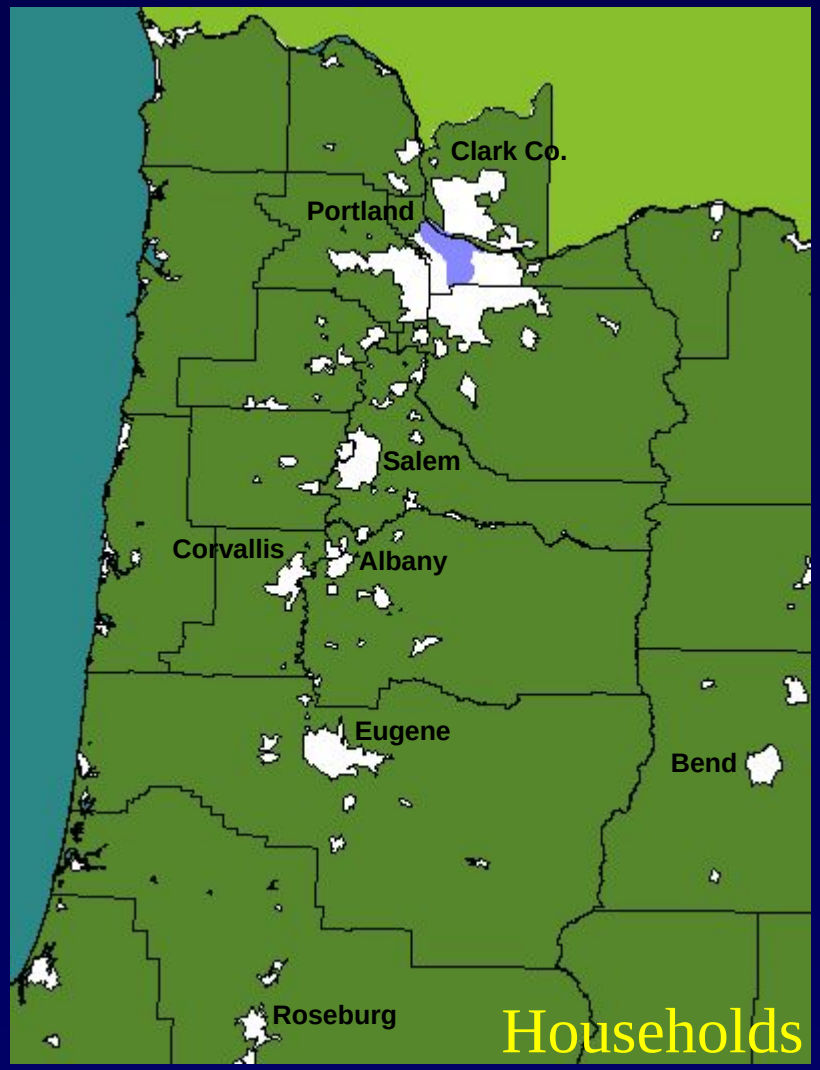

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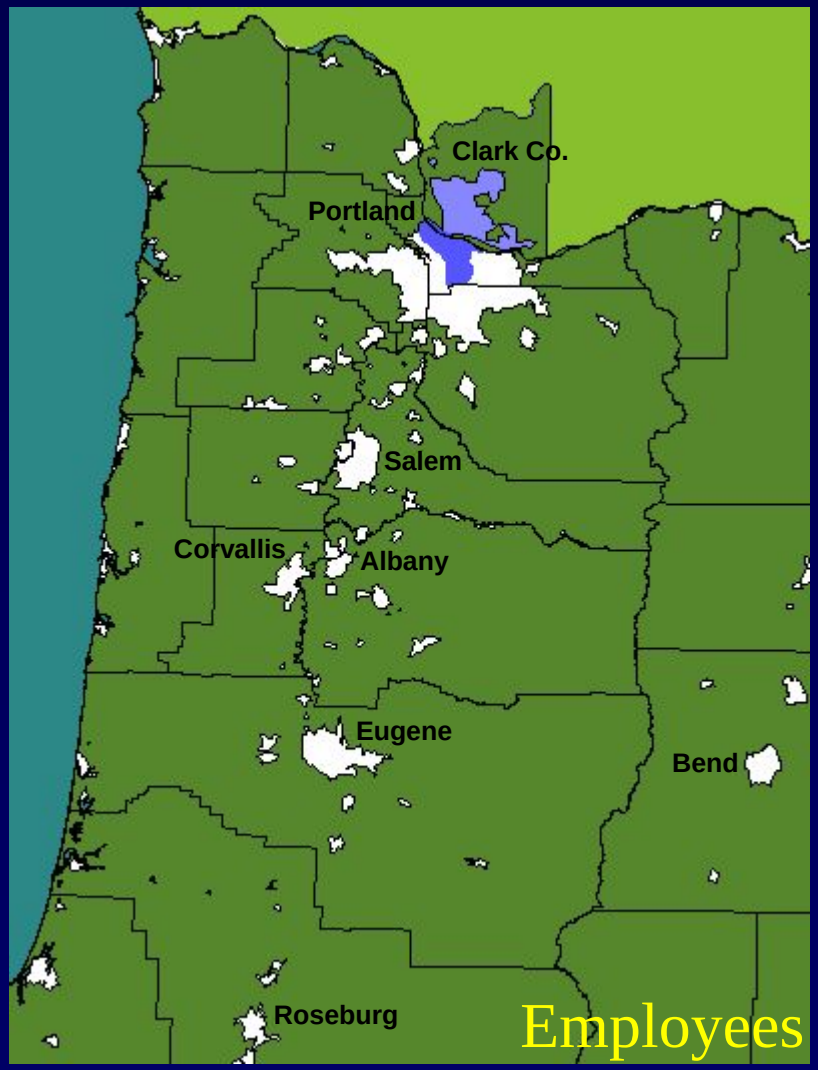
2005 Historic/No-Build Differences



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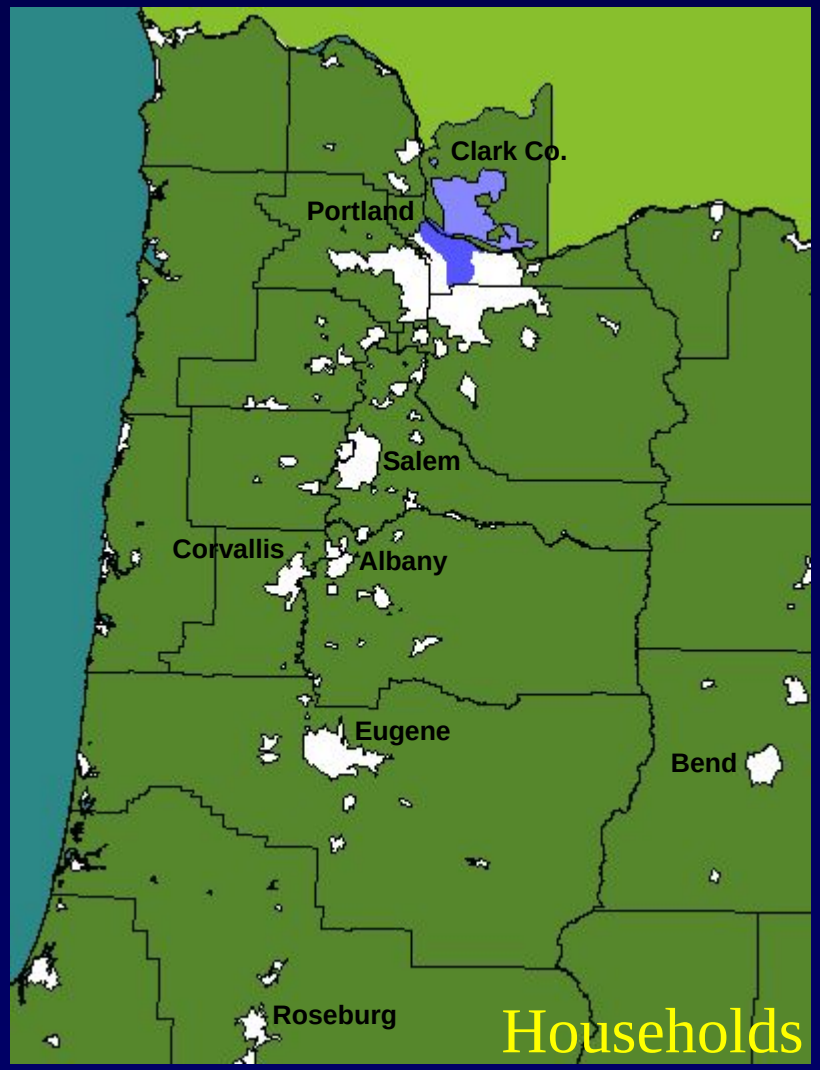

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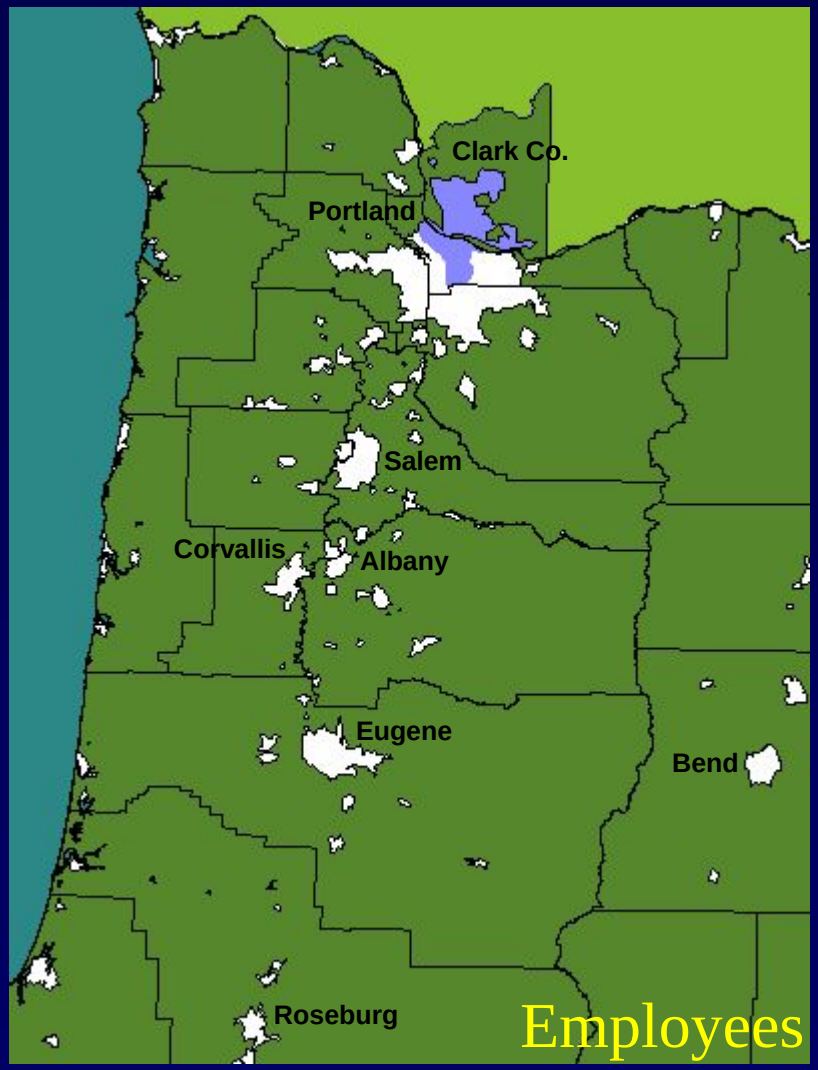
2010 Historic/No-Build Differences



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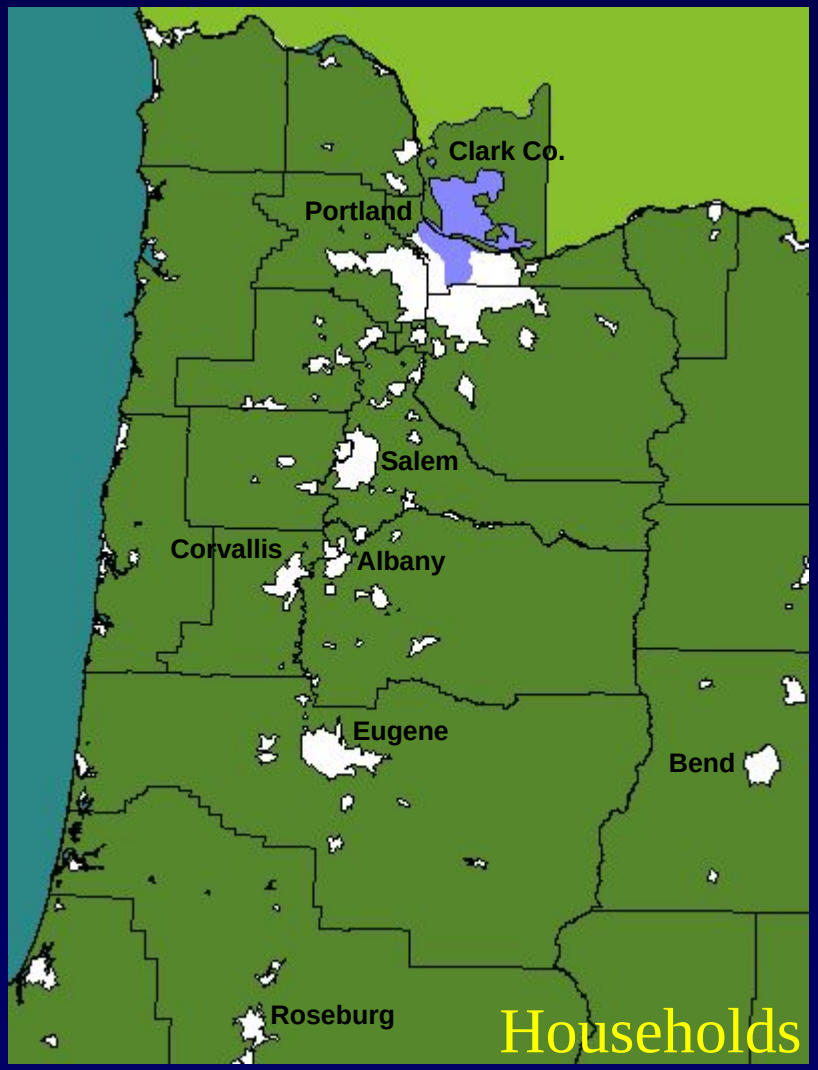

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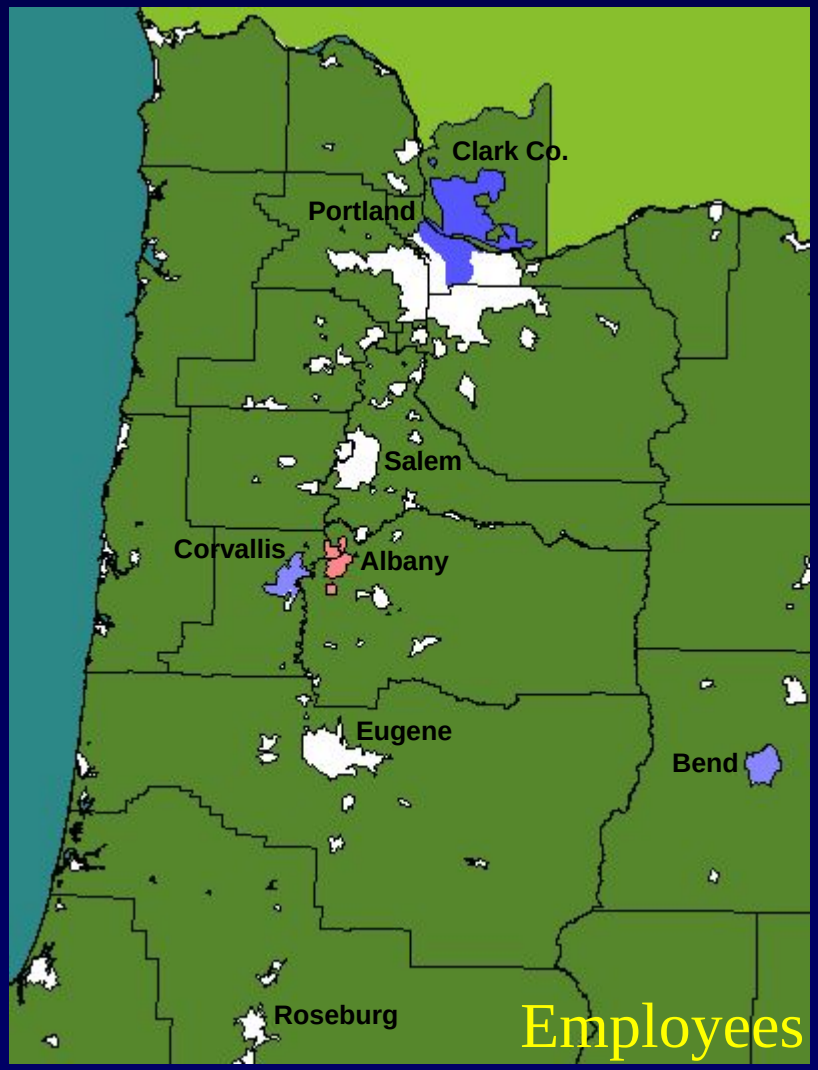
2015 Historic/No-Build Differences



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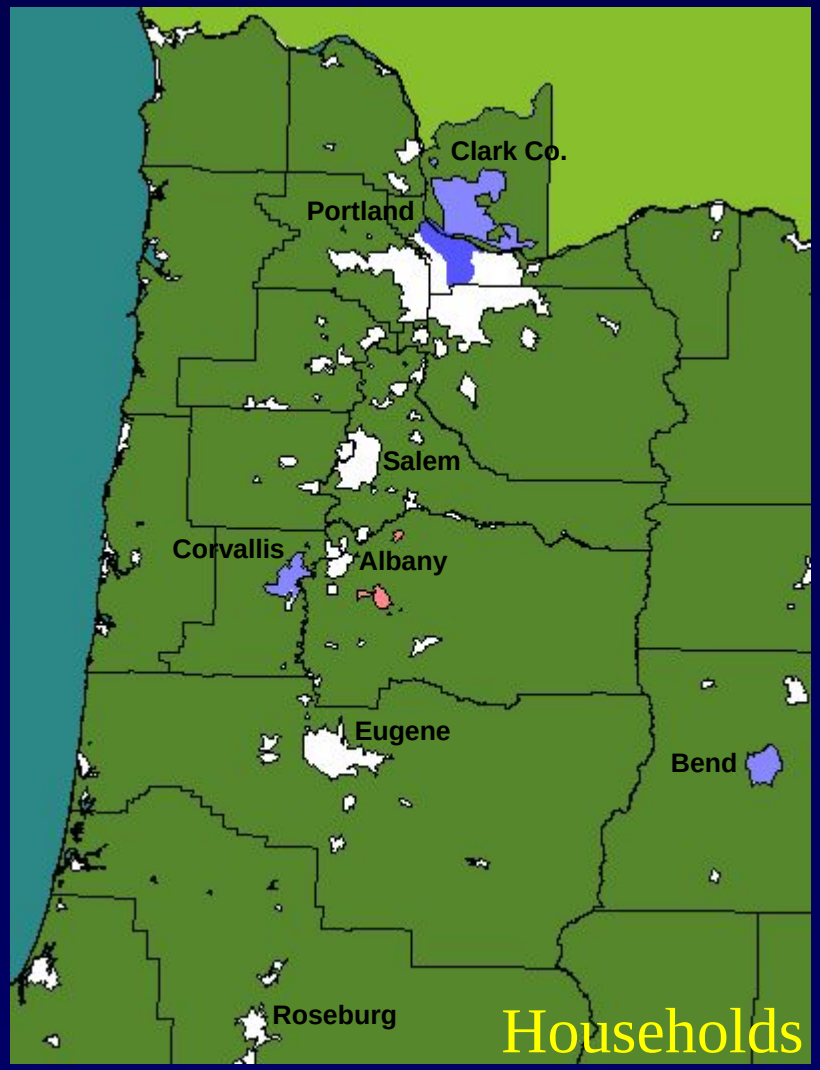

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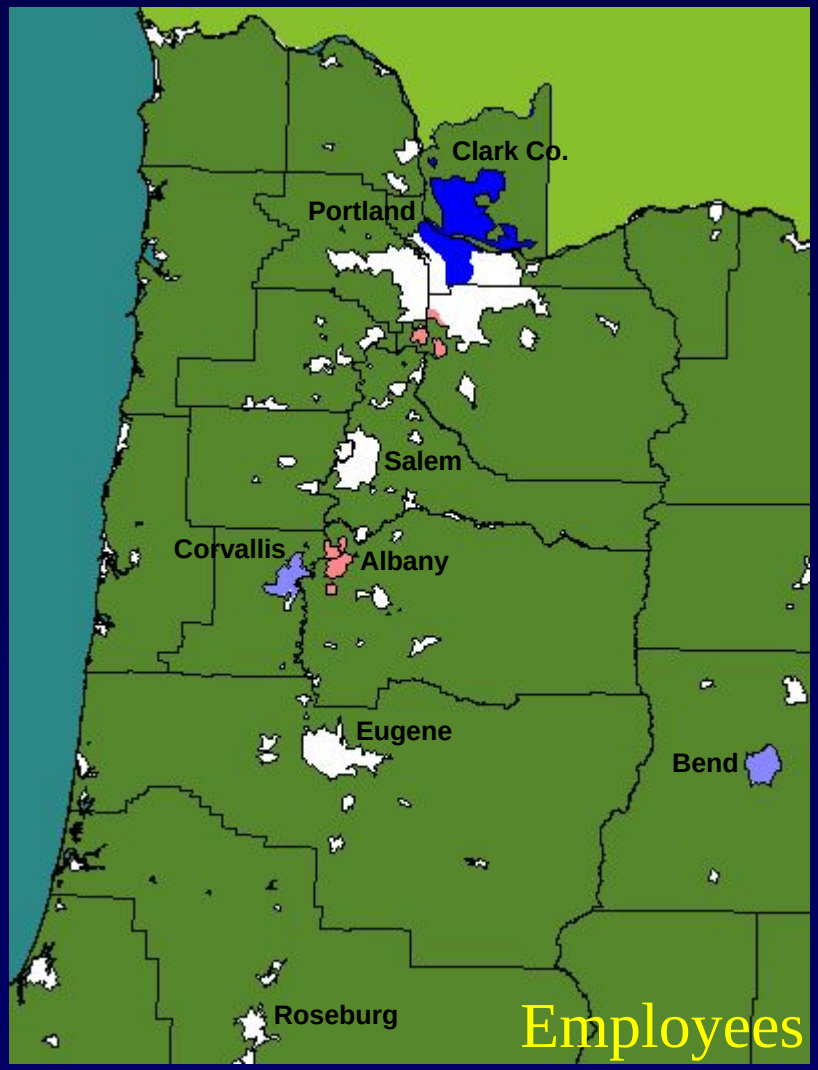
2020 Historic/No-Build Differences



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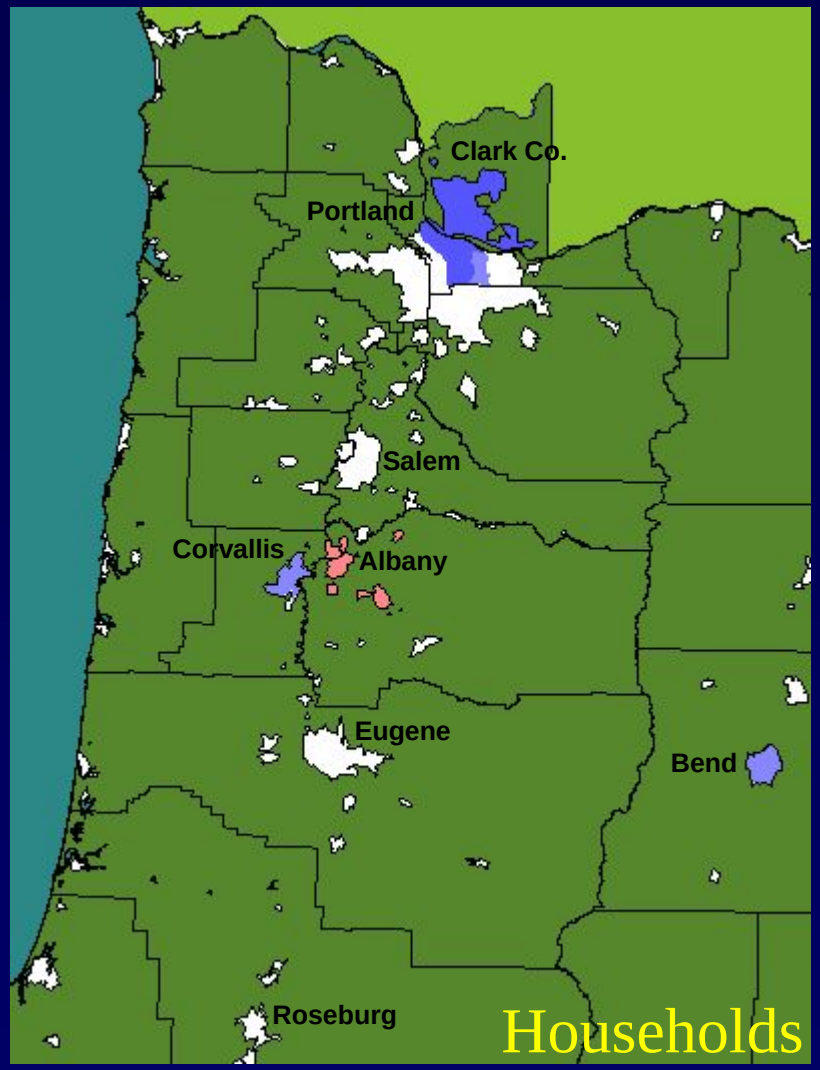

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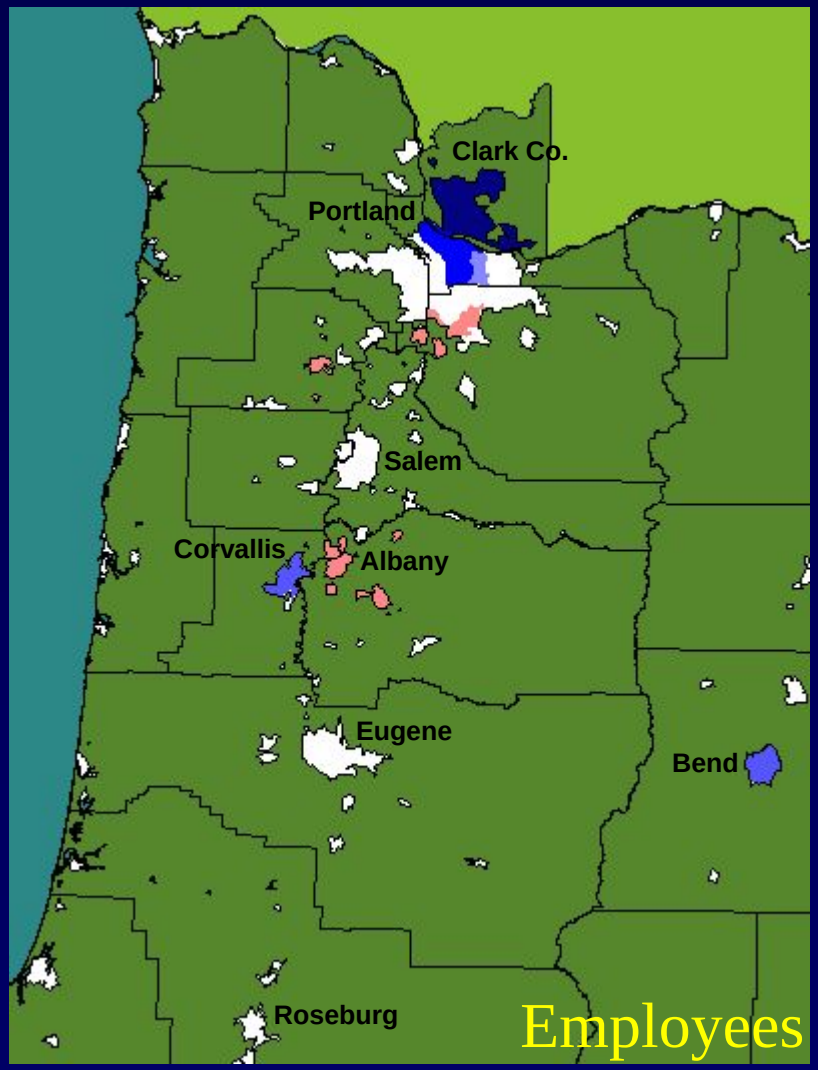
2025 Historic/No-Build Differences



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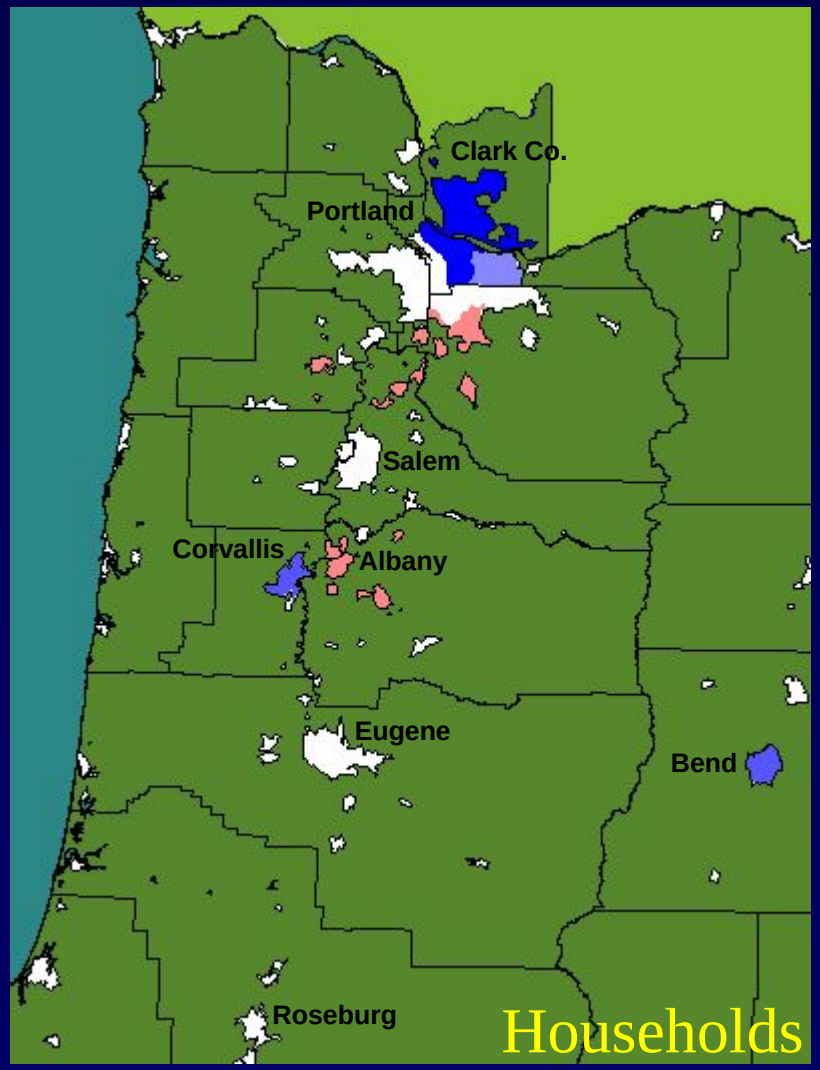

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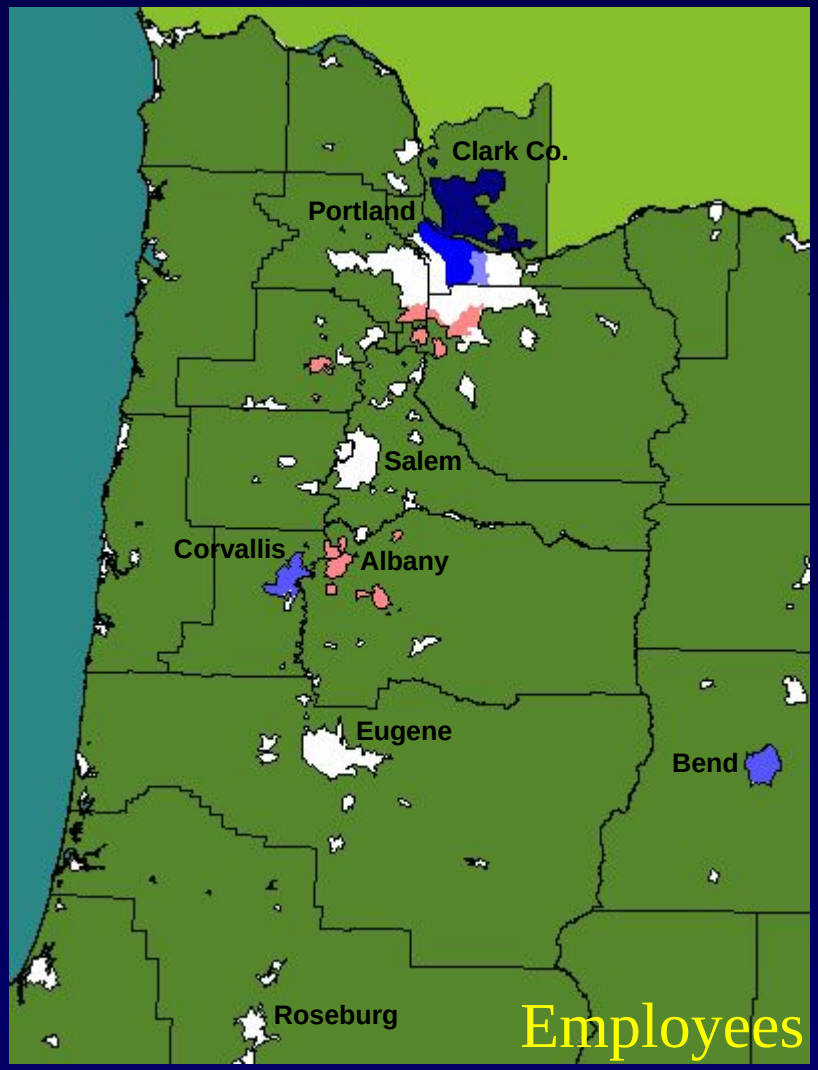
2030 Historic/No-Build Differences



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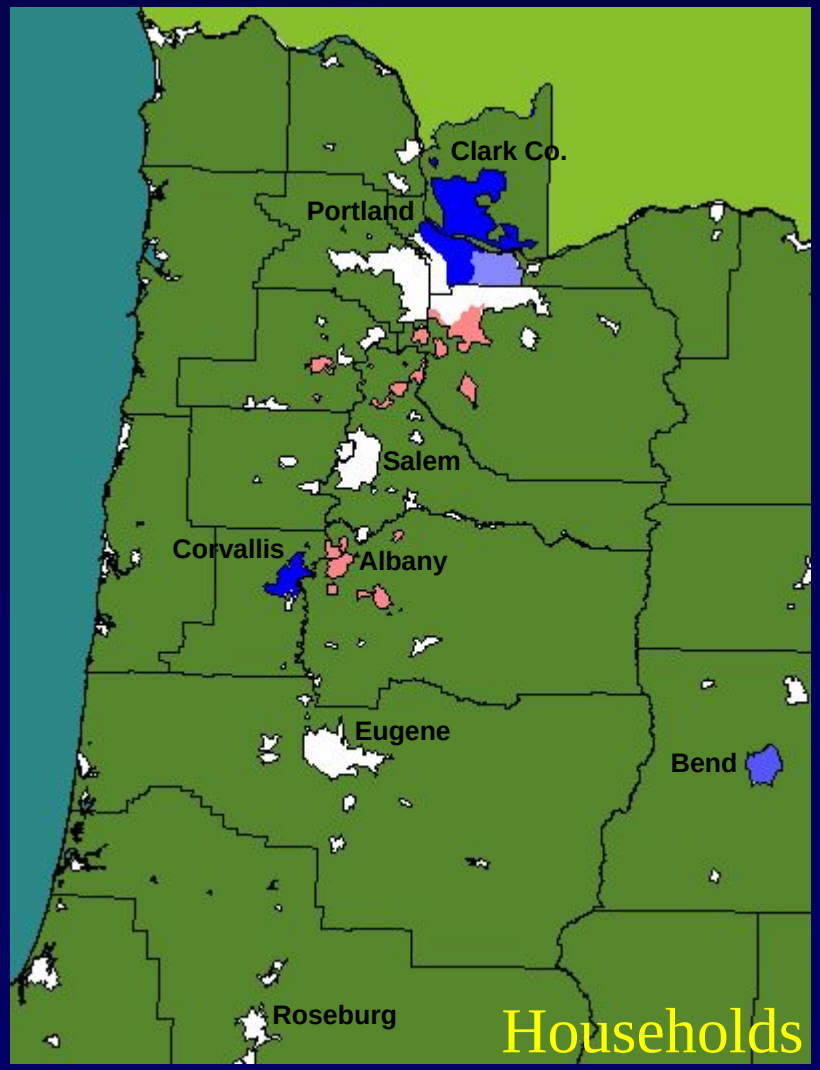

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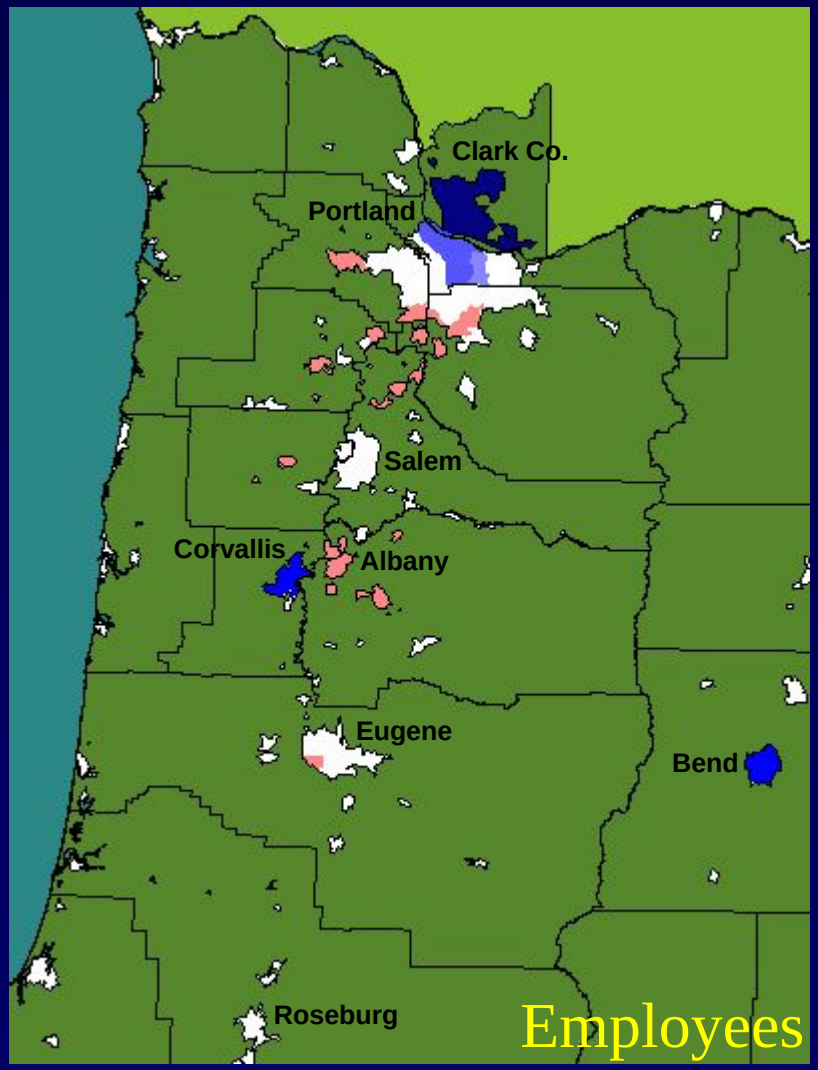
2035 Historic/No-Build Differences



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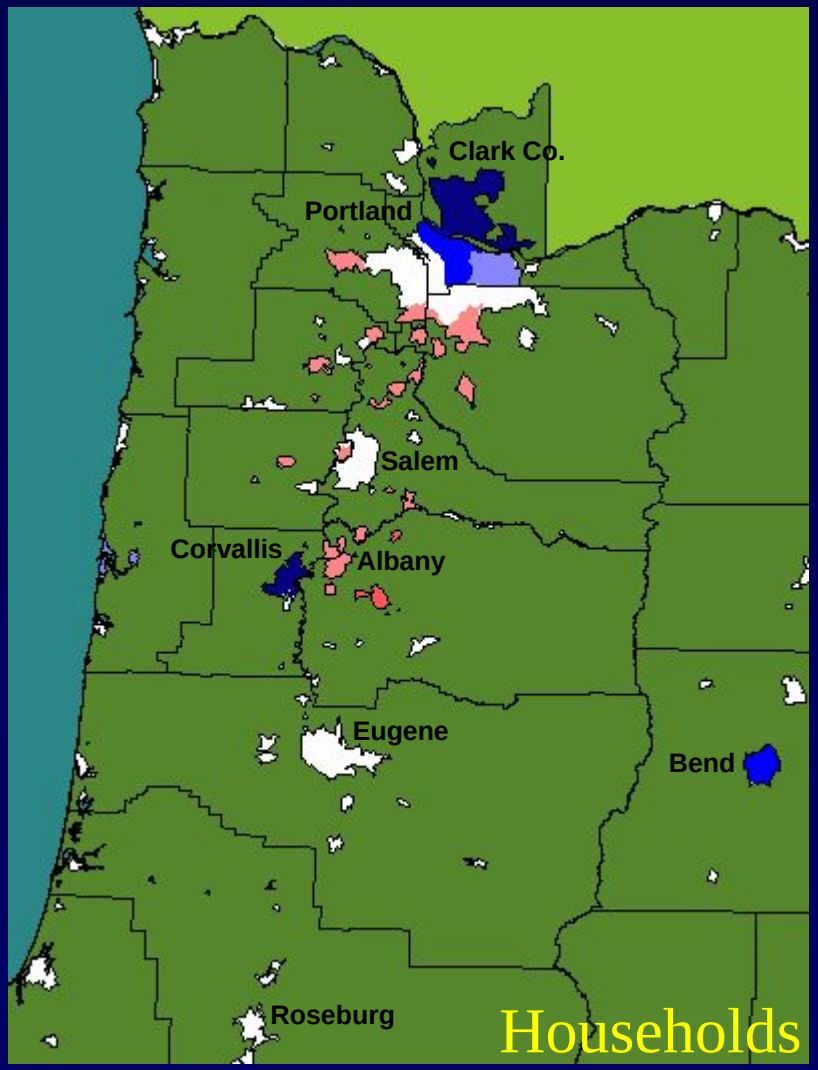

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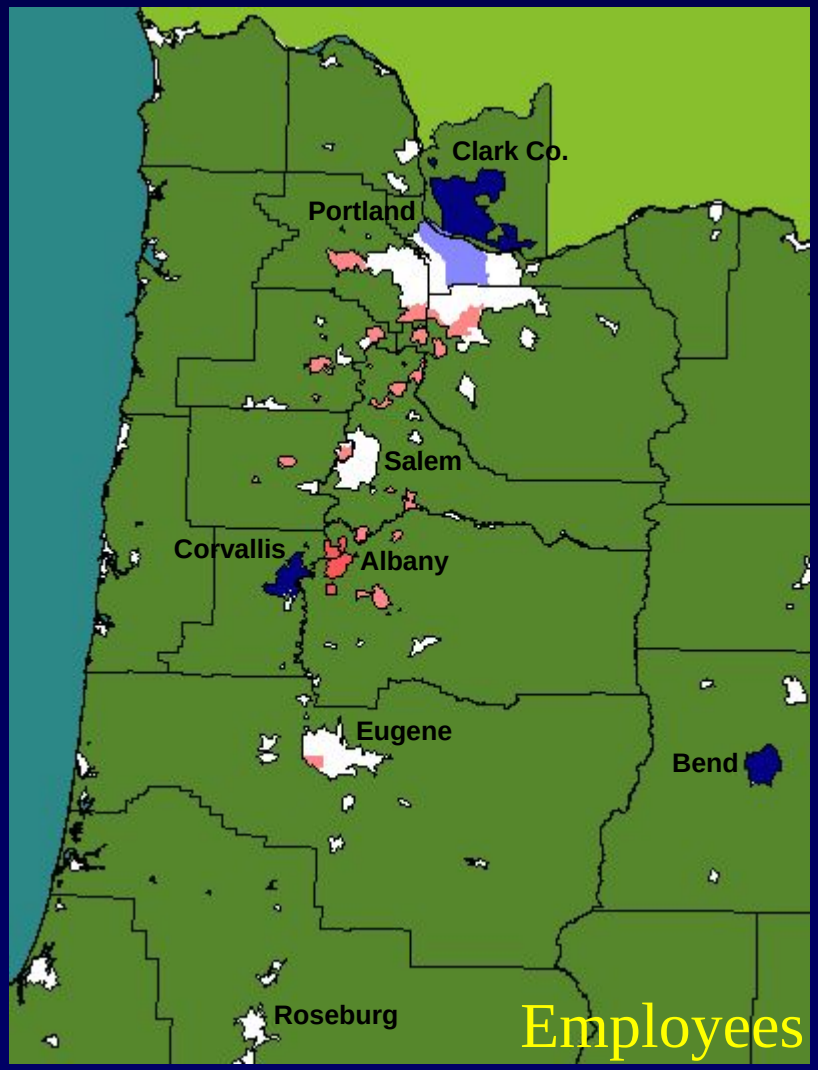
2040 Historic/No-Build Differences



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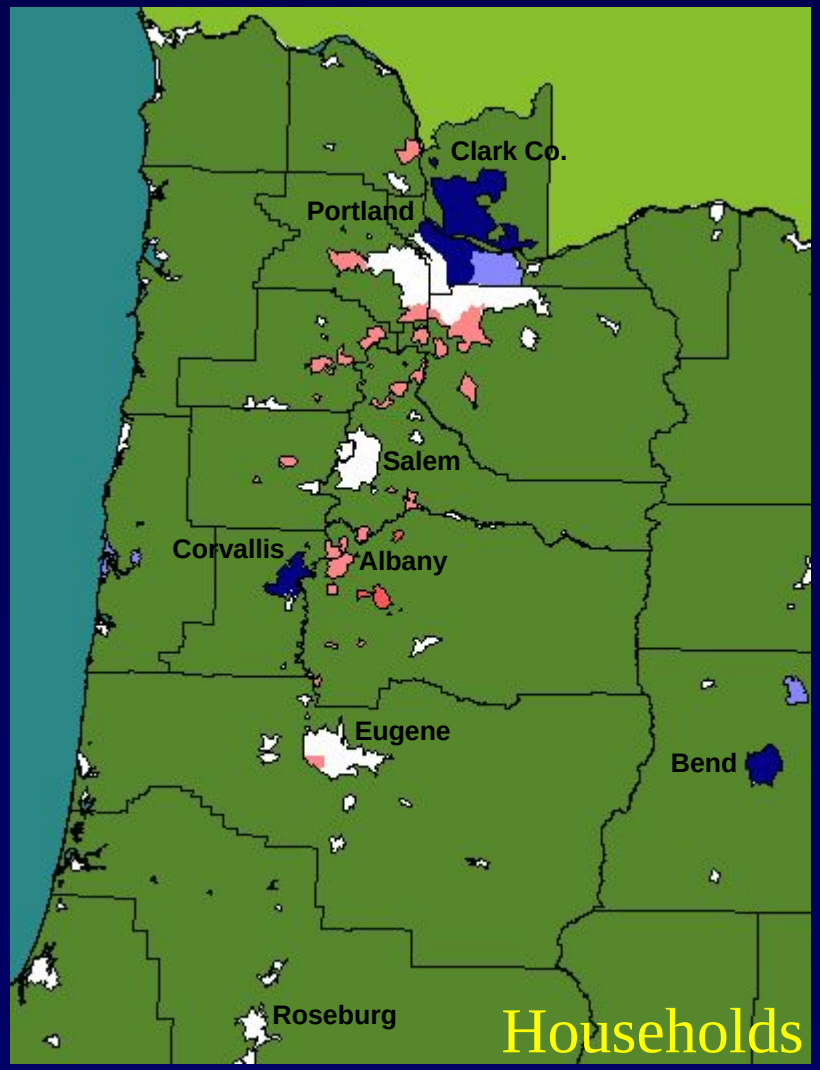
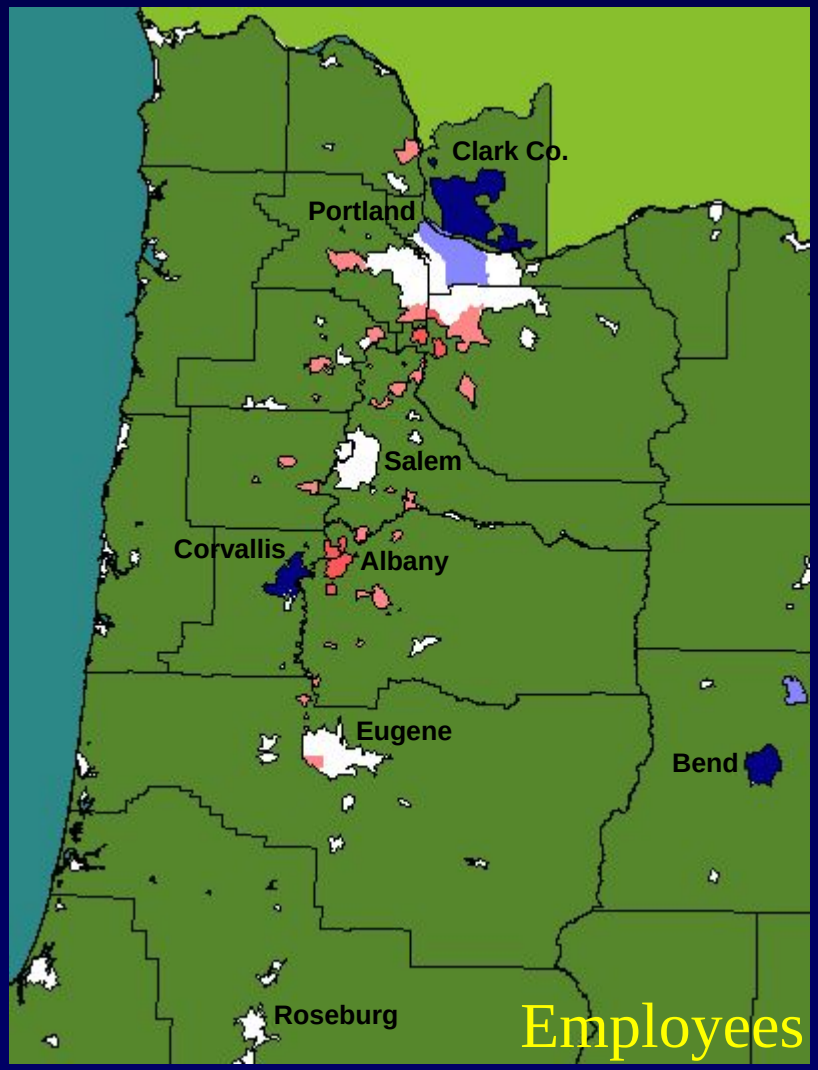


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2045 Historic/No-Build Differences



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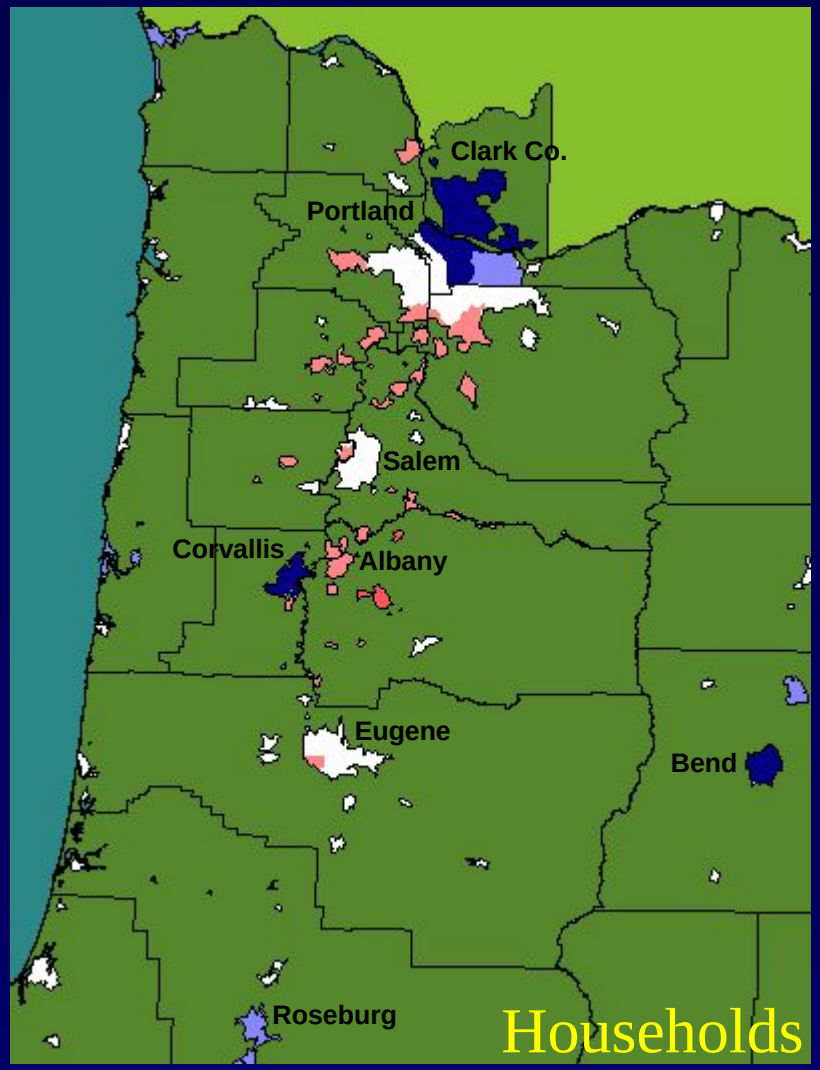
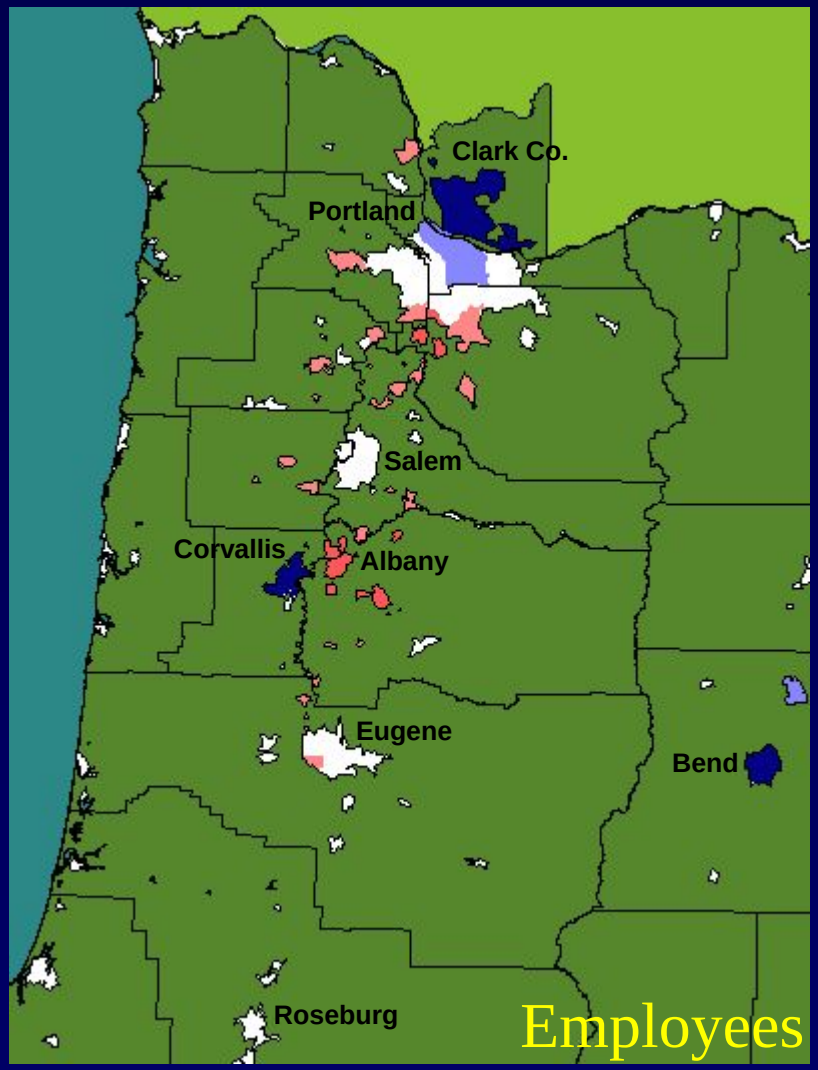


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2050 Historic/No-Build Differences



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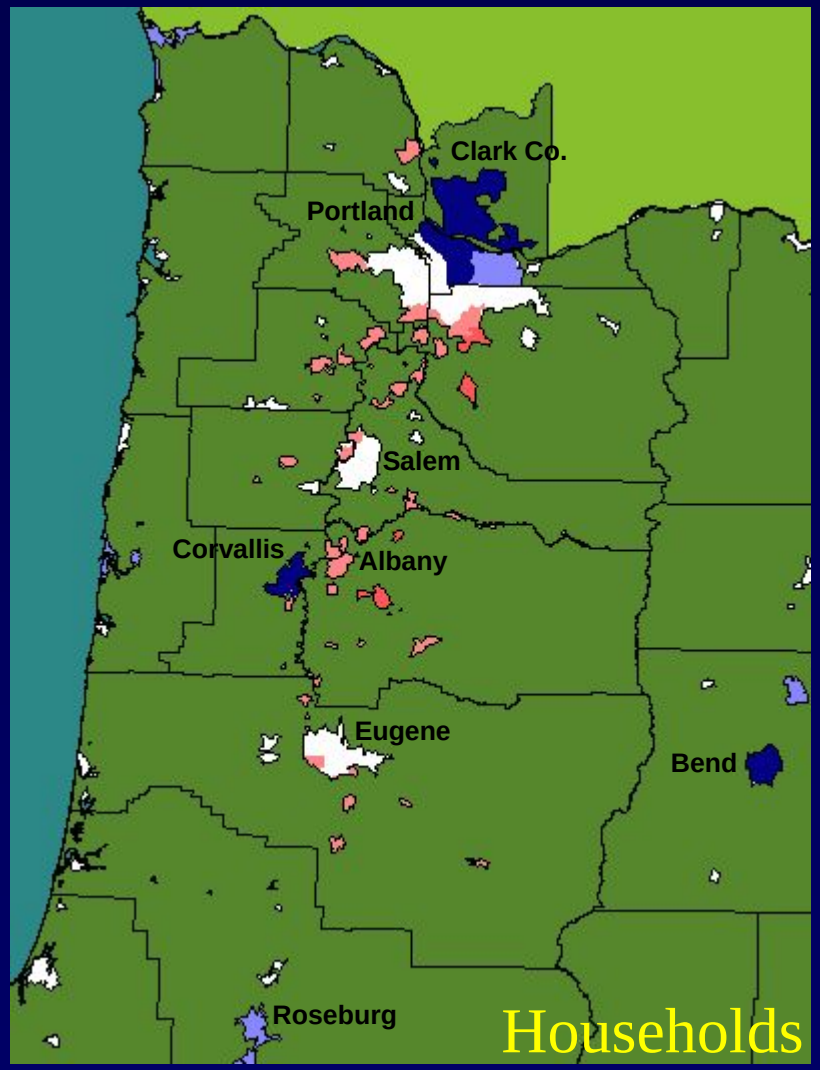
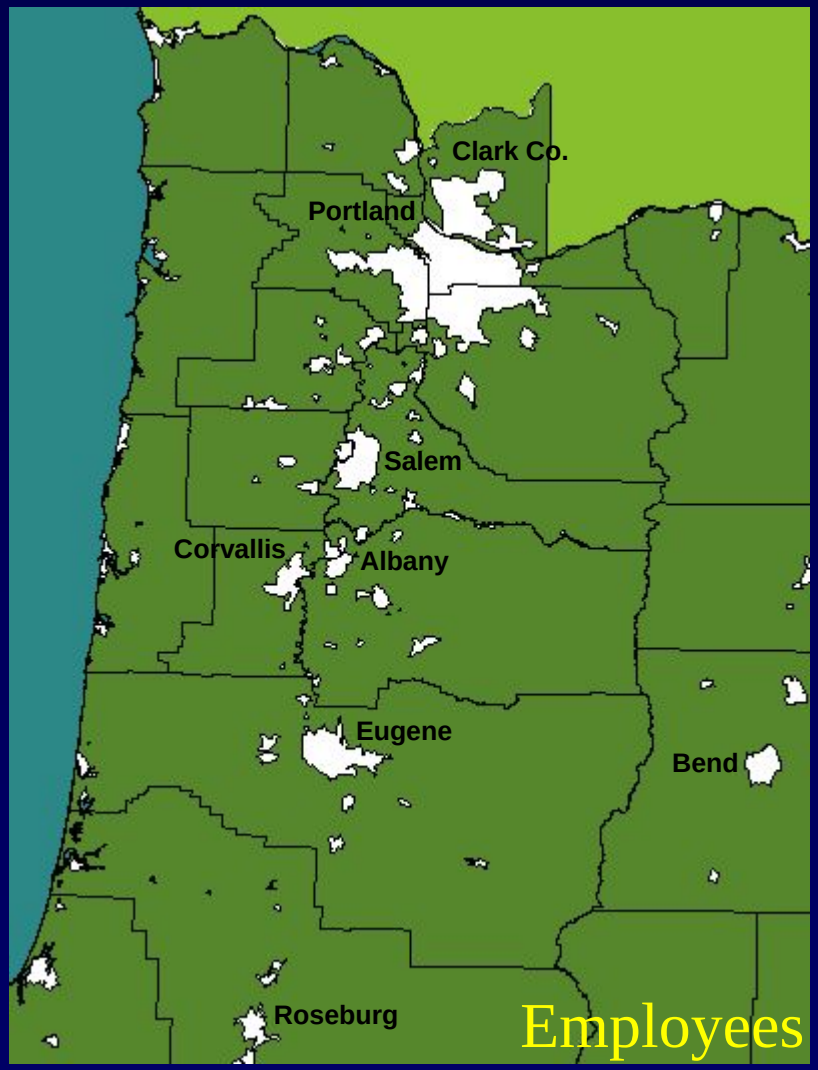


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2000 Compact/CTC Differences



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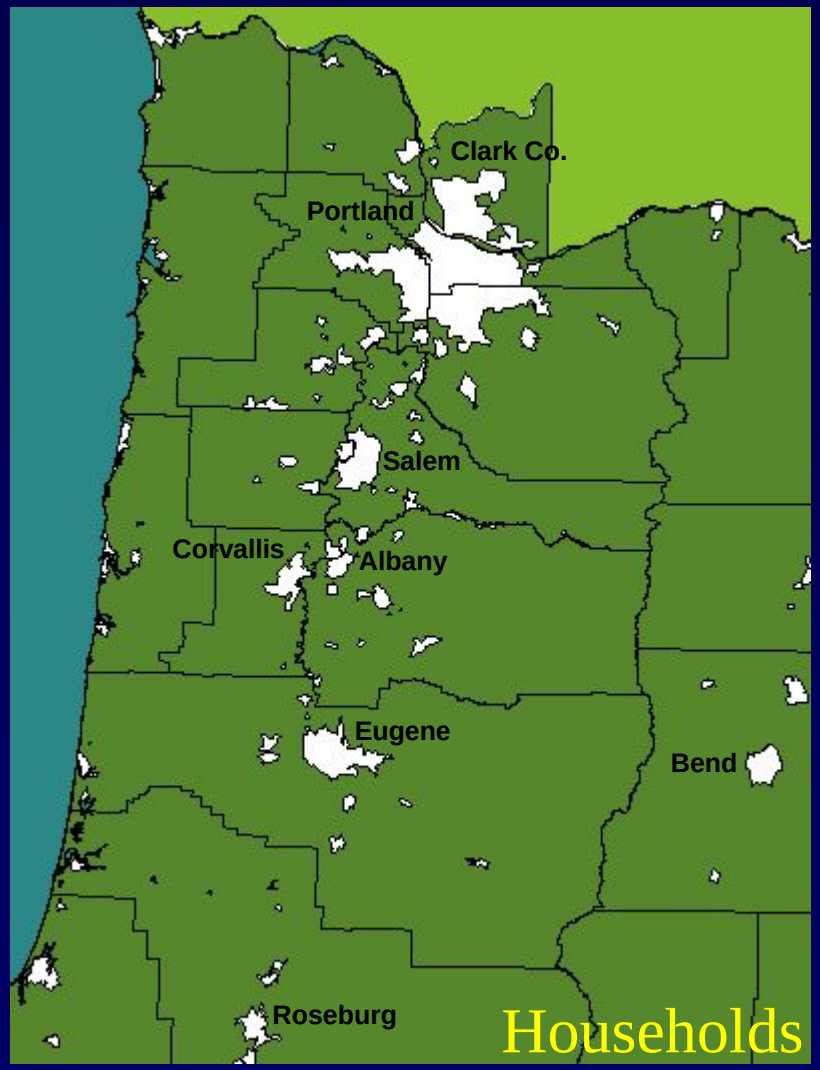
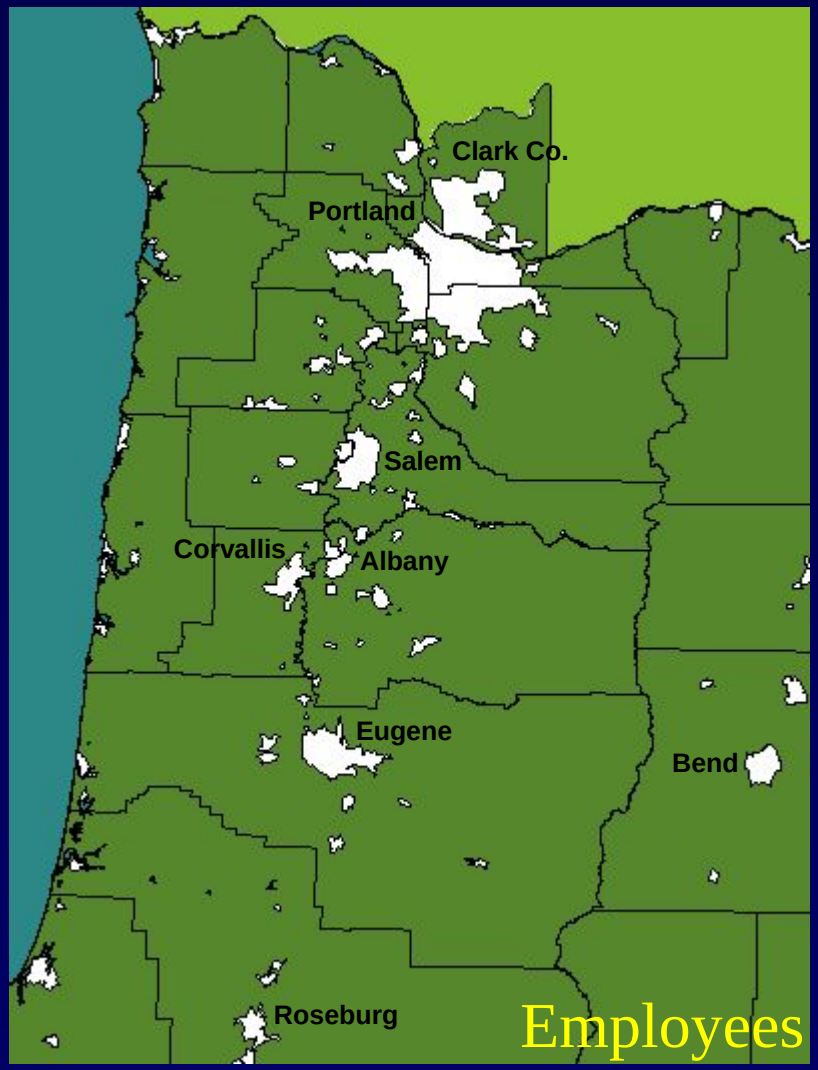


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2005 Compact/CTC Differences



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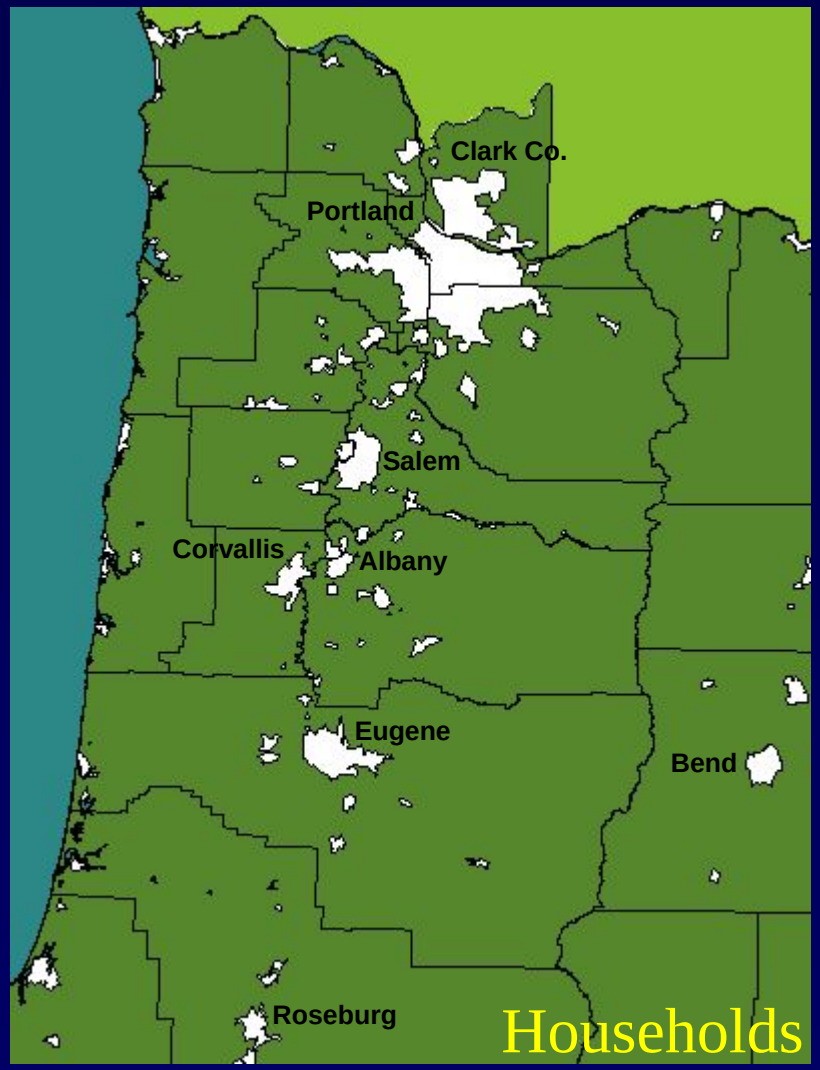
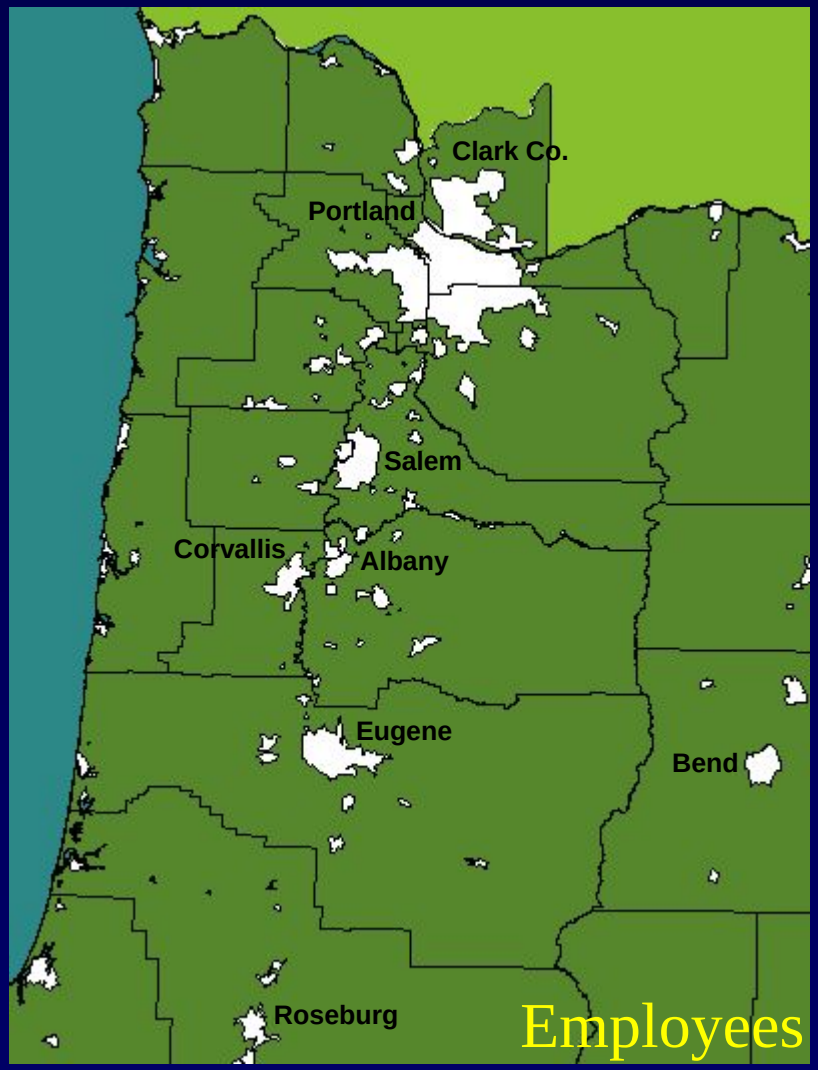


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2010 Compact/CTC Differences



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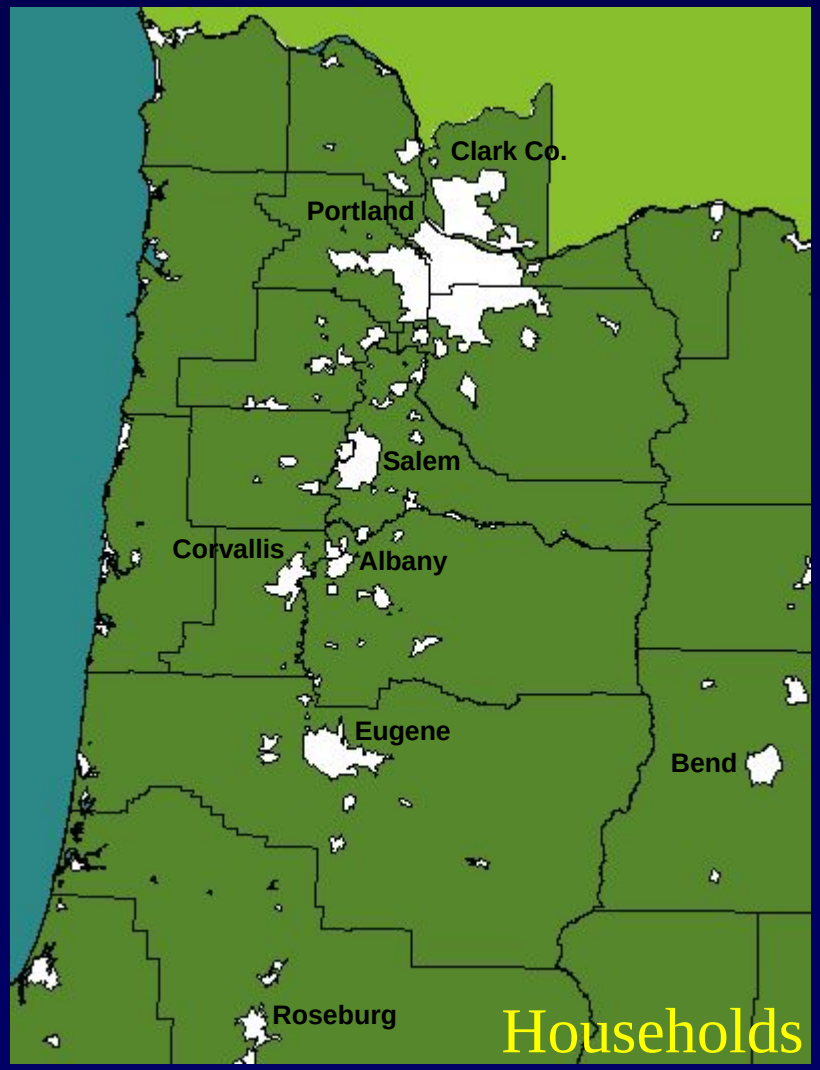

Region Emp | Region HHs | Transport | Maps

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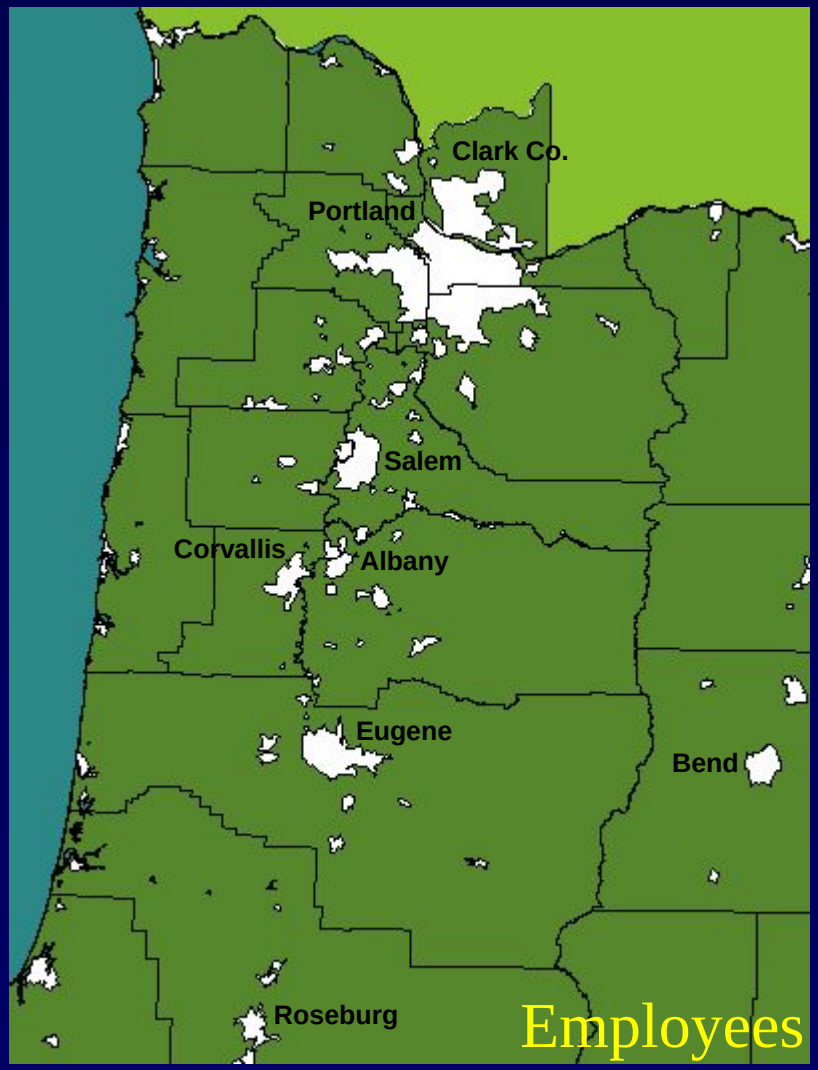
2015 Compact/CTC Differences



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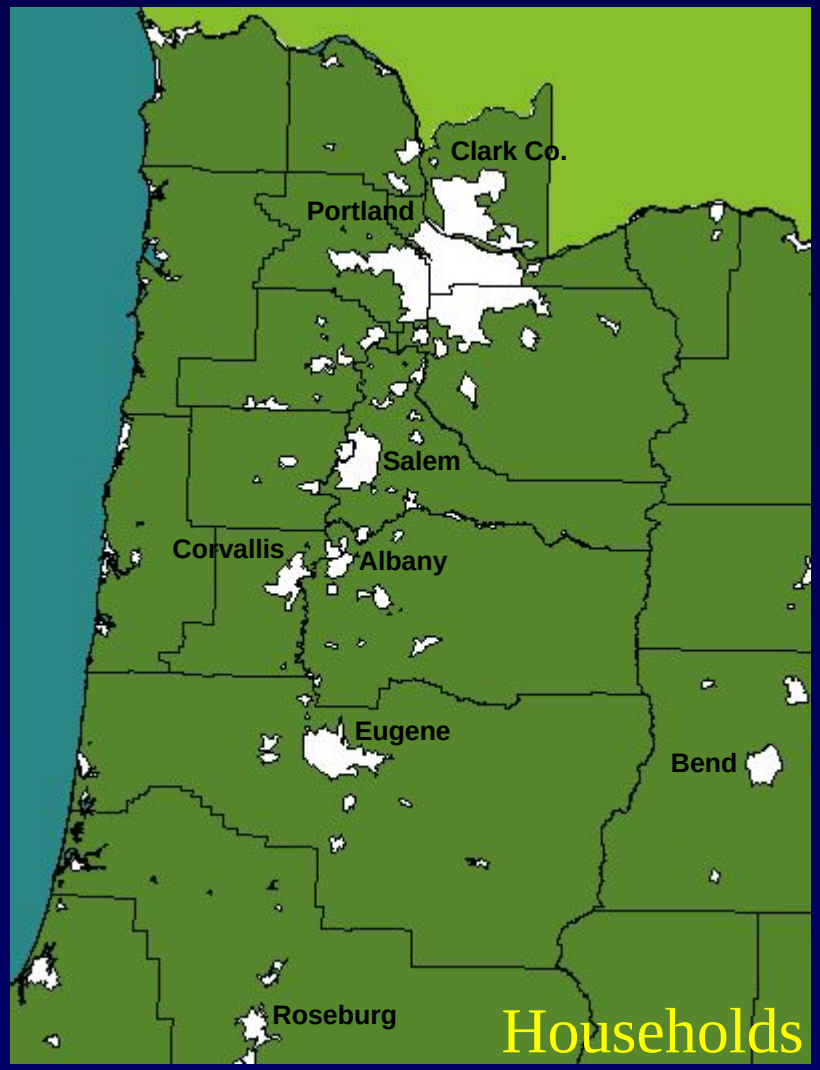

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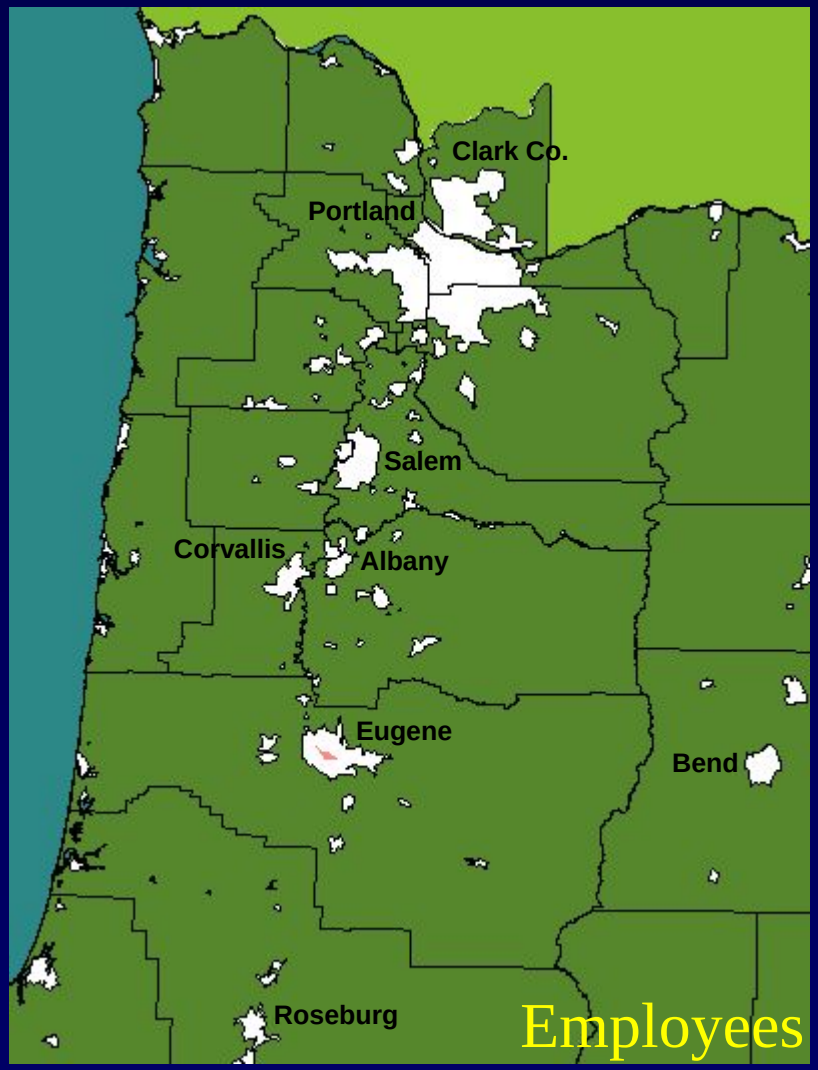
2020 Compact/CTC Differences



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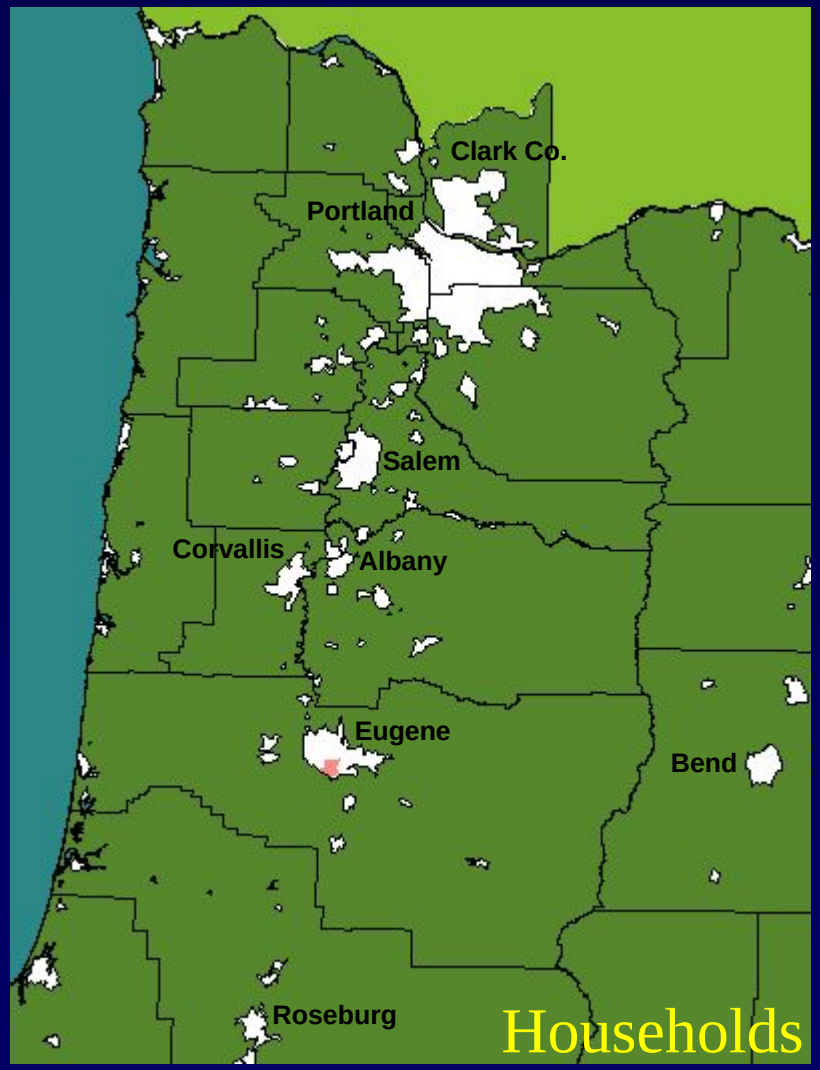
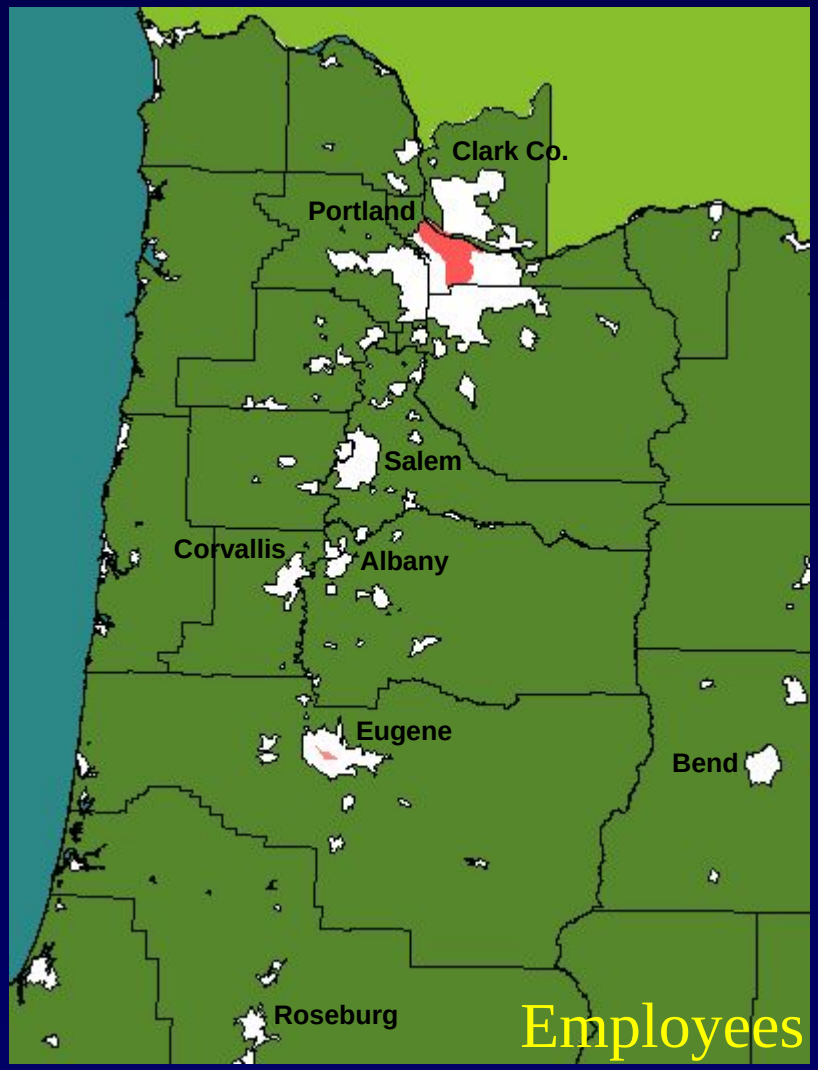


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2025 Compact/CTC Differences



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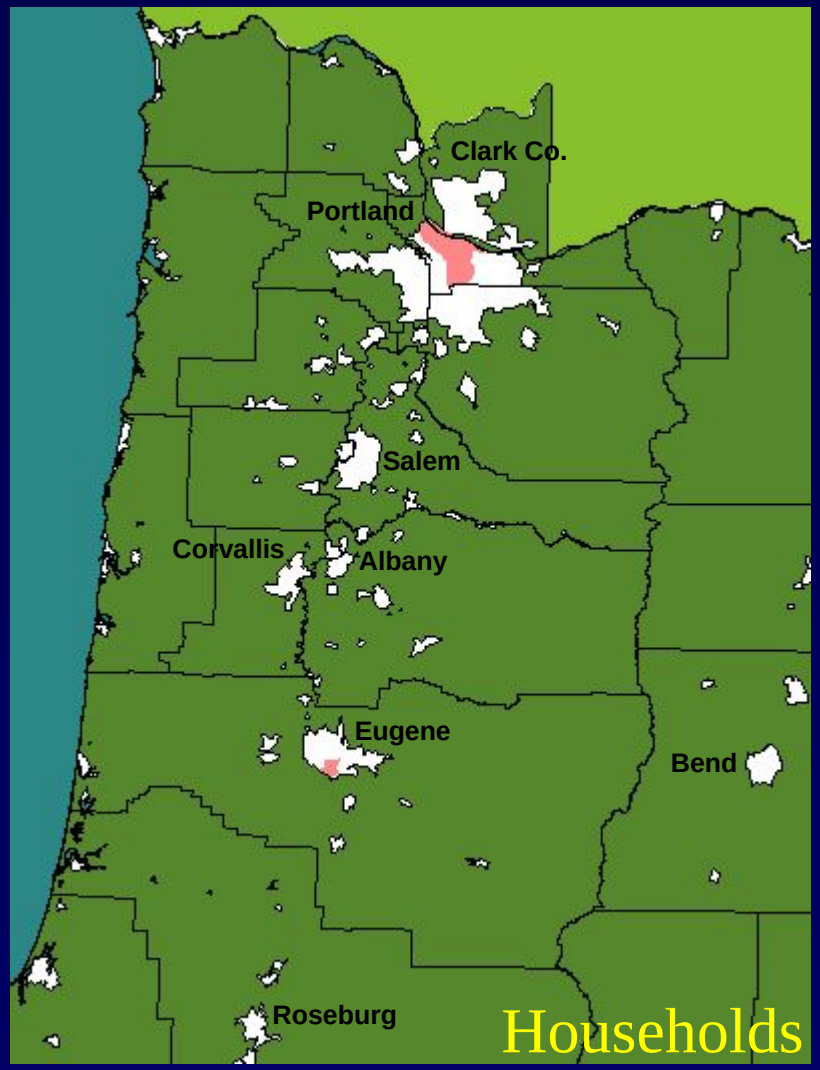
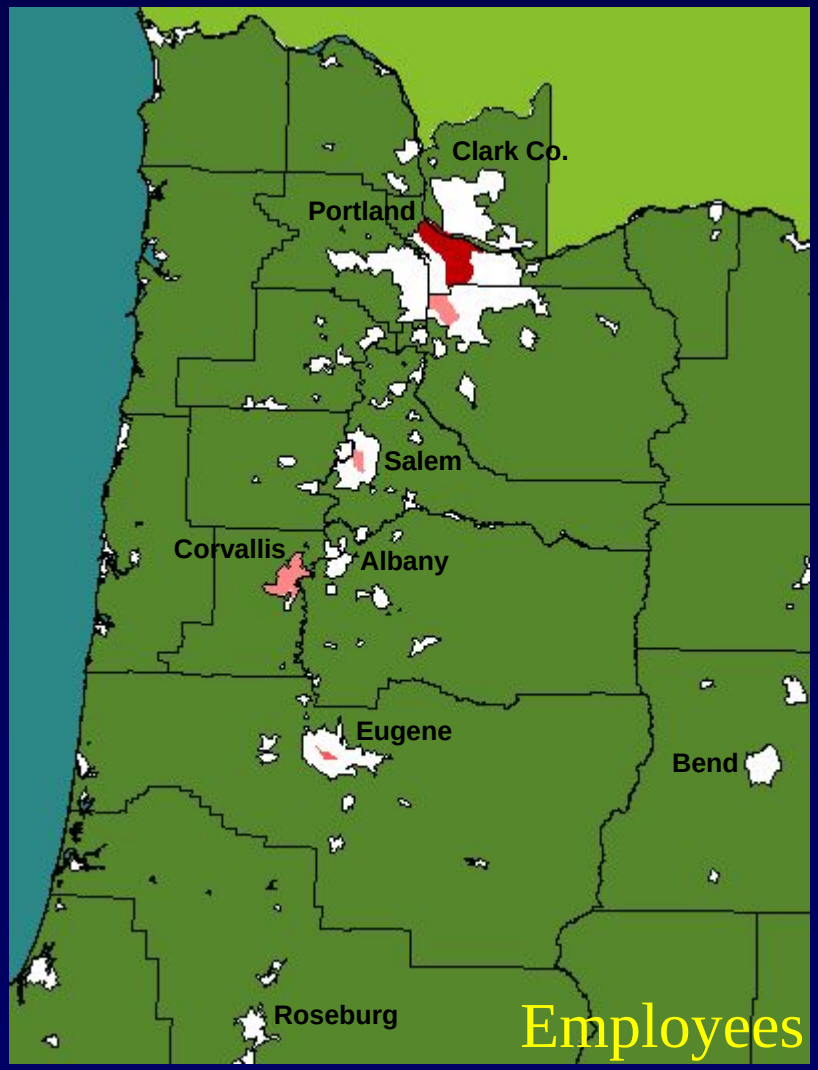


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2030 Compact/CTC Differences



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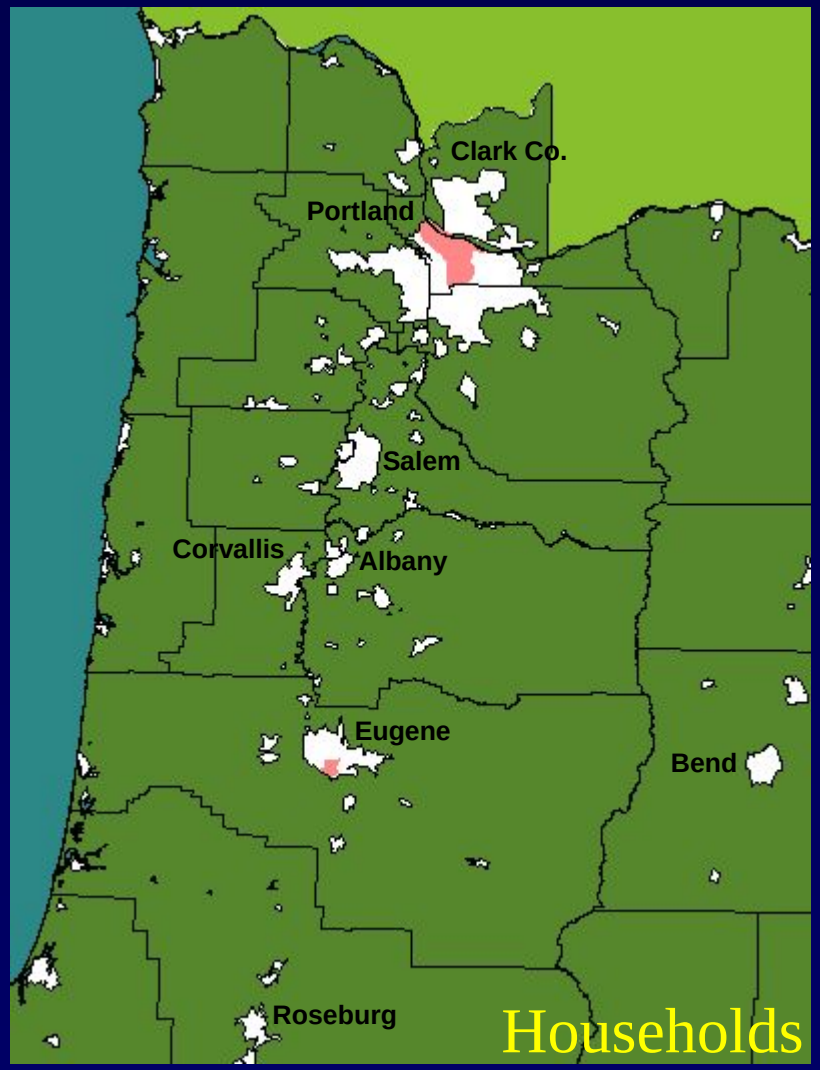
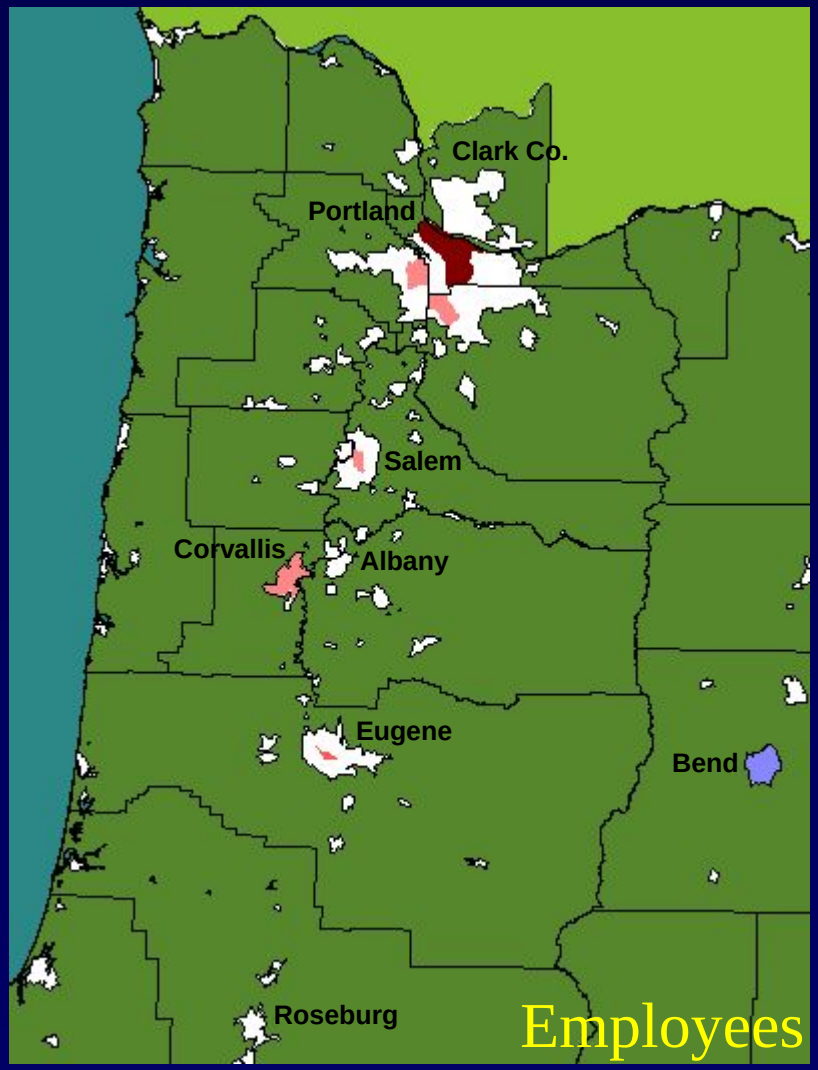


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2035 Compact/CTC Differences



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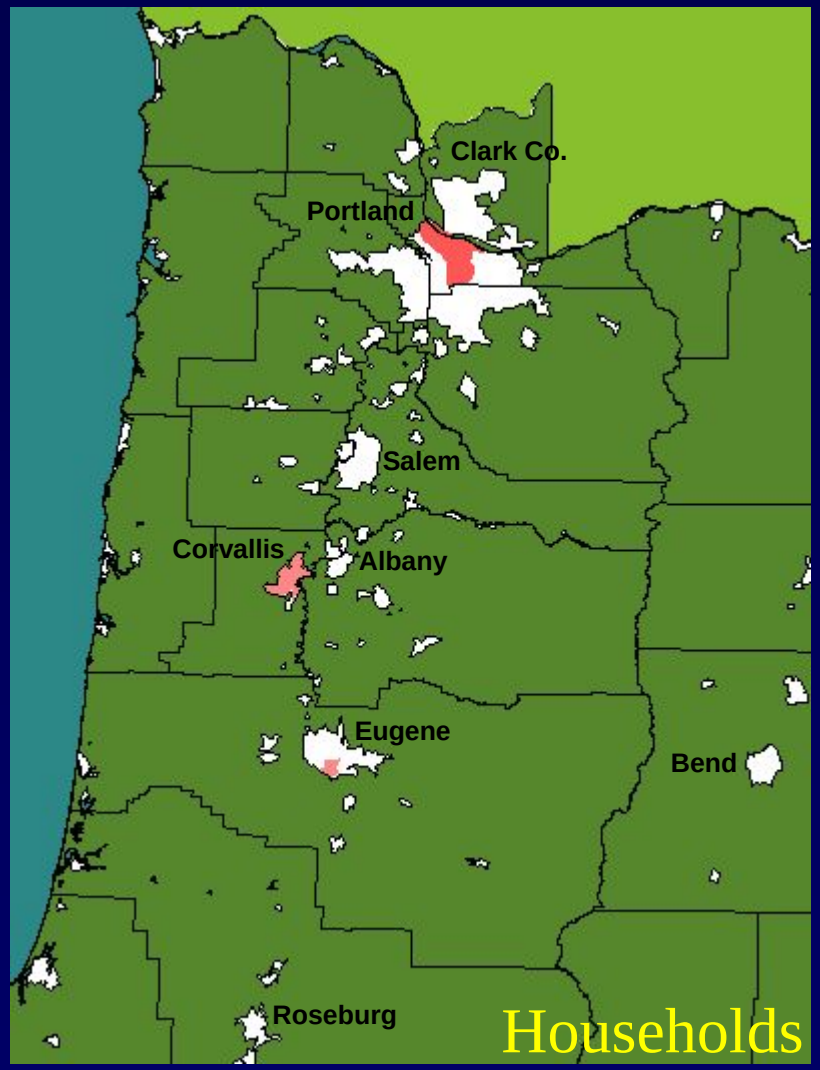
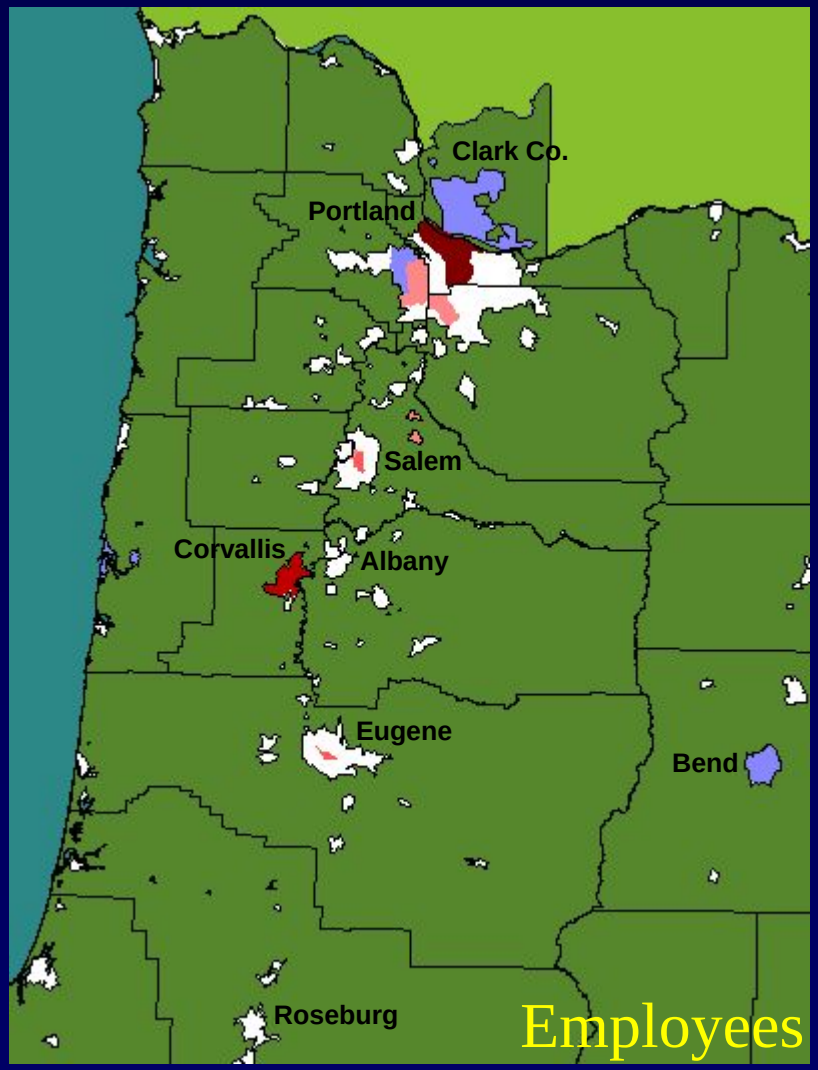


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2040 Compact/CTC Differences



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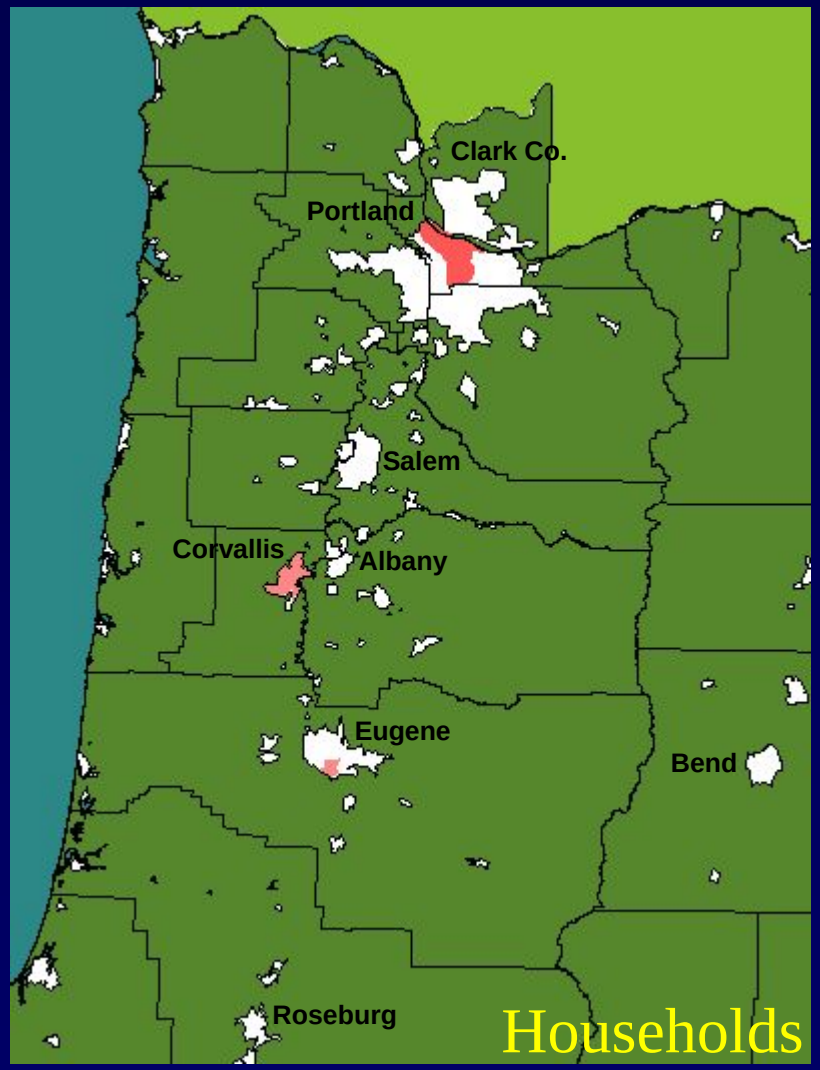
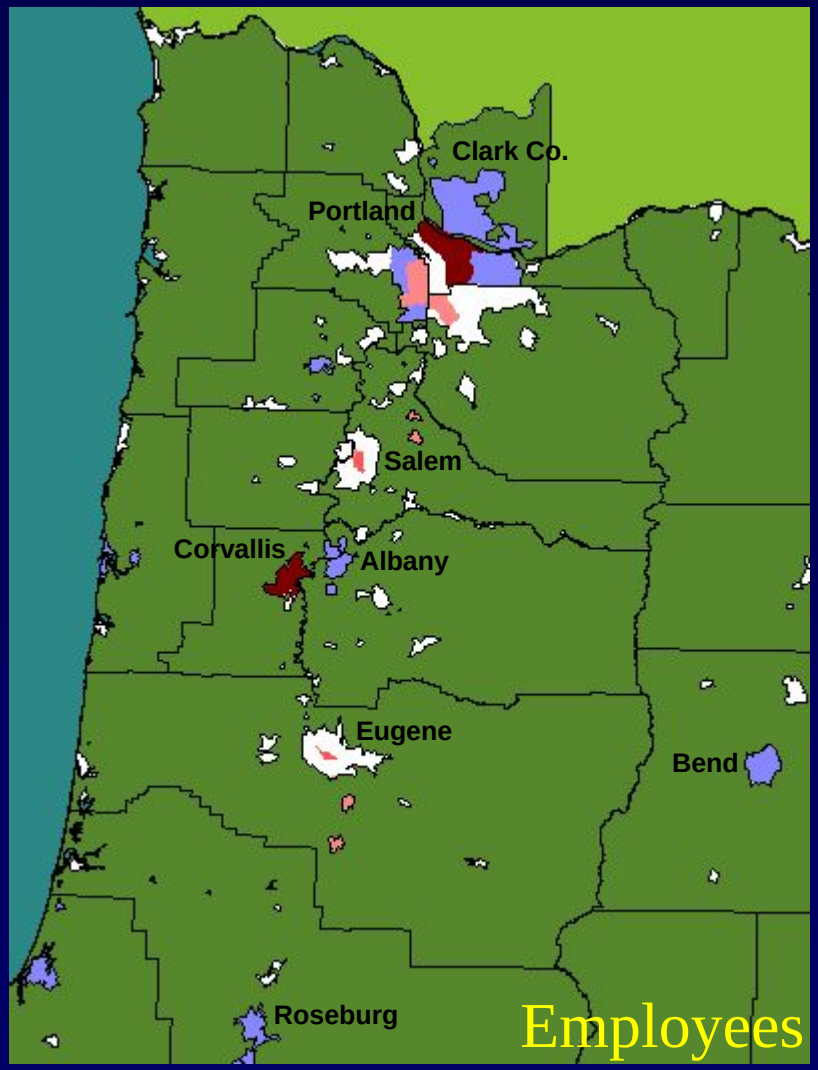


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2045 Compact/CTC Differences



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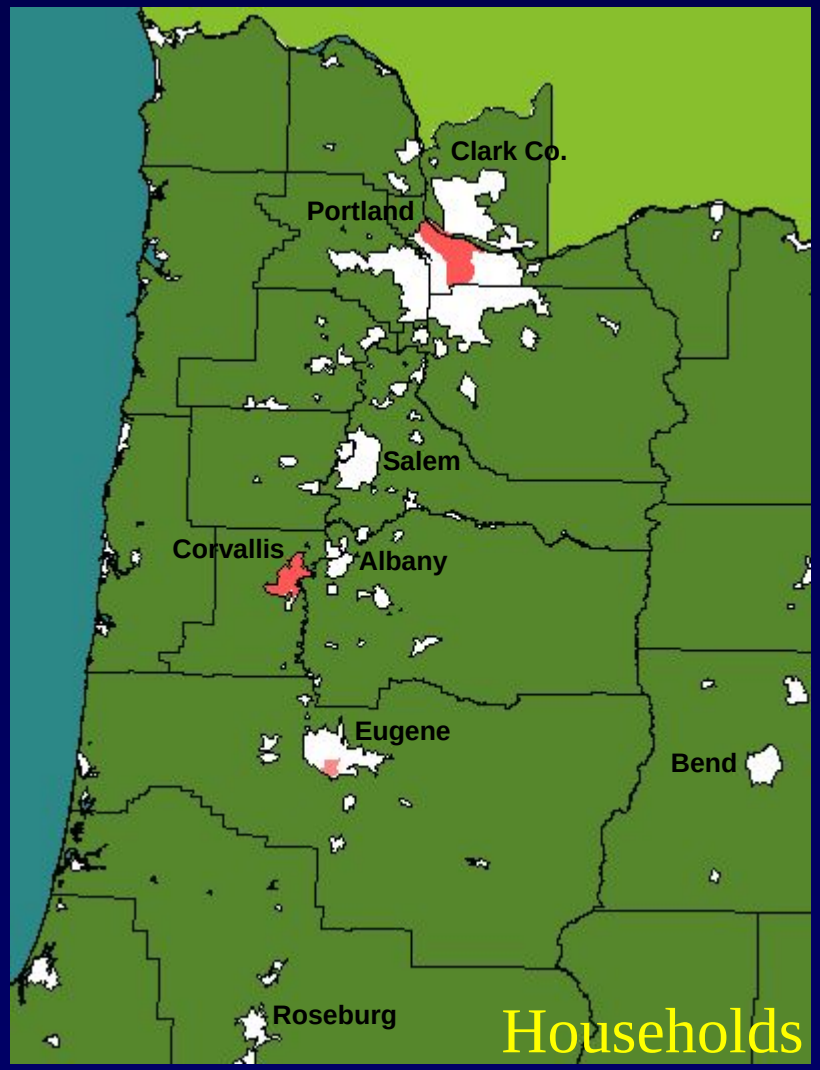
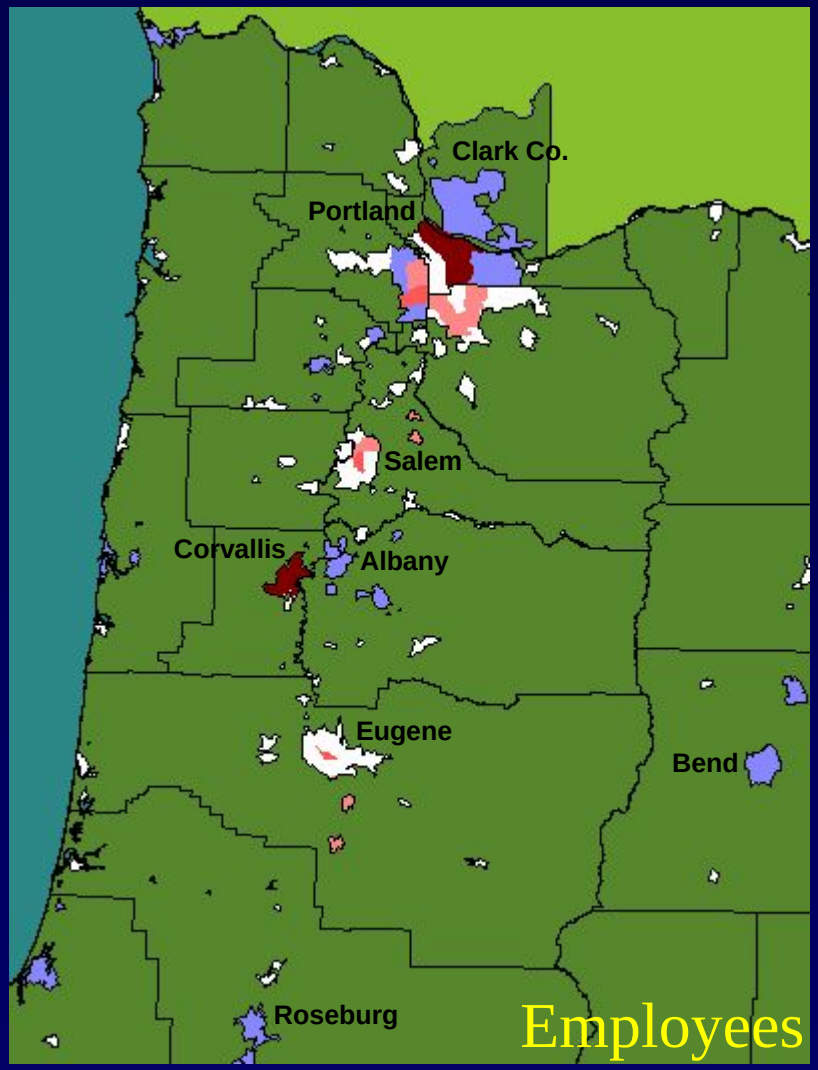


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2050 Compact/CTC Differences



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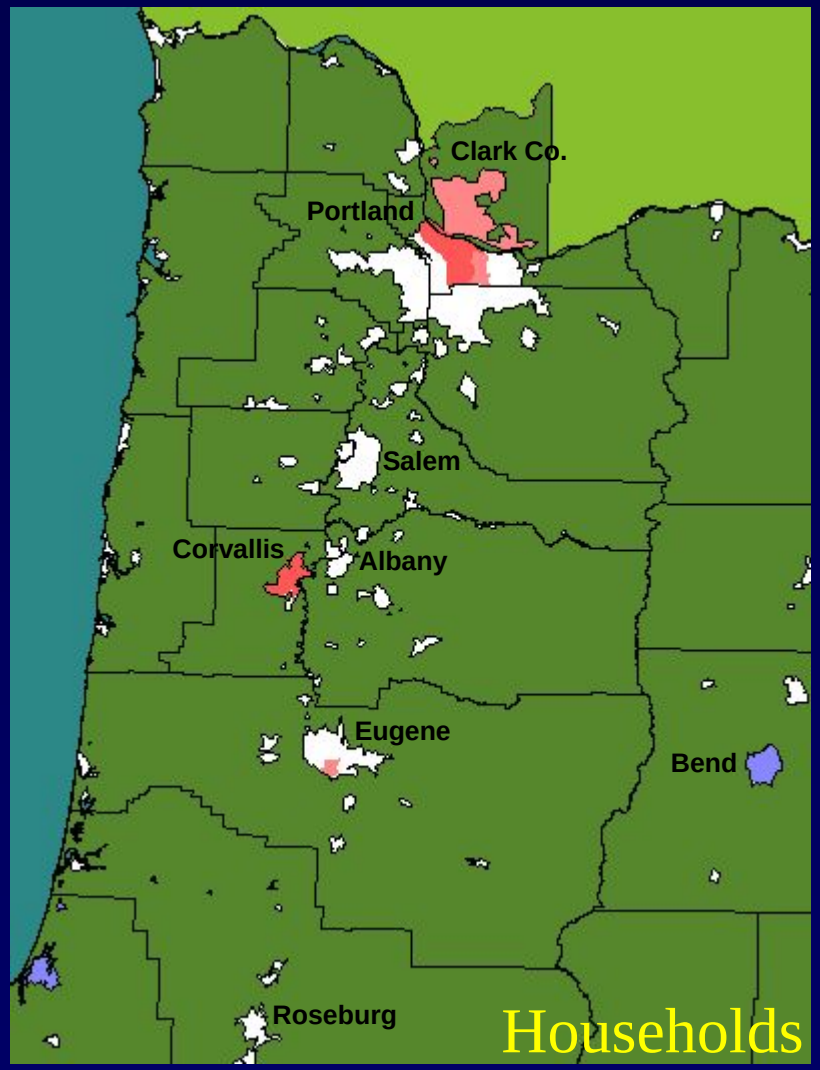
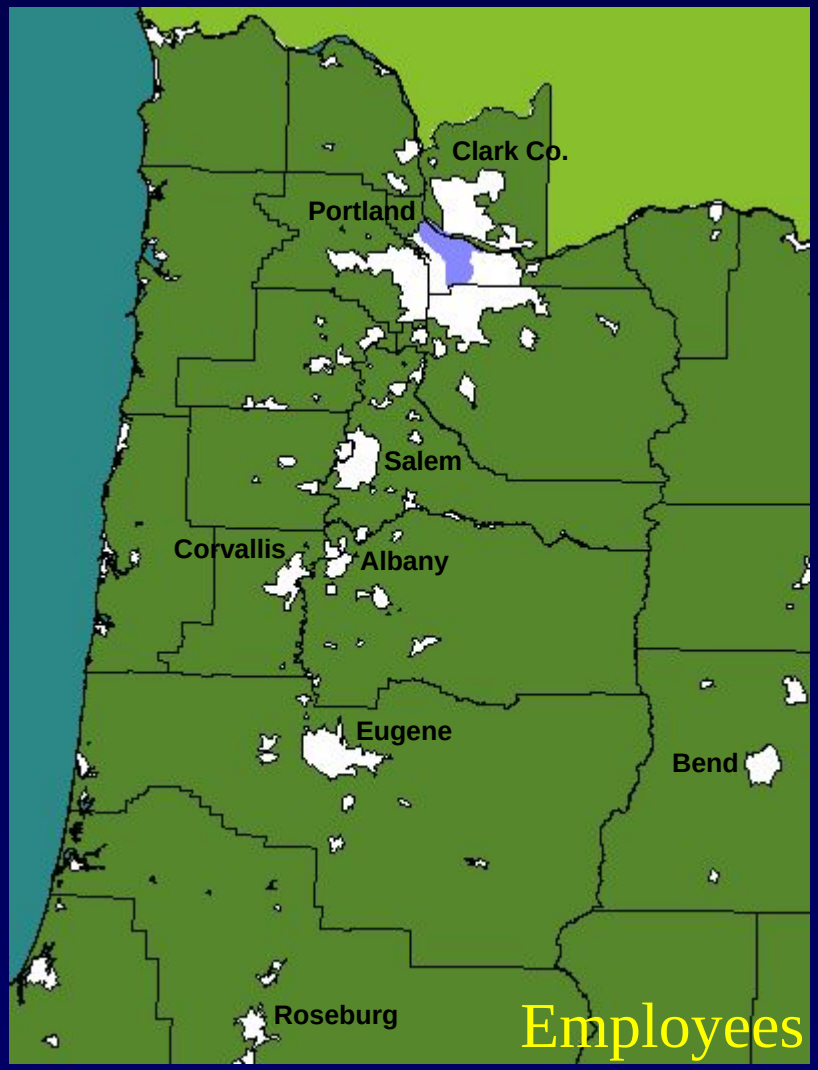


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2000 Compact/No-Build Differences



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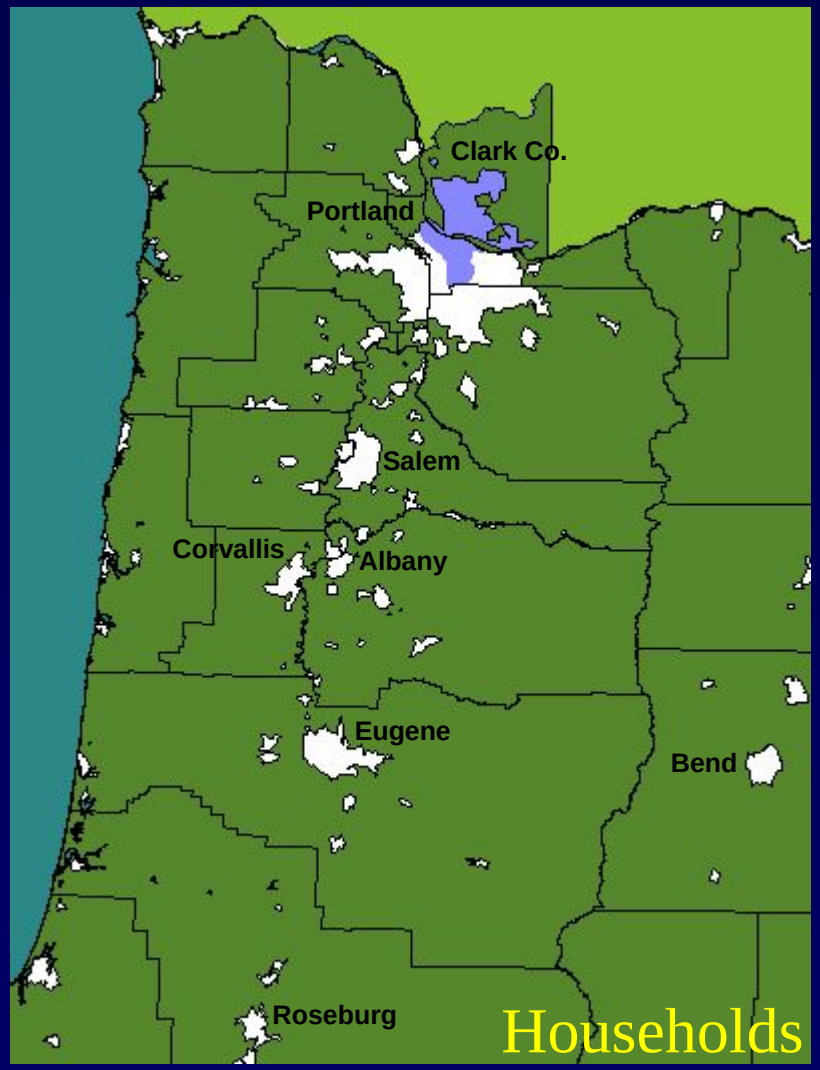
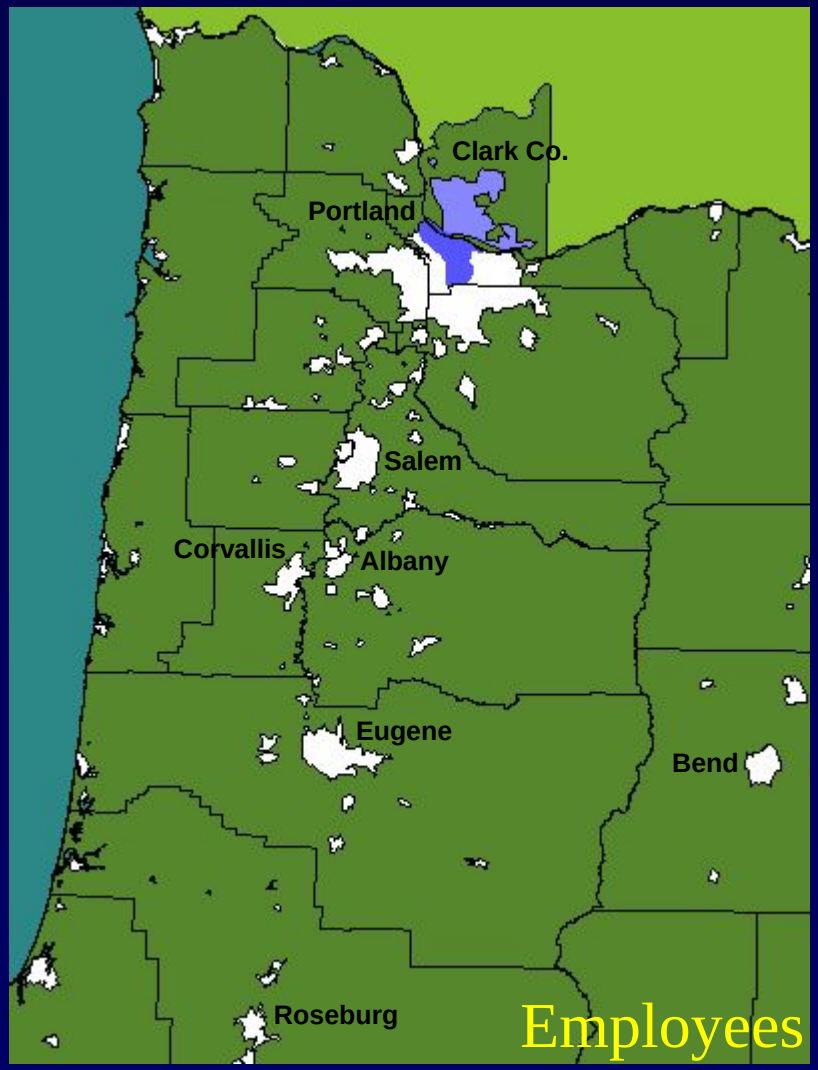


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2005 Compact/No-Build Differences



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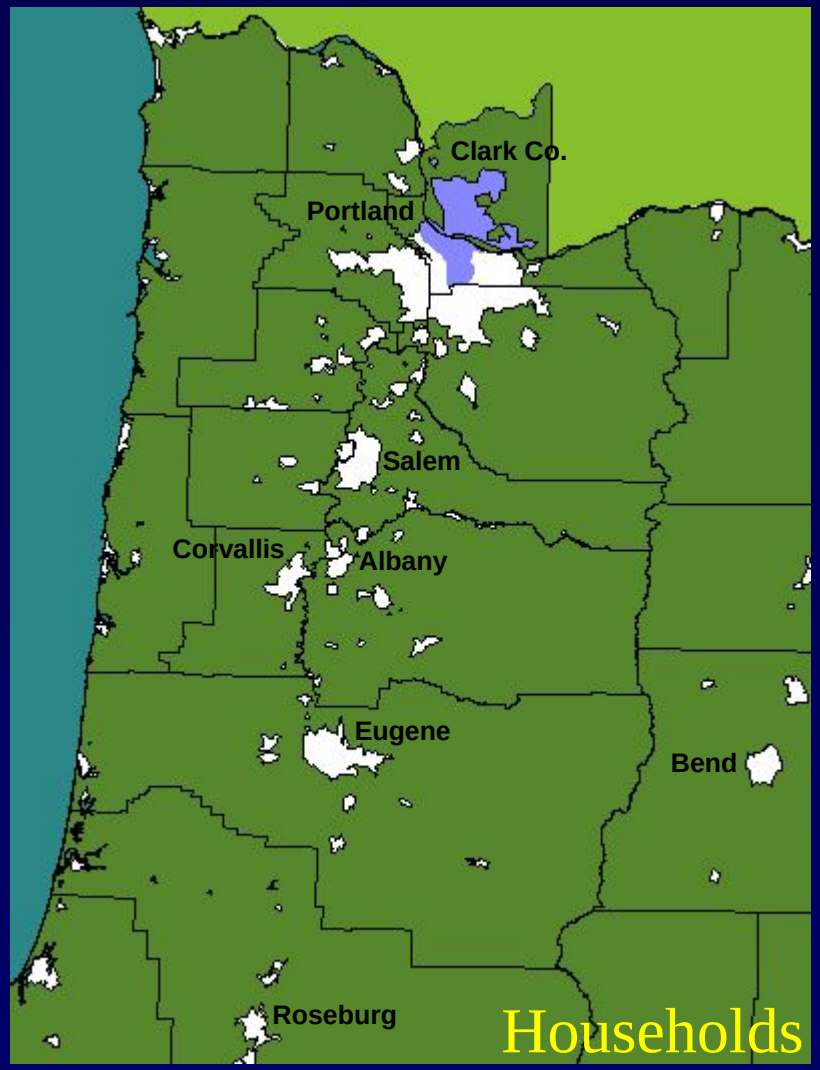
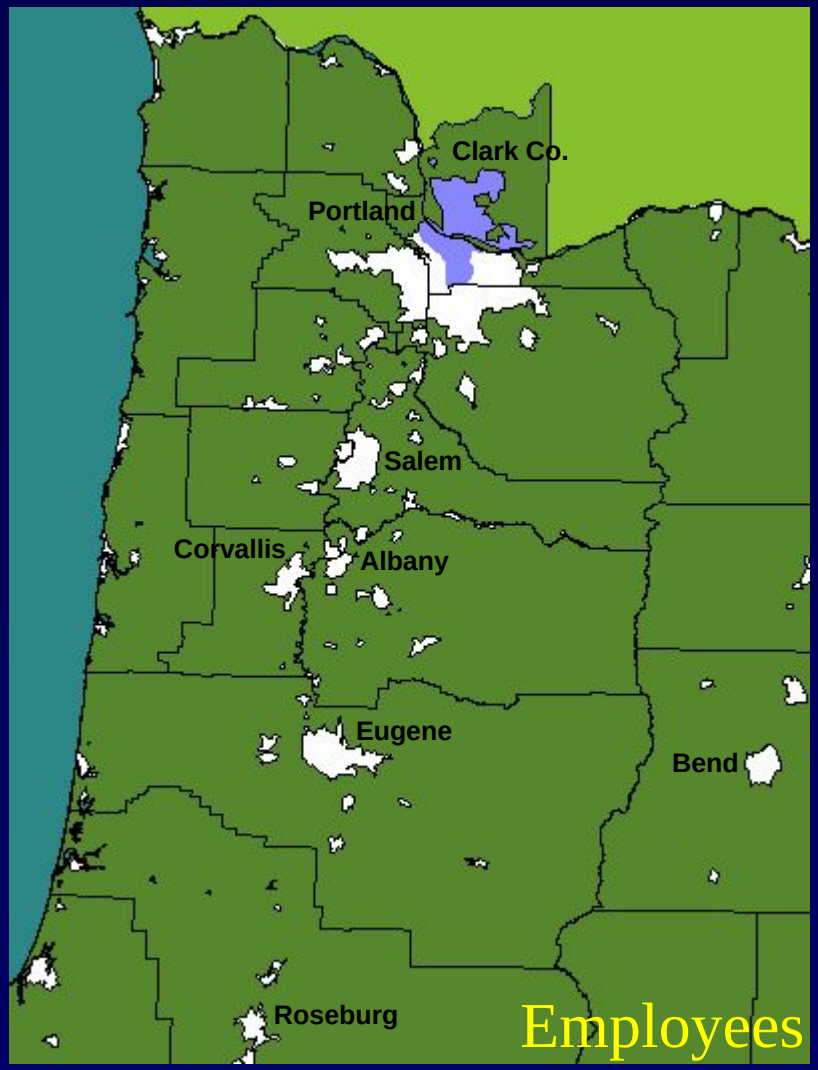


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2010 Compact/No-Build Differences



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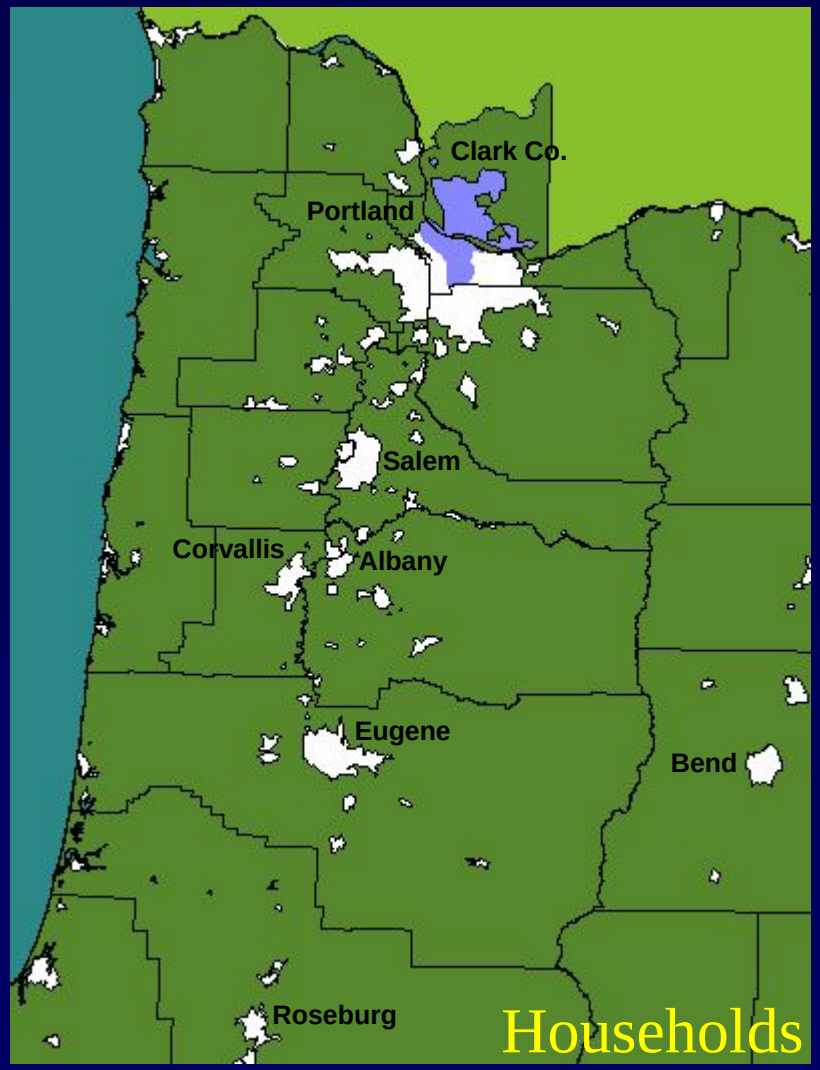
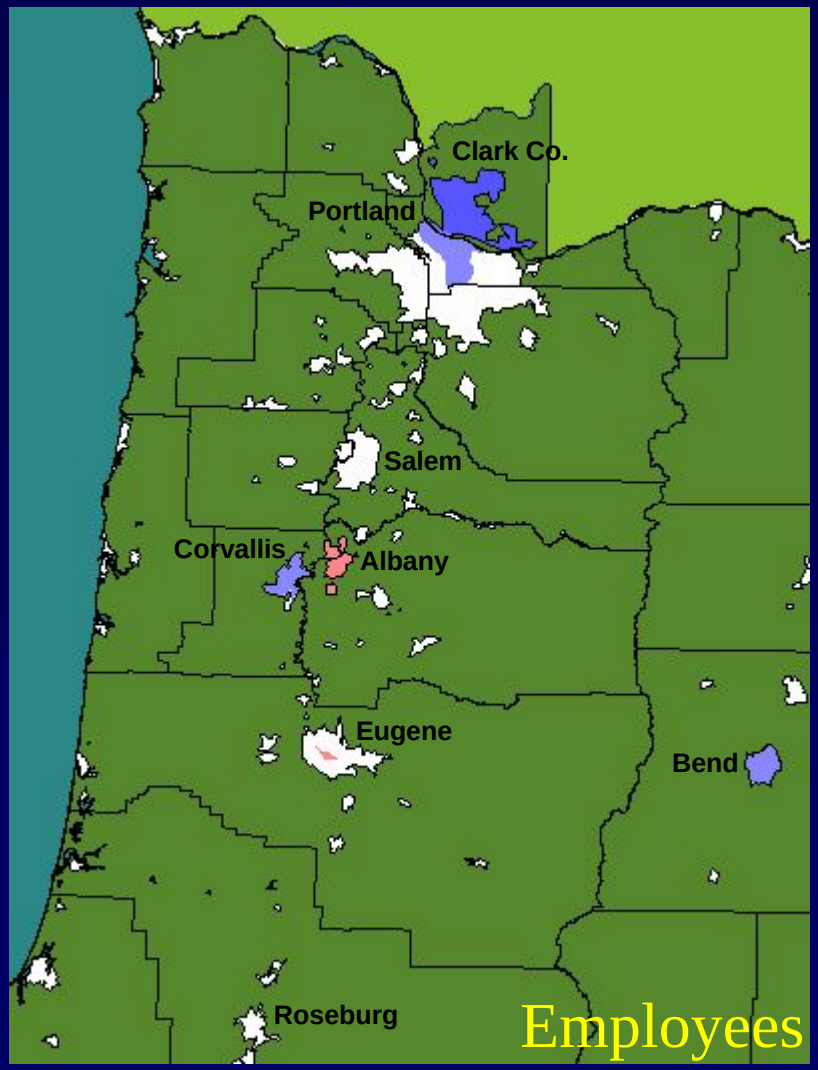


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2015 Compact/No-Build Differences



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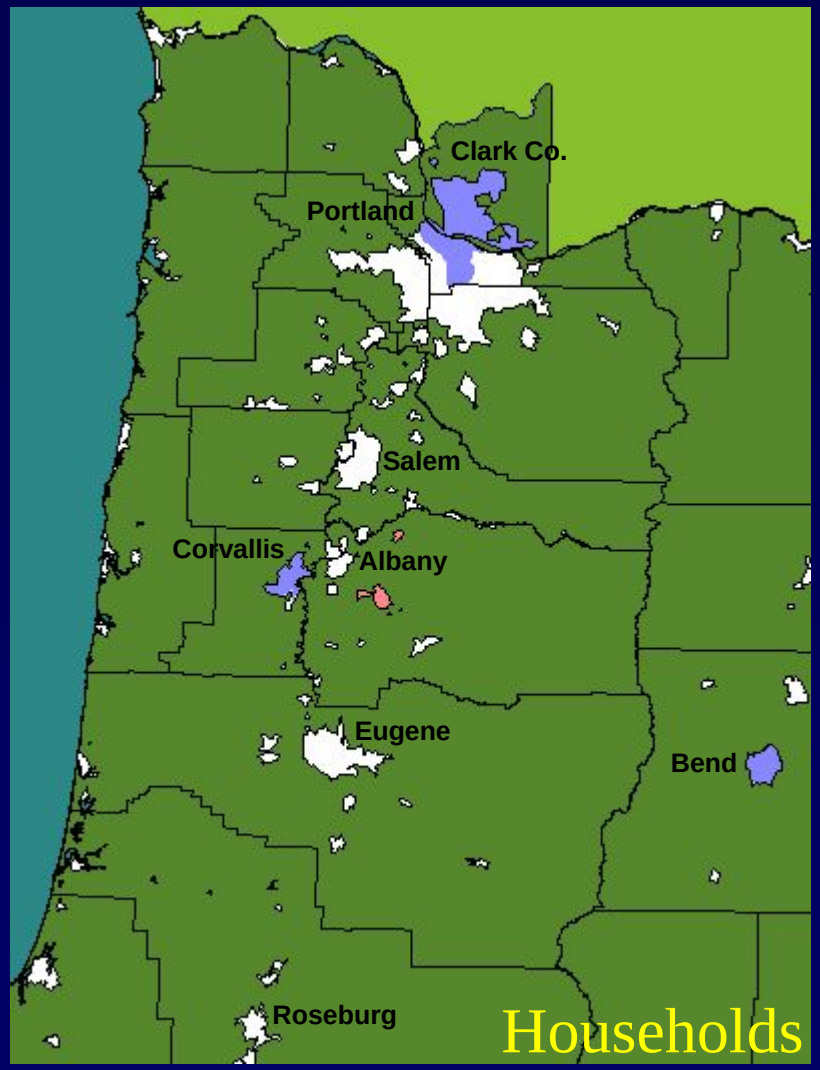
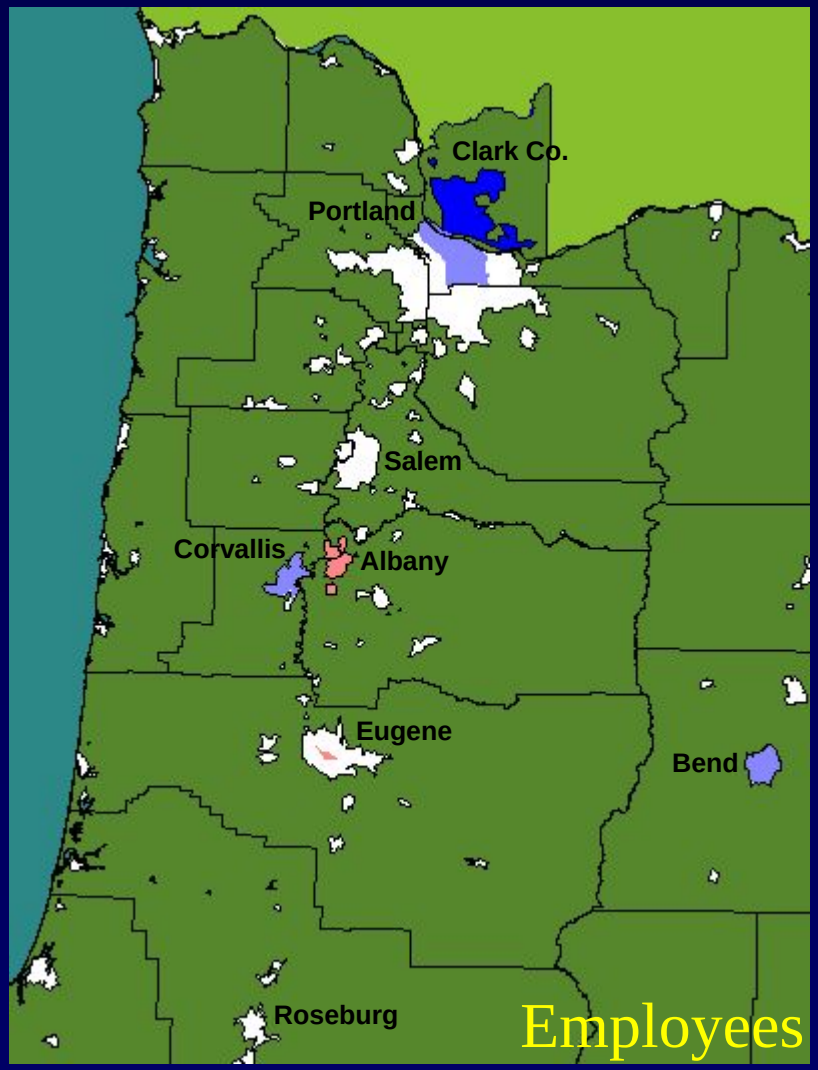


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2020 Compact/No-Build Differences



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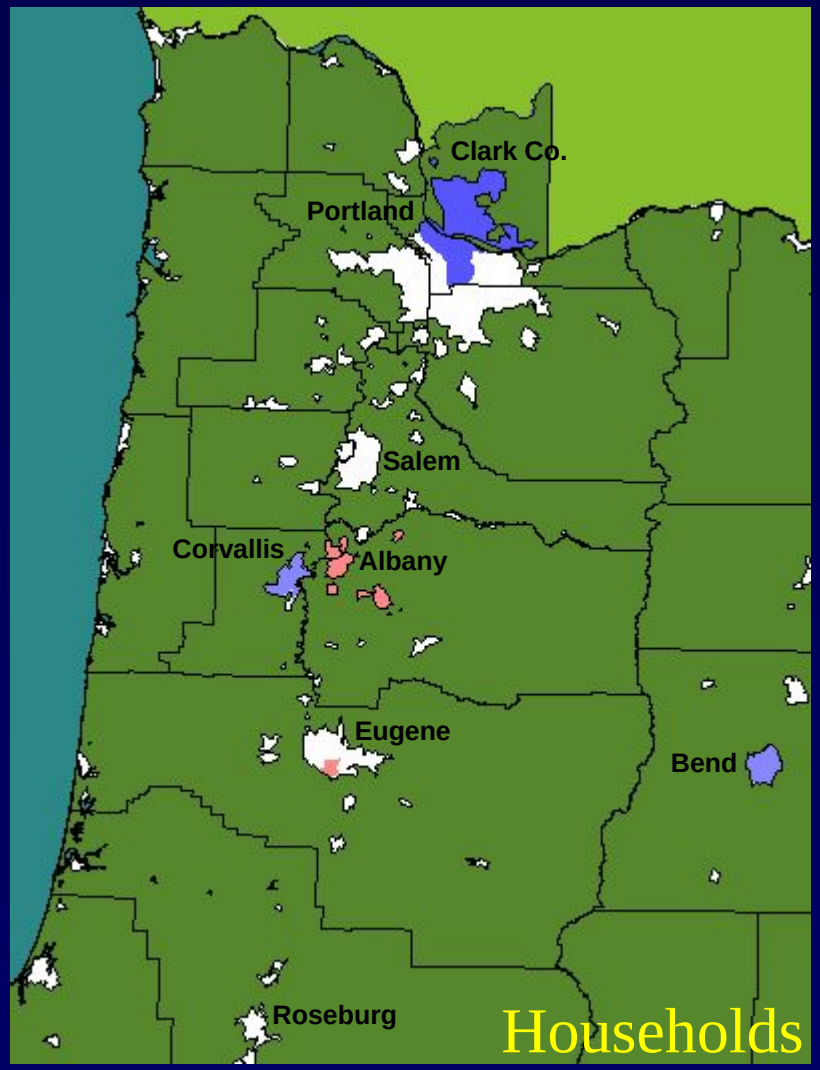
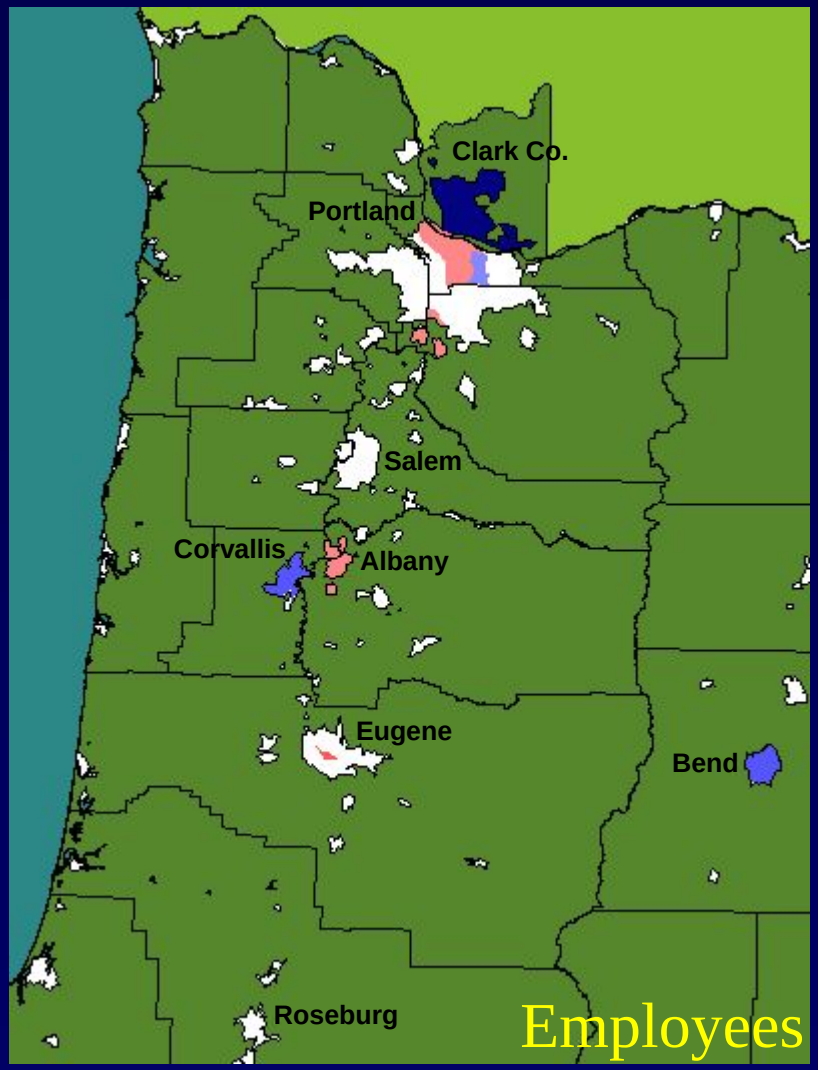


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2025 Compact/No-Build Differences



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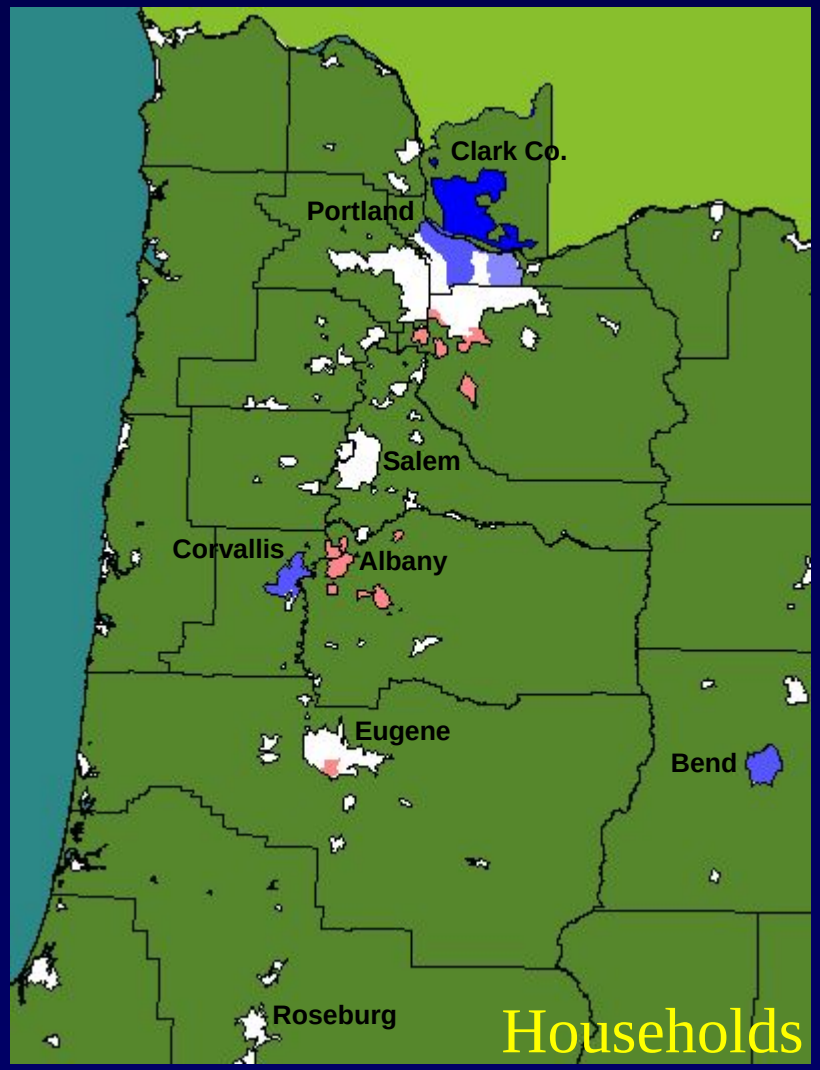
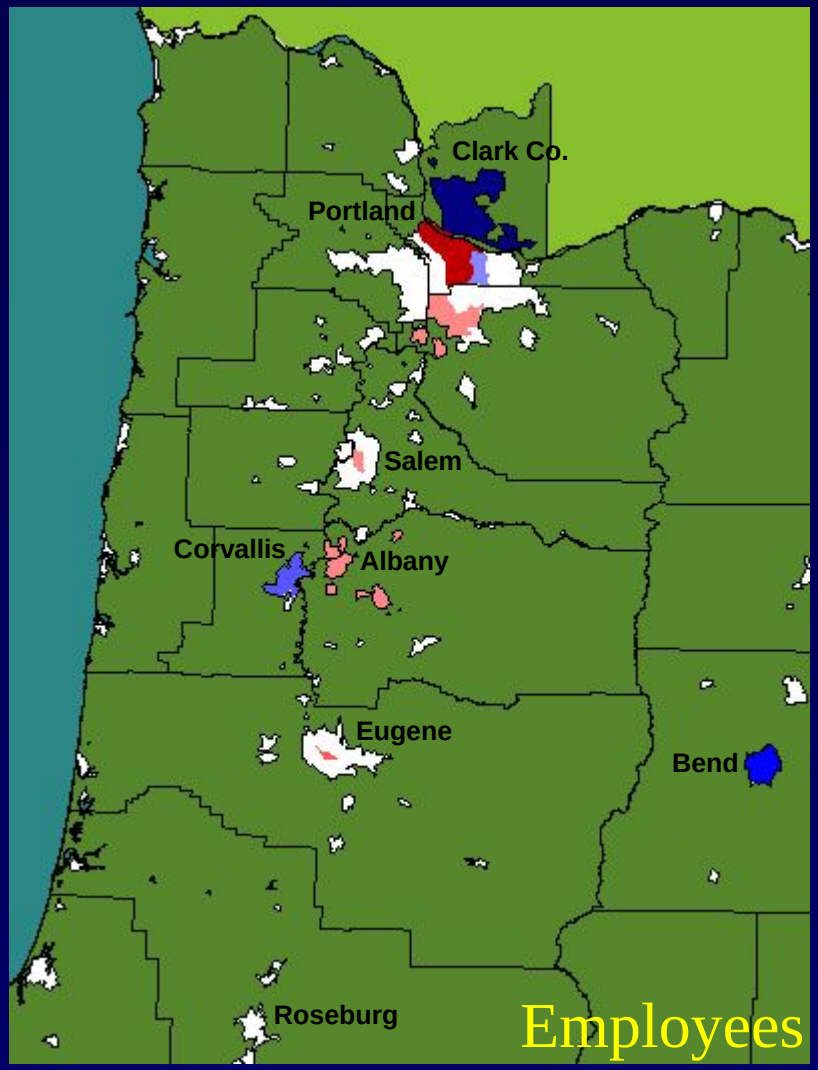


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2030 Compact/No-Build Differences



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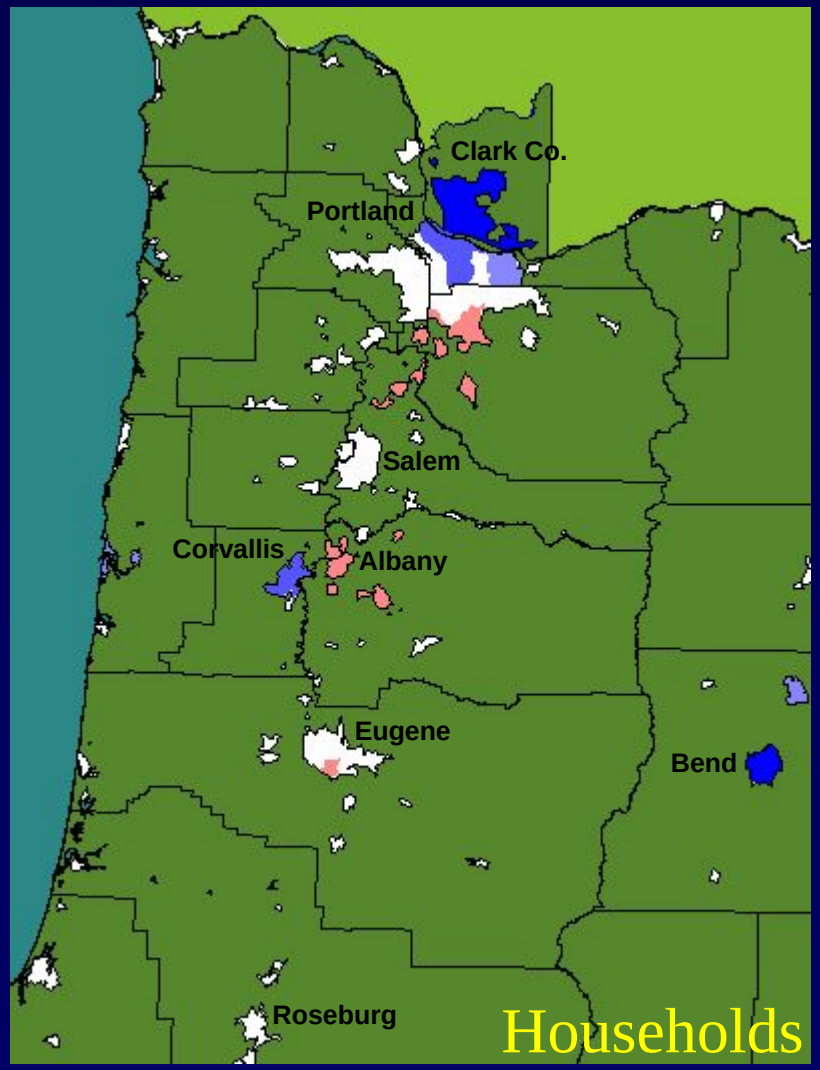

Region Emp | Region HHs | Transport | Maps

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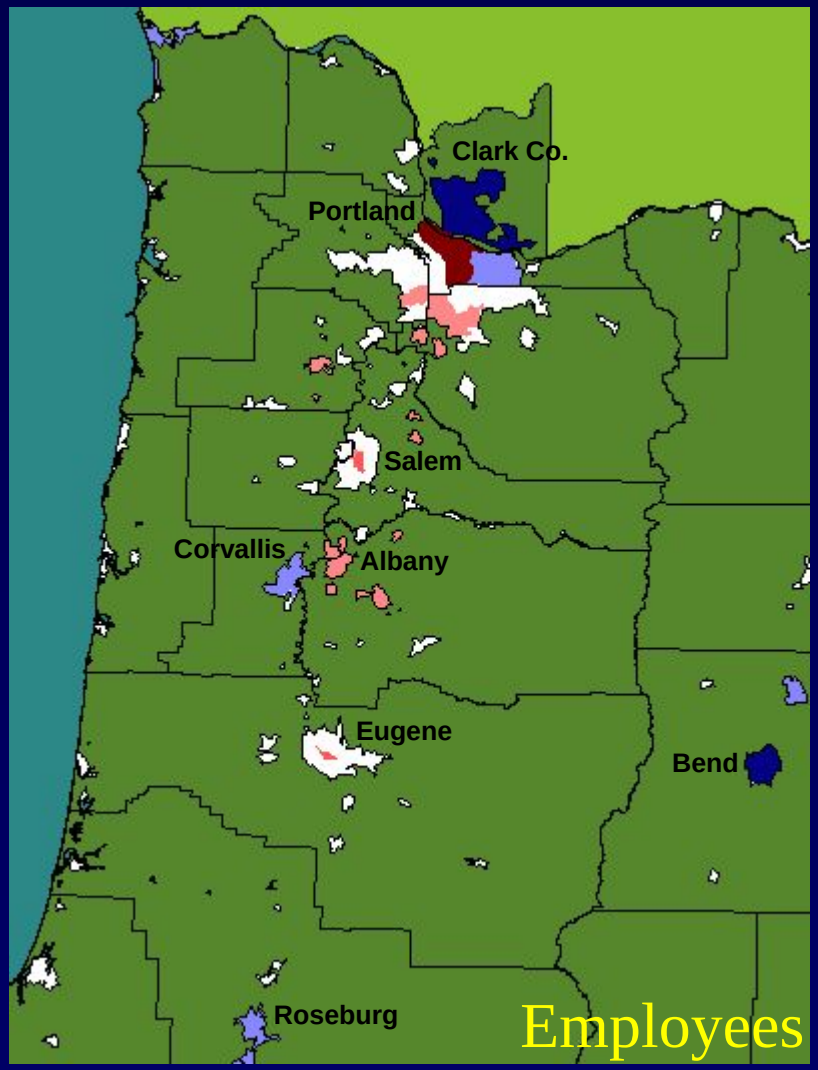
2035 Compact/No-Build Differences



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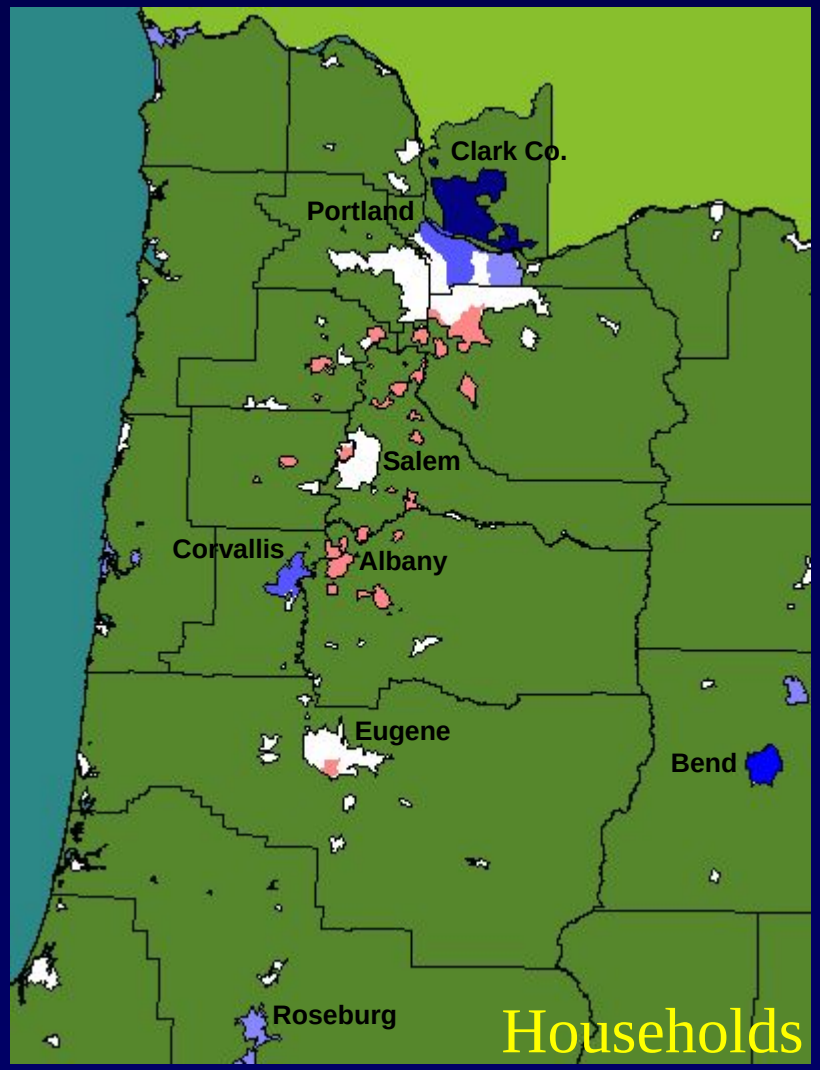

Region Emp | Region HHs | Transport | Maps

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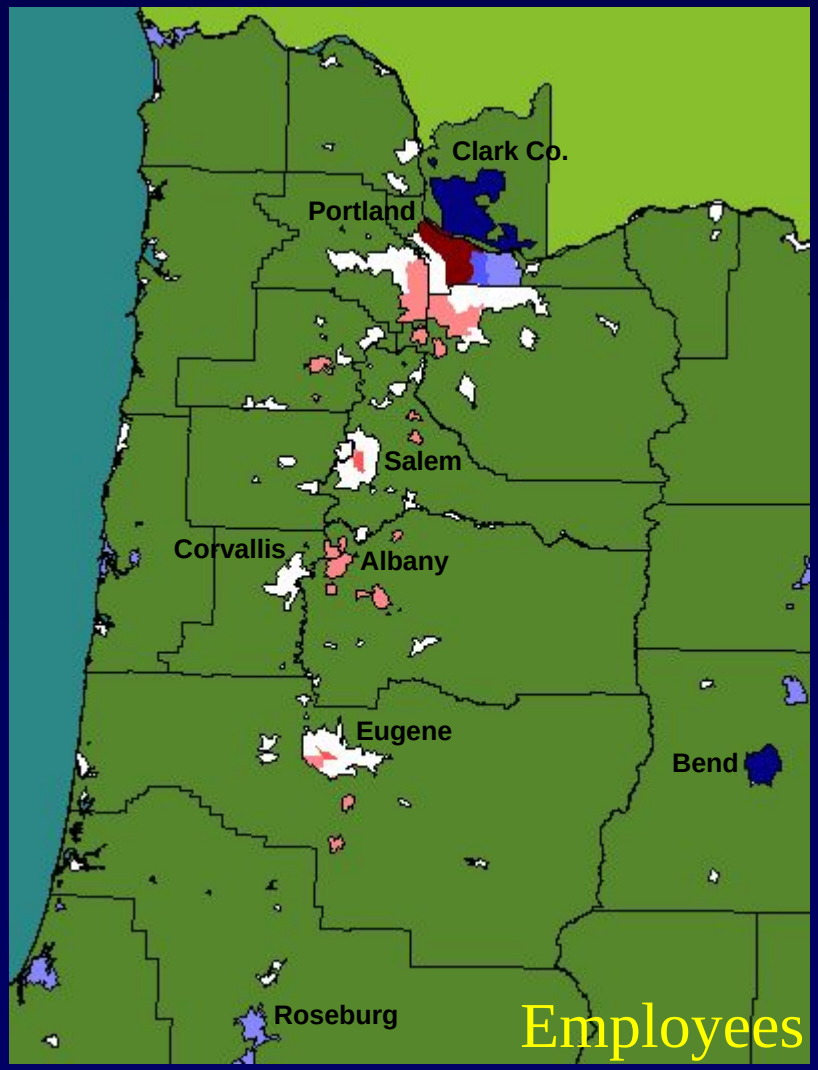
2040 Compact/No-Build Differences



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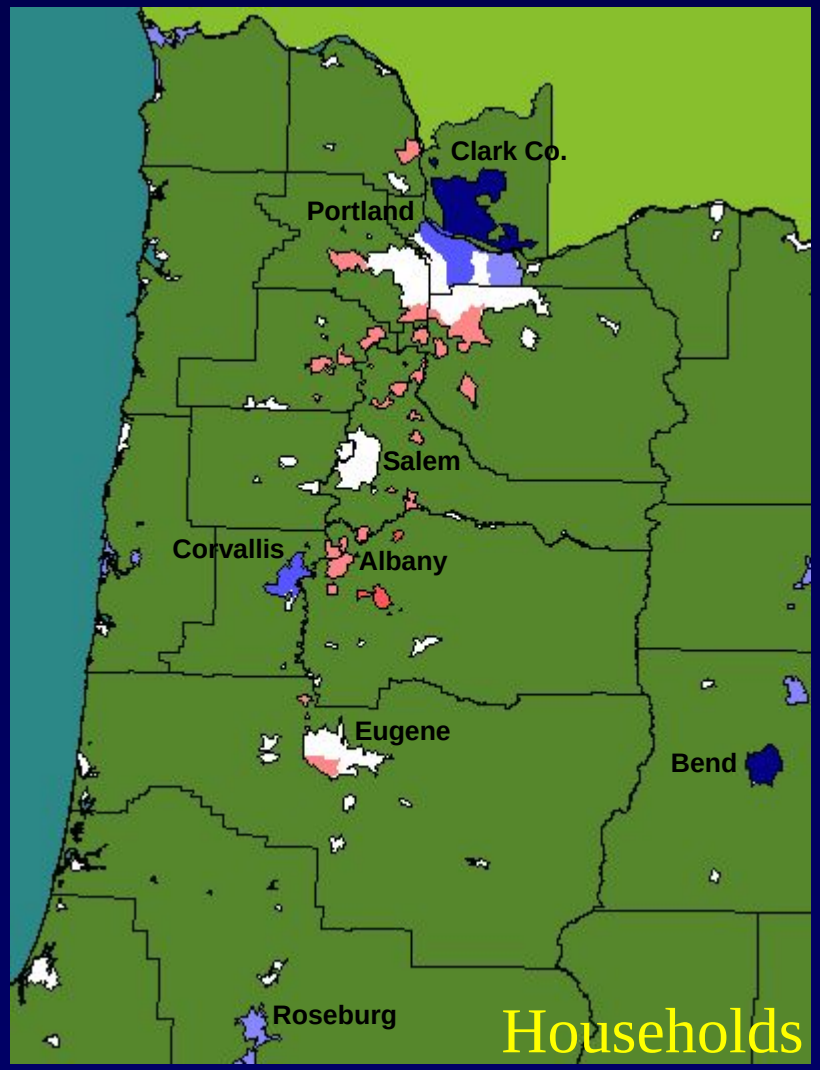

Region Emp | Region HHs | Transport | Maps

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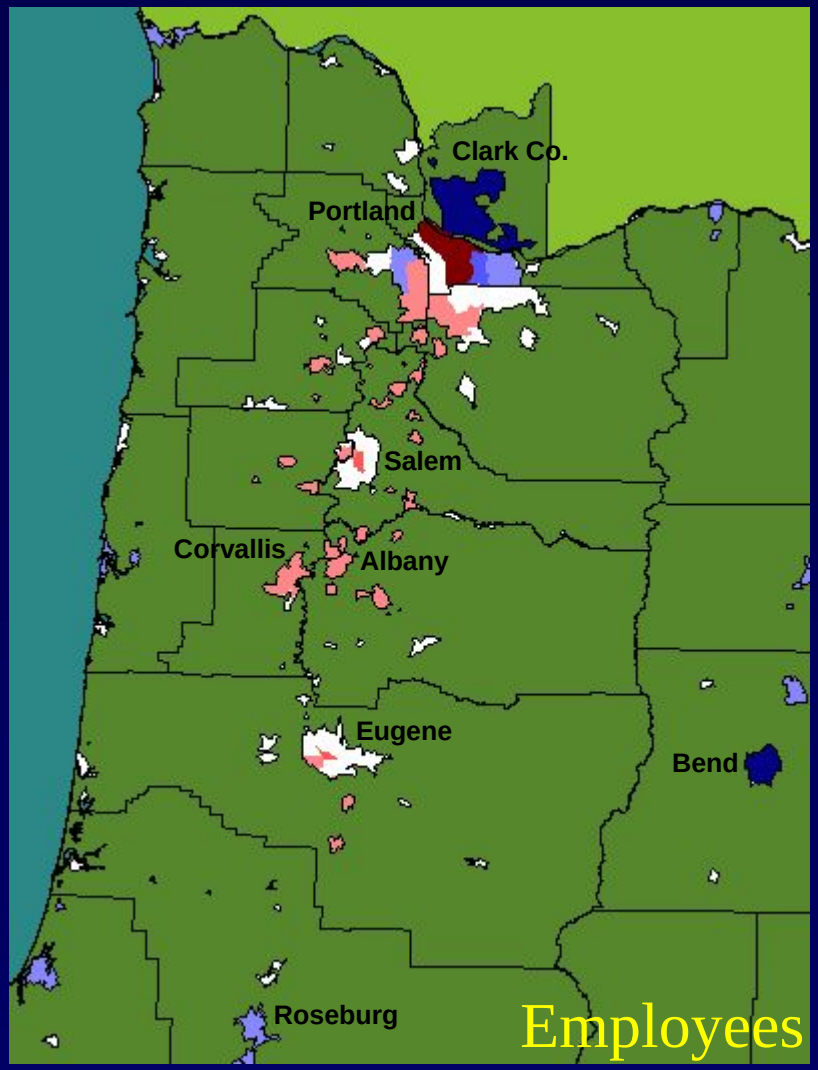
2045 Compact/No-Build Differences



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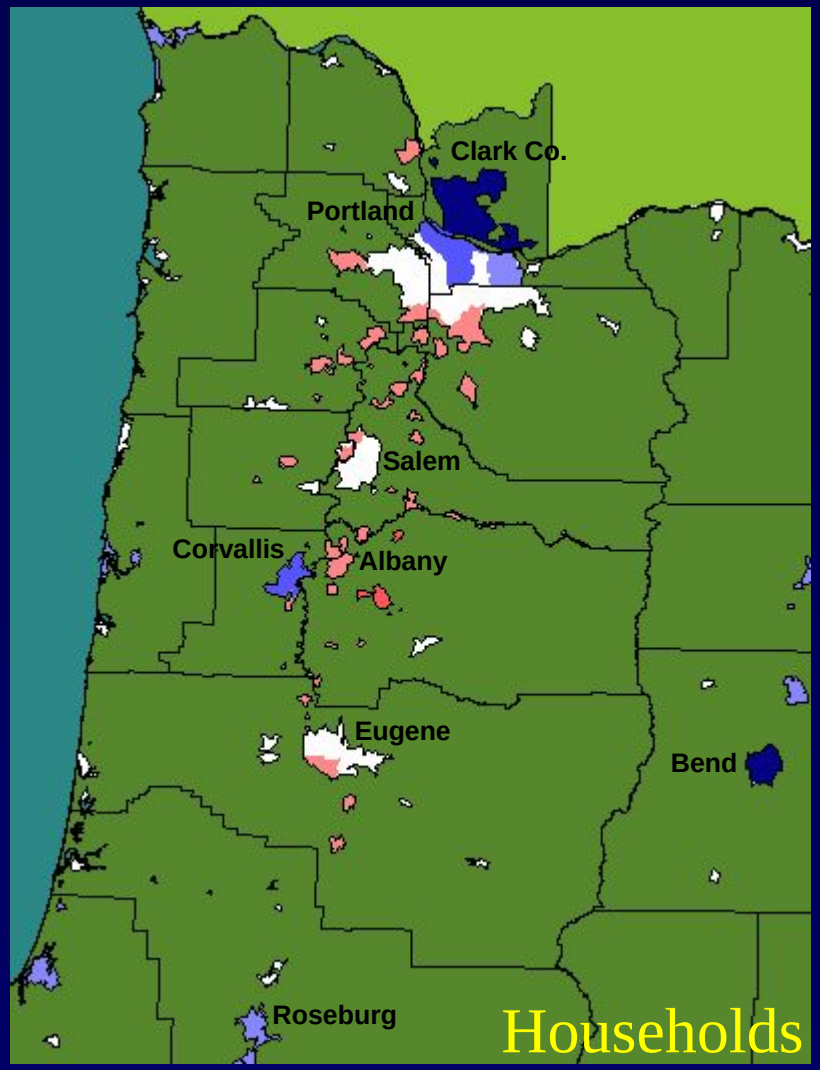

Region Emp | Region HHs | Transport | Maps

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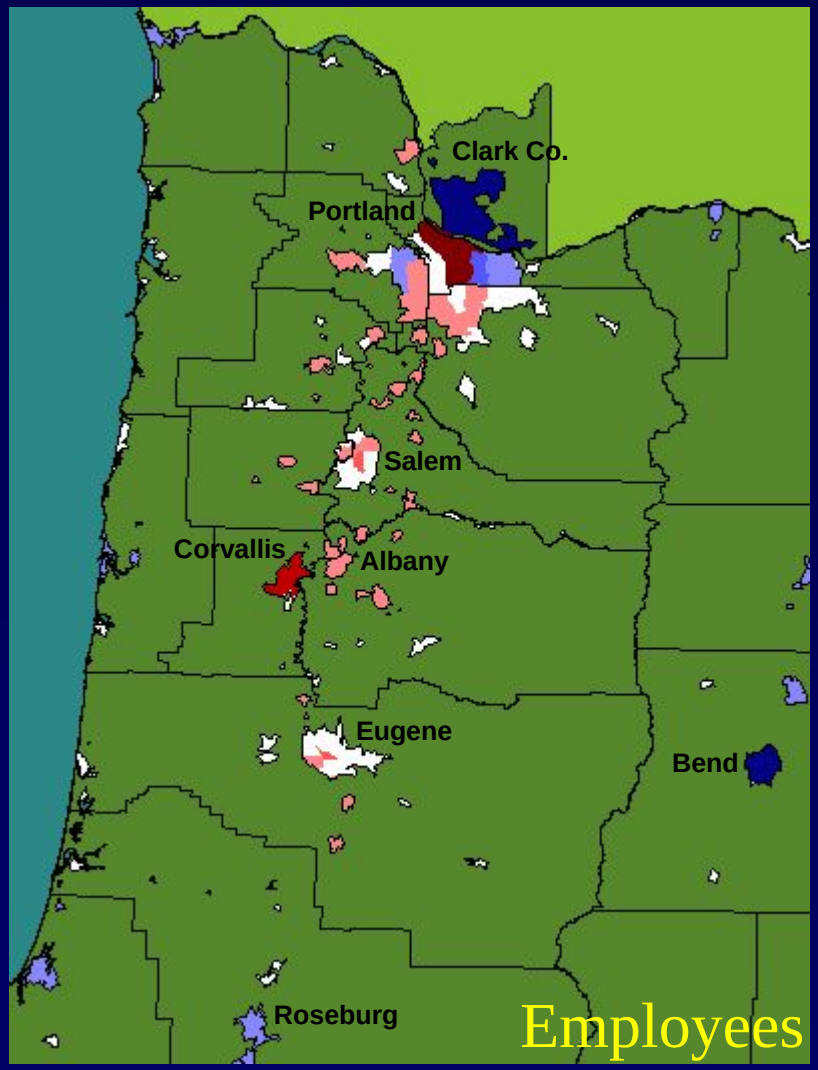
2050 Compact/No-Build Differences



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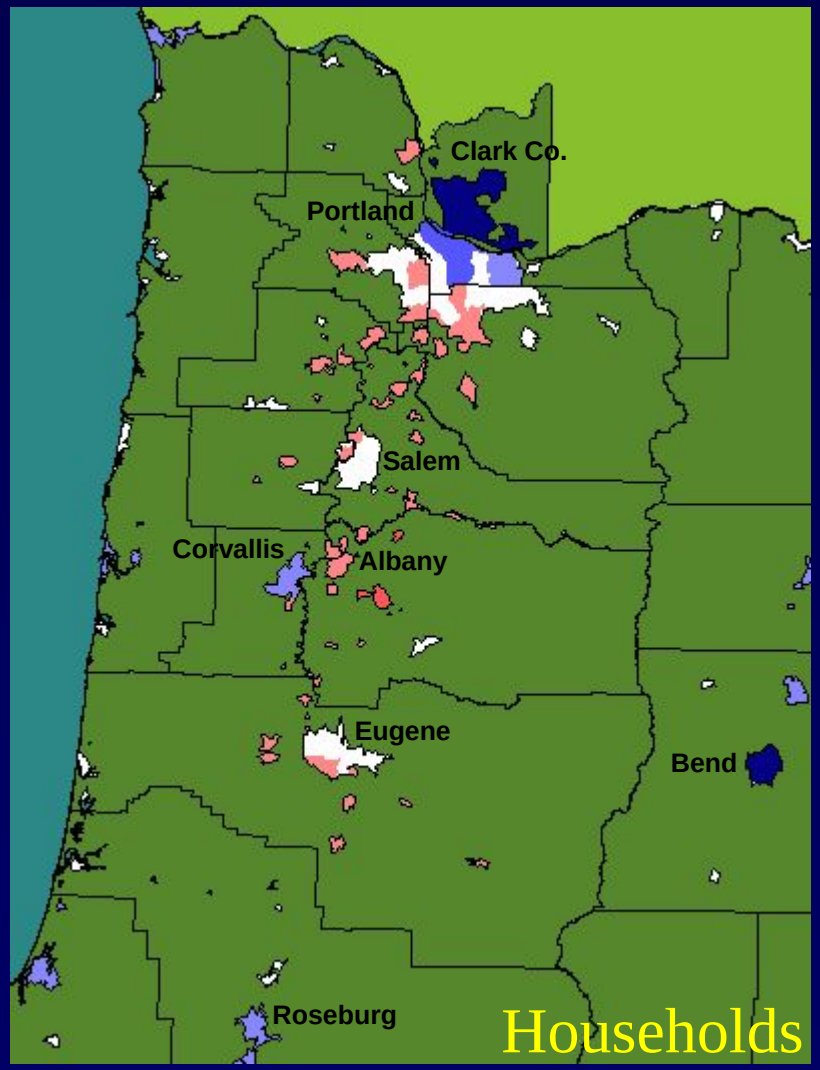
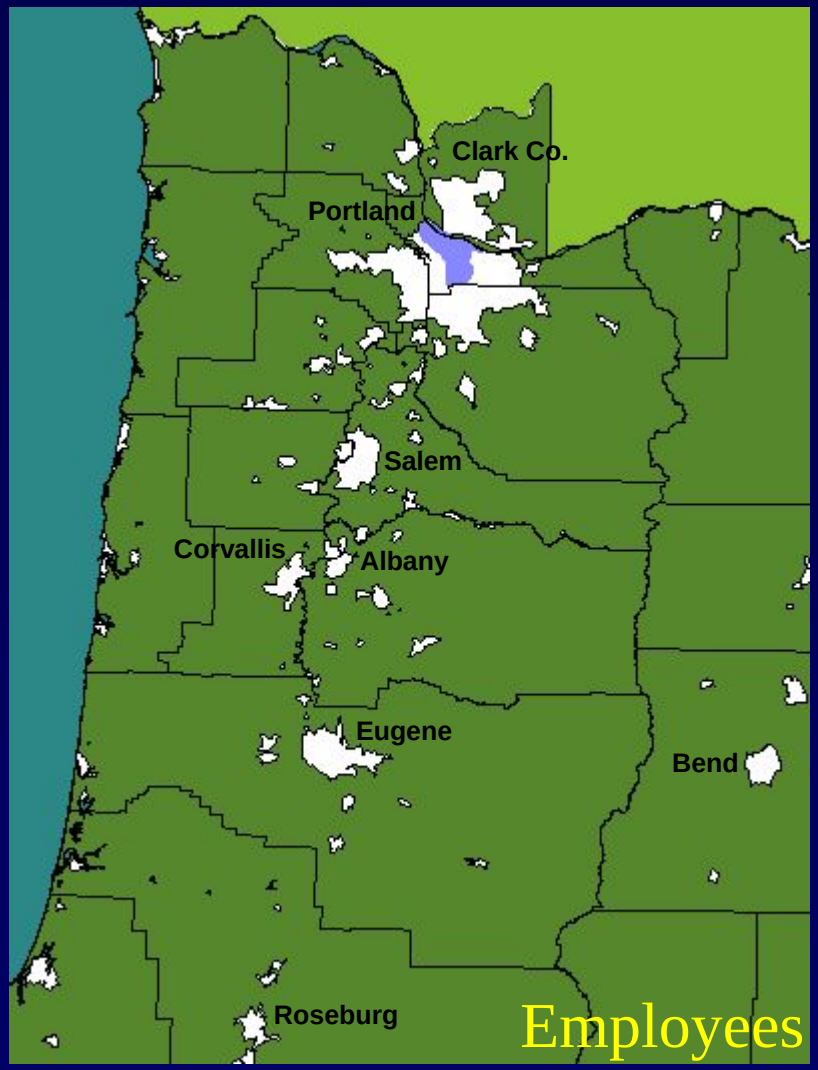


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2000 Historic/Highway Differences



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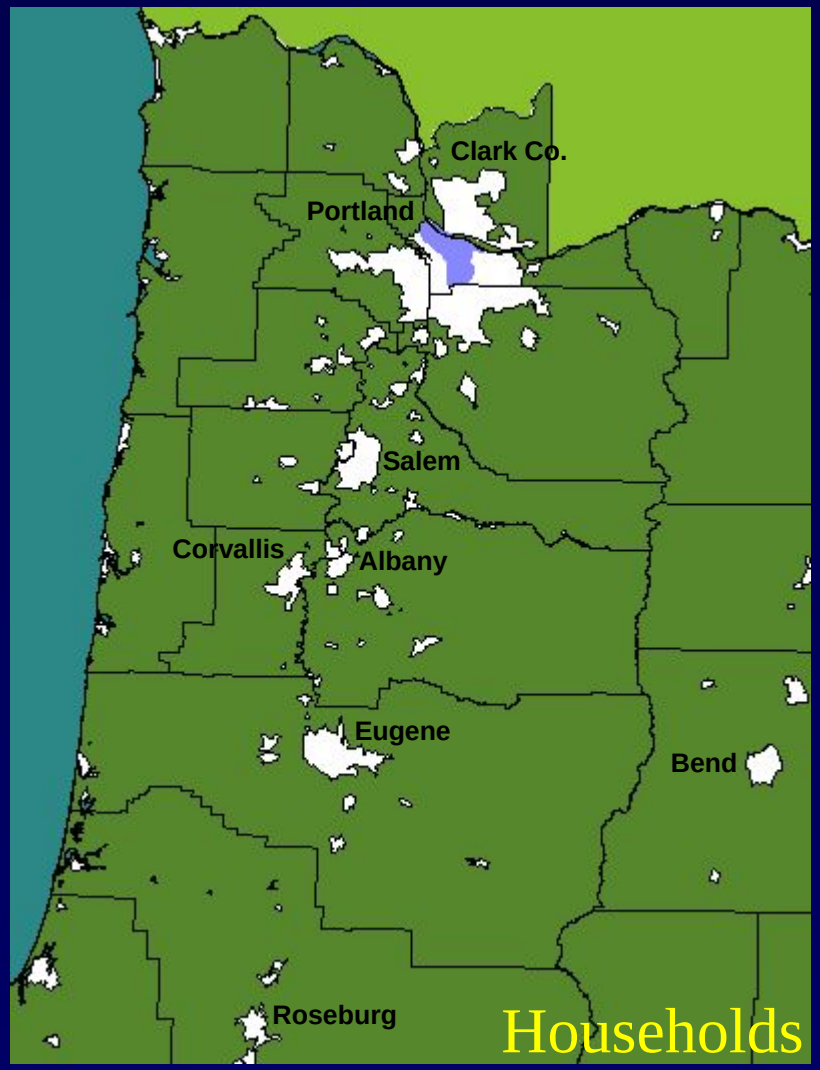
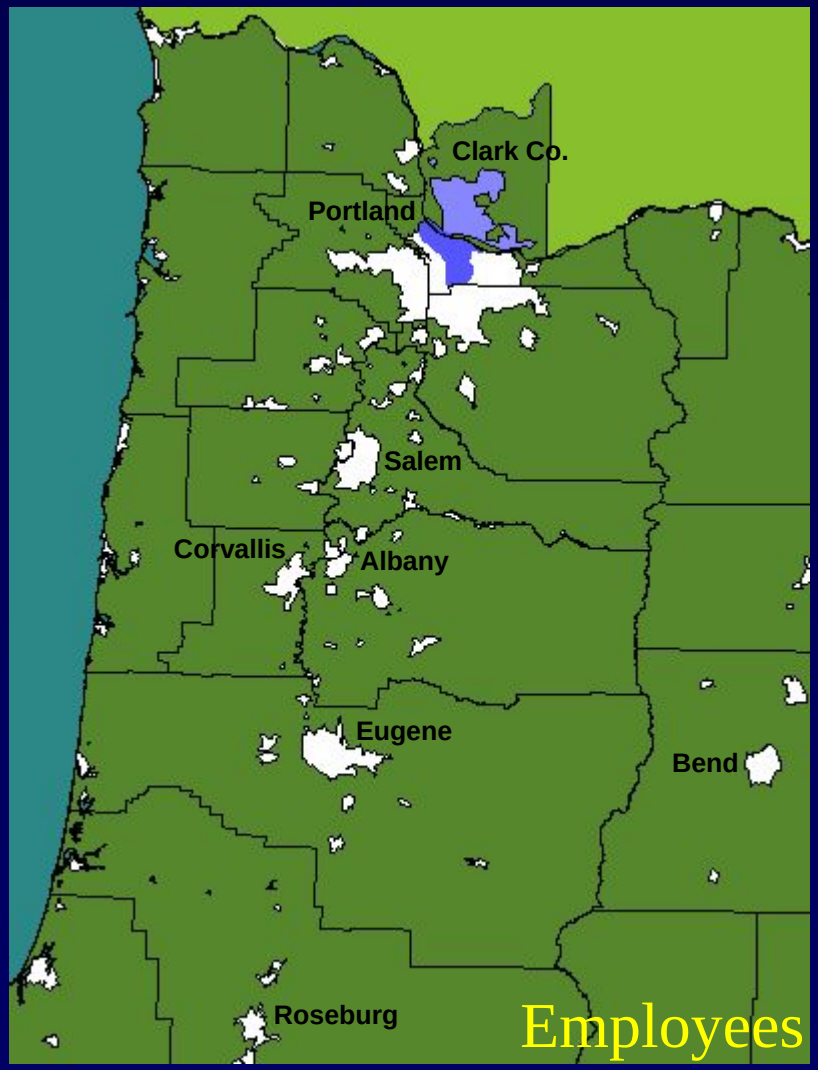


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2005 Historic/Highway Differences



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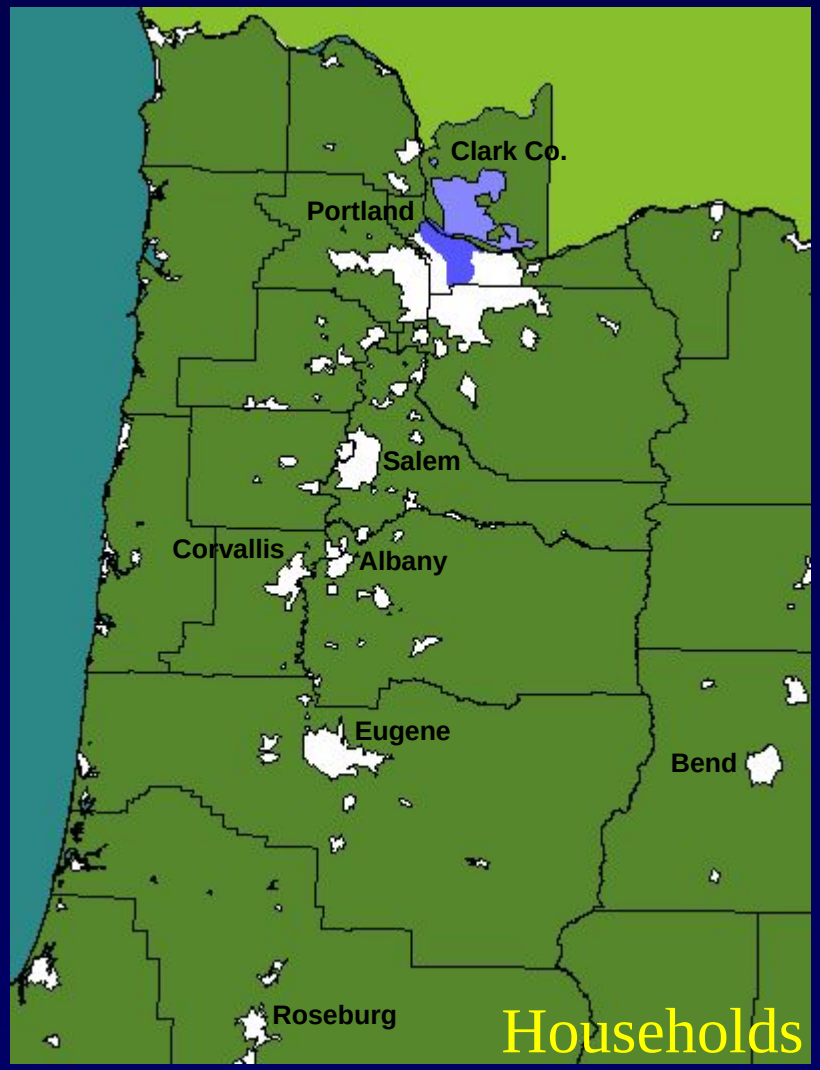
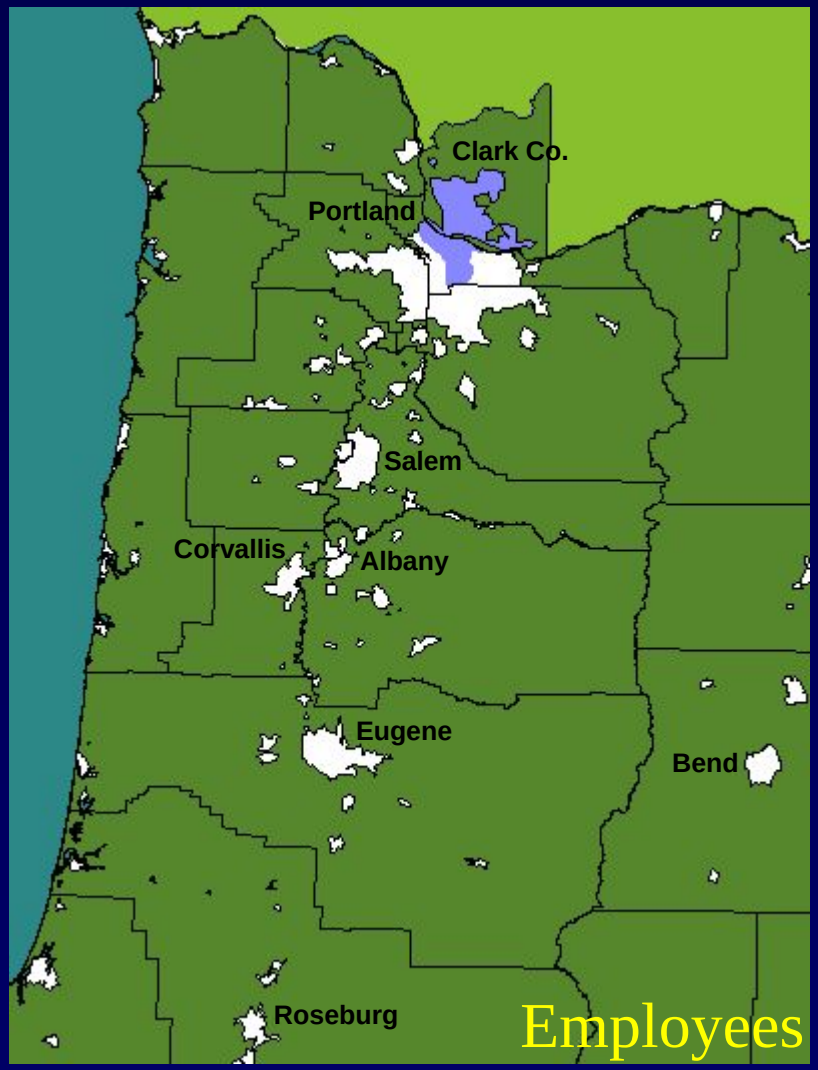


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2010 Historic/Highway Differences



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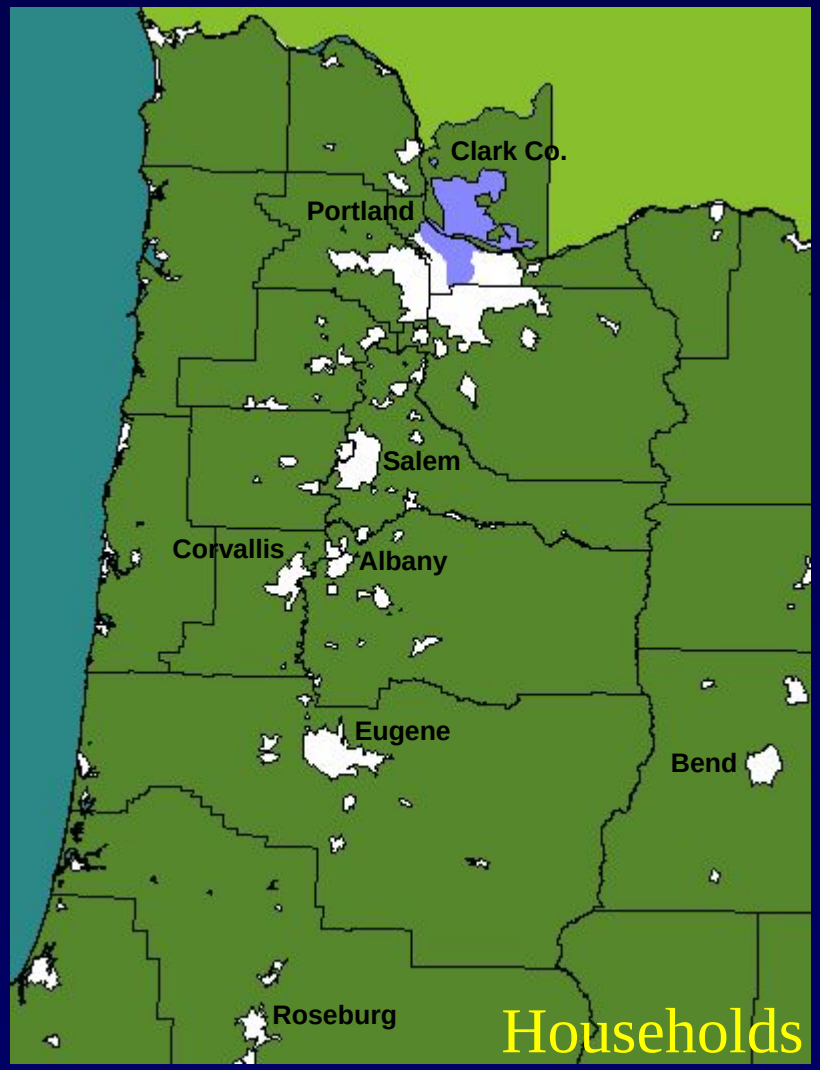
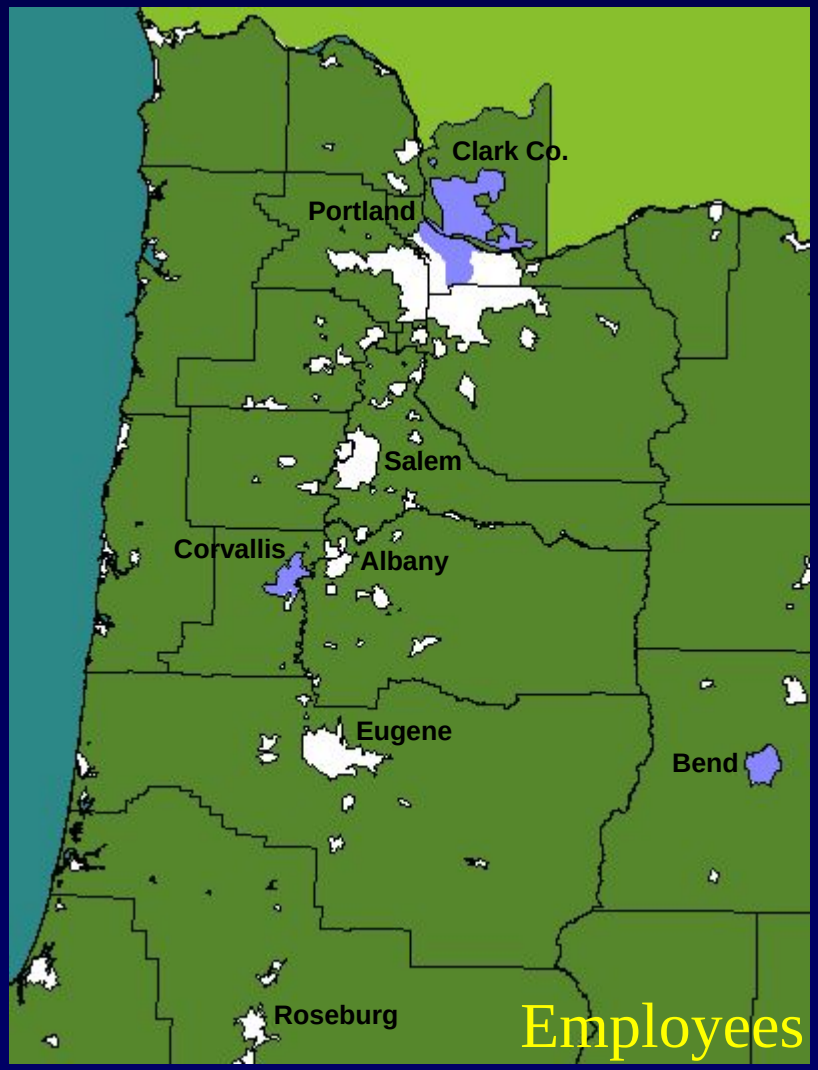


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2015 Historic/Highway Differences



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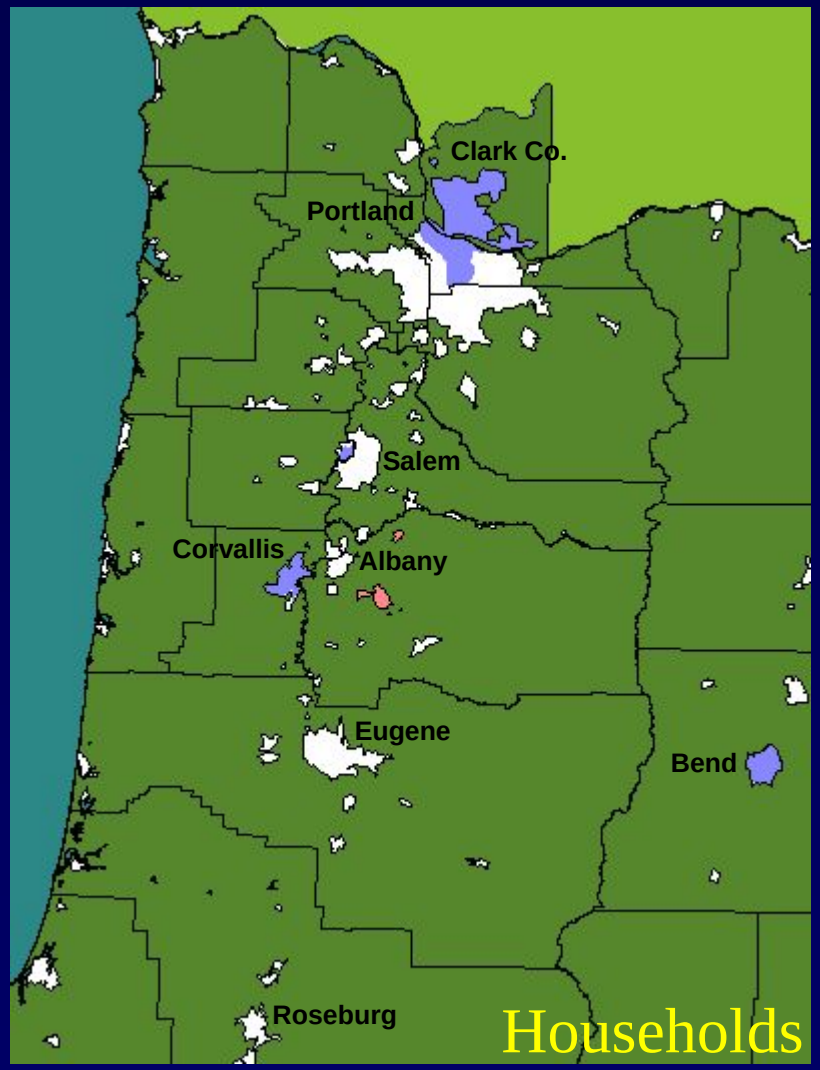
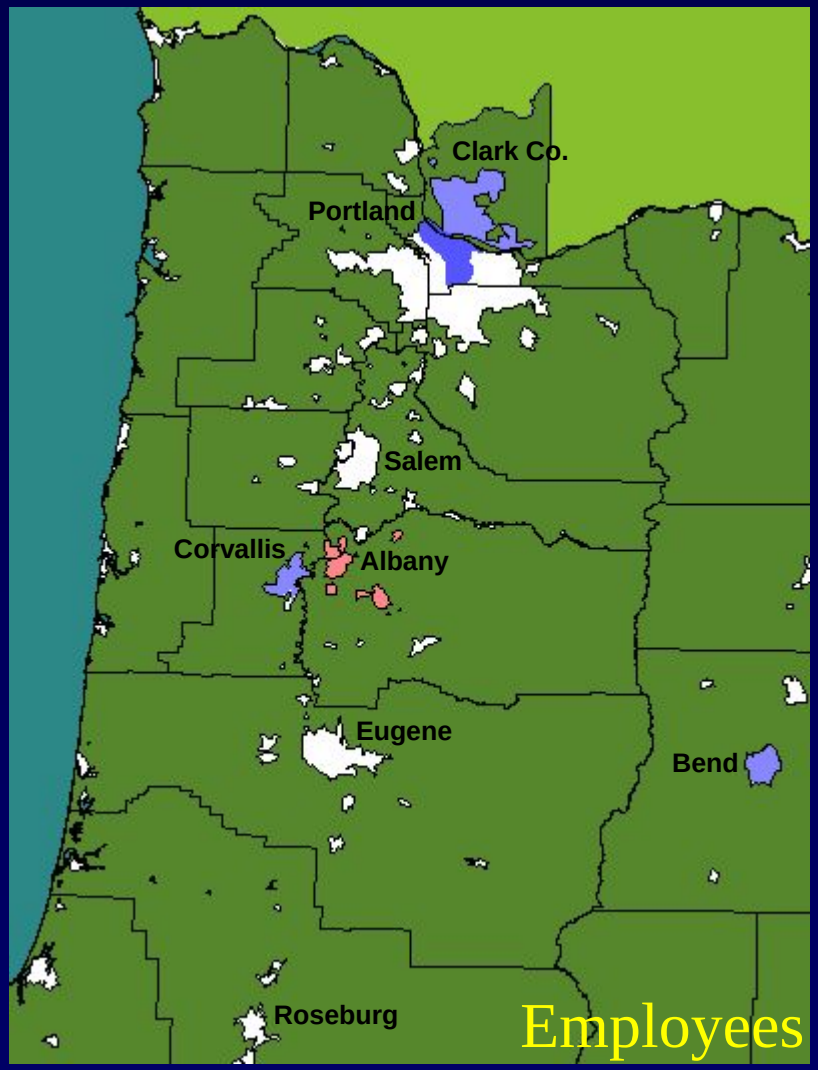


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2020 Historic/Highway Differences



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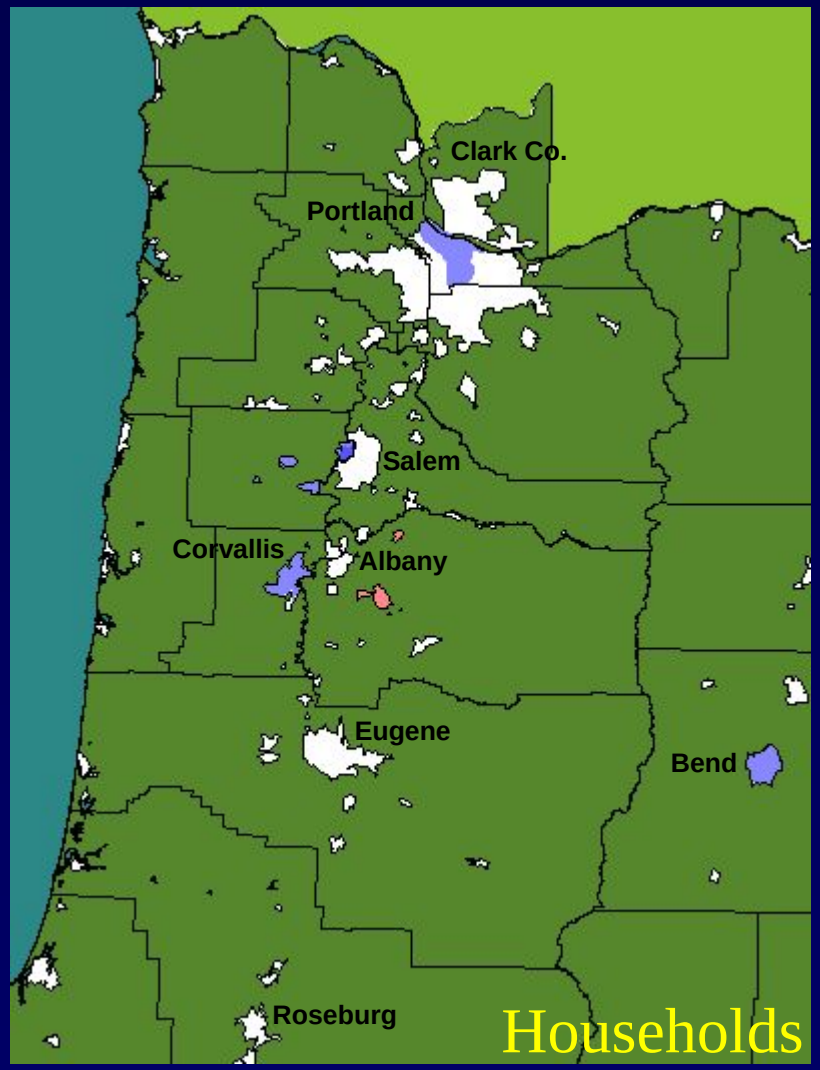
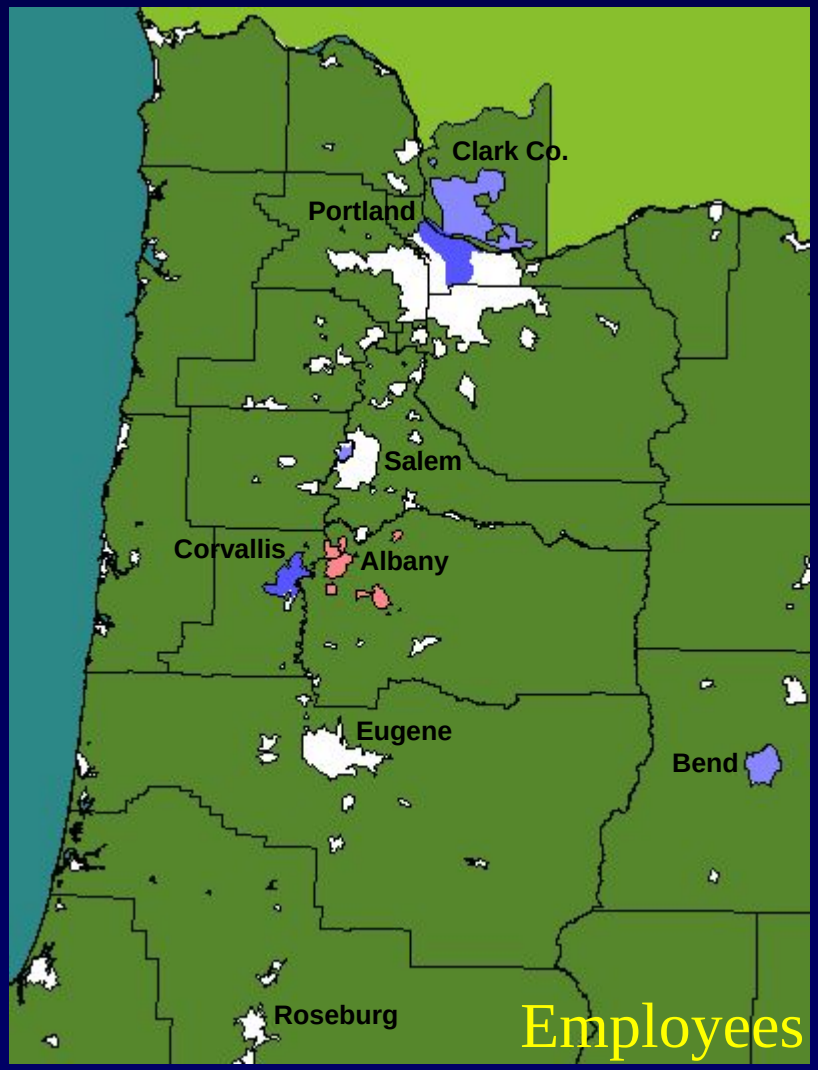


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2025 Historic/Highway Differences



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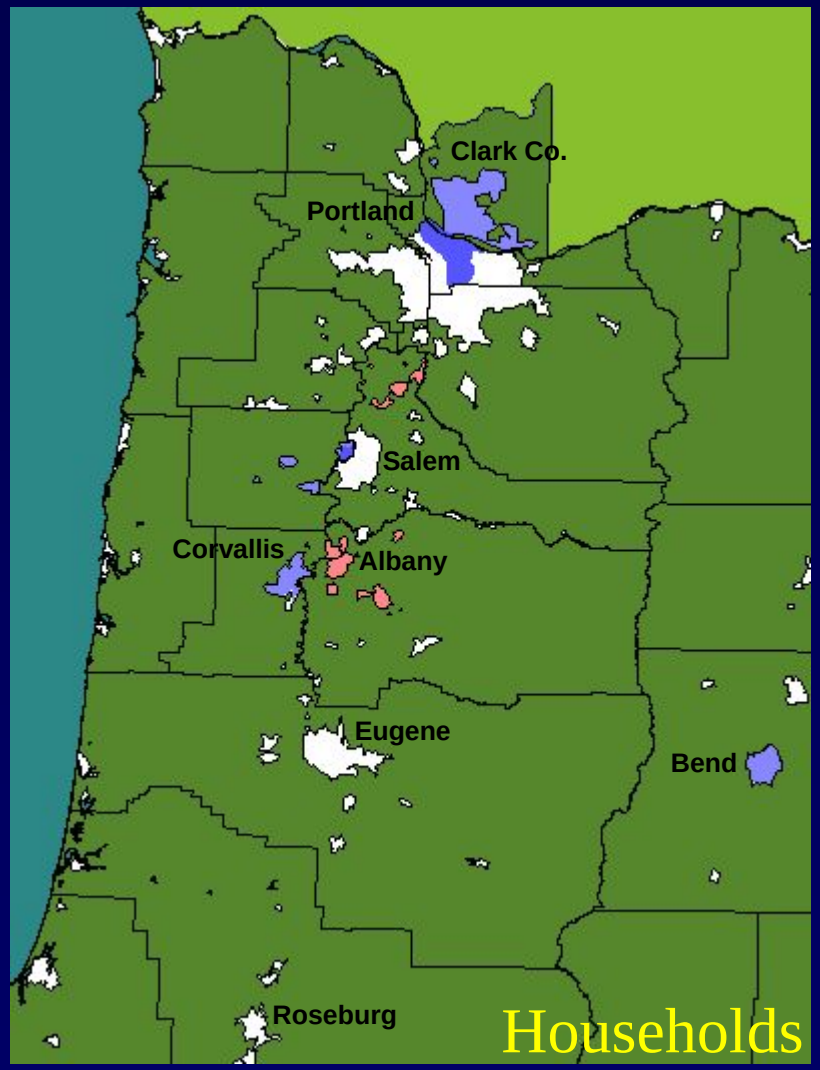
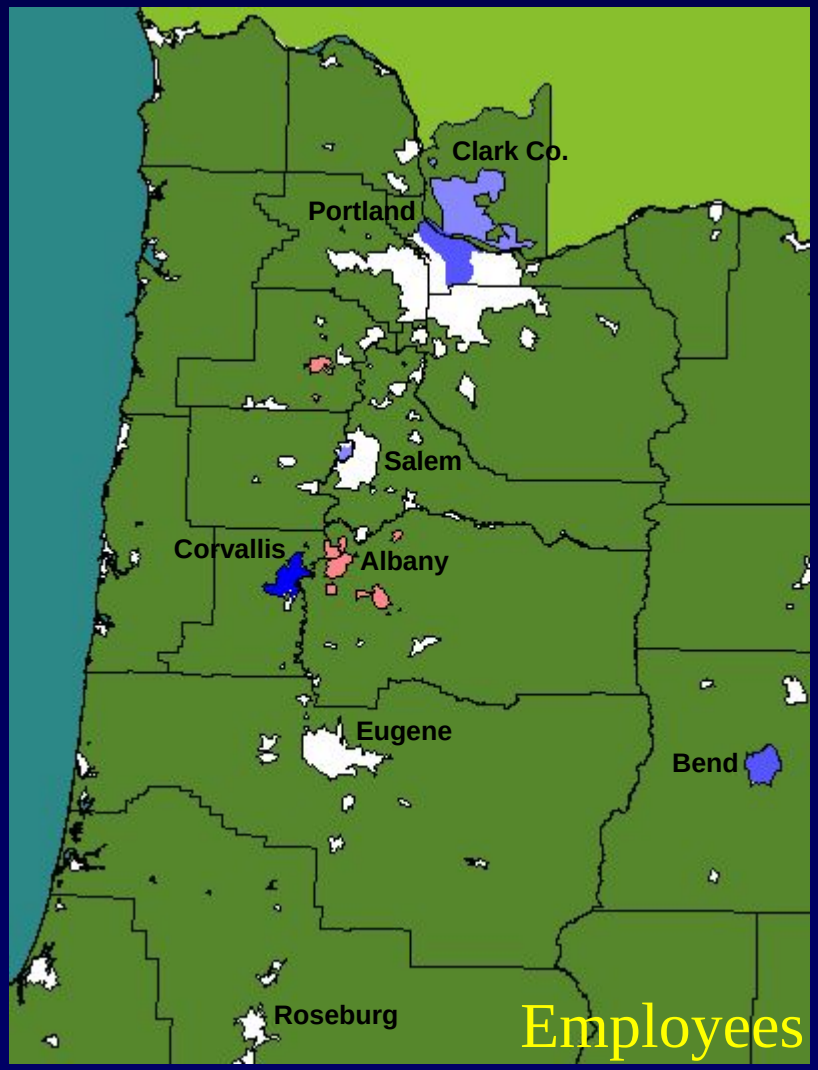


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2030 Historic/Highway Differences



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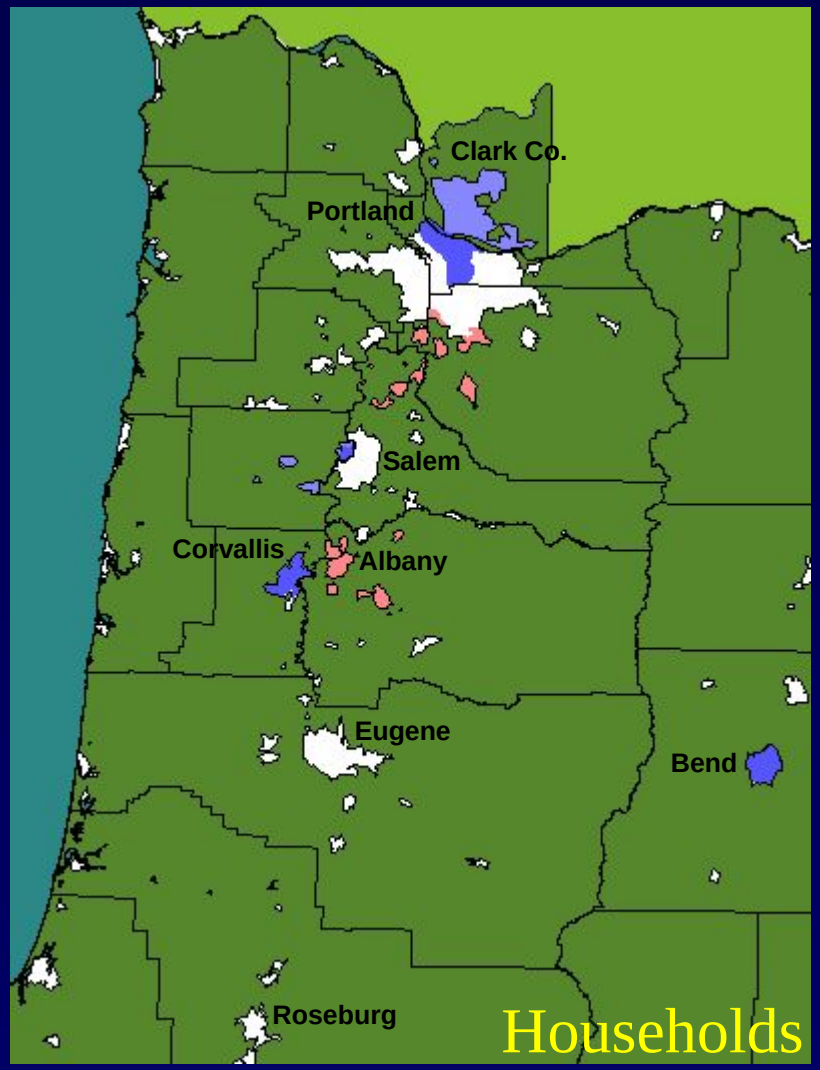
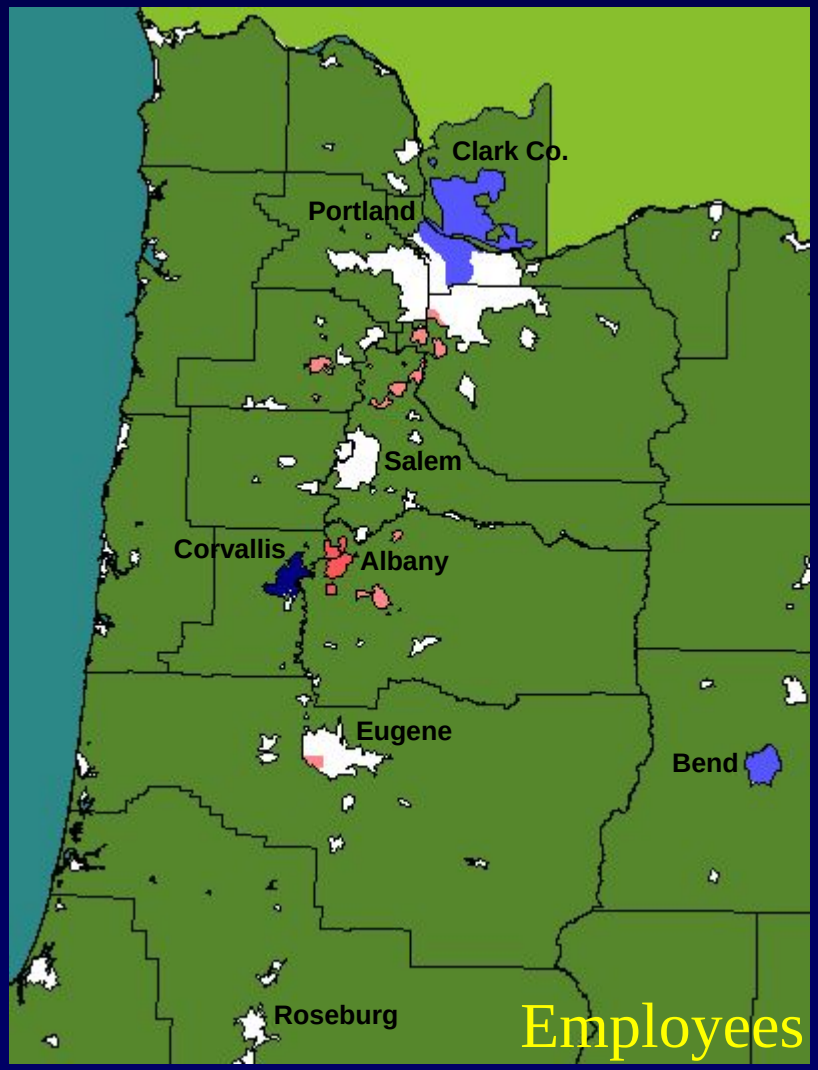


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2035 Historic/Highway Differences



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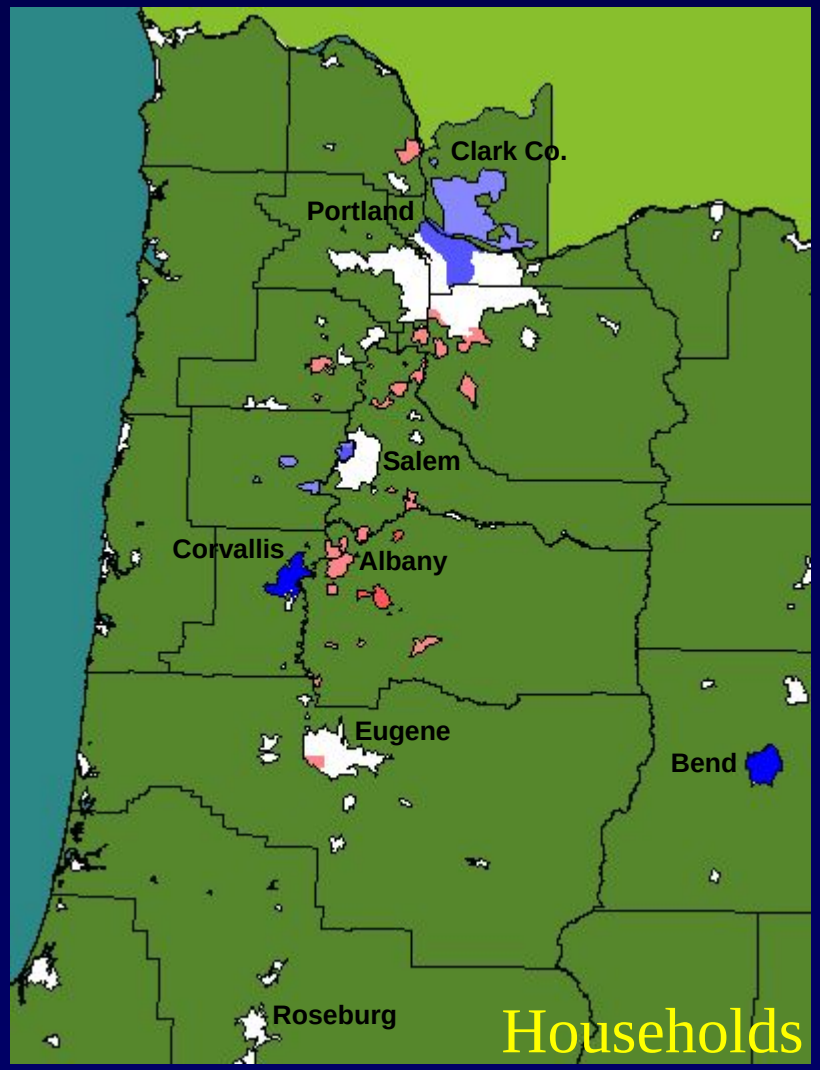
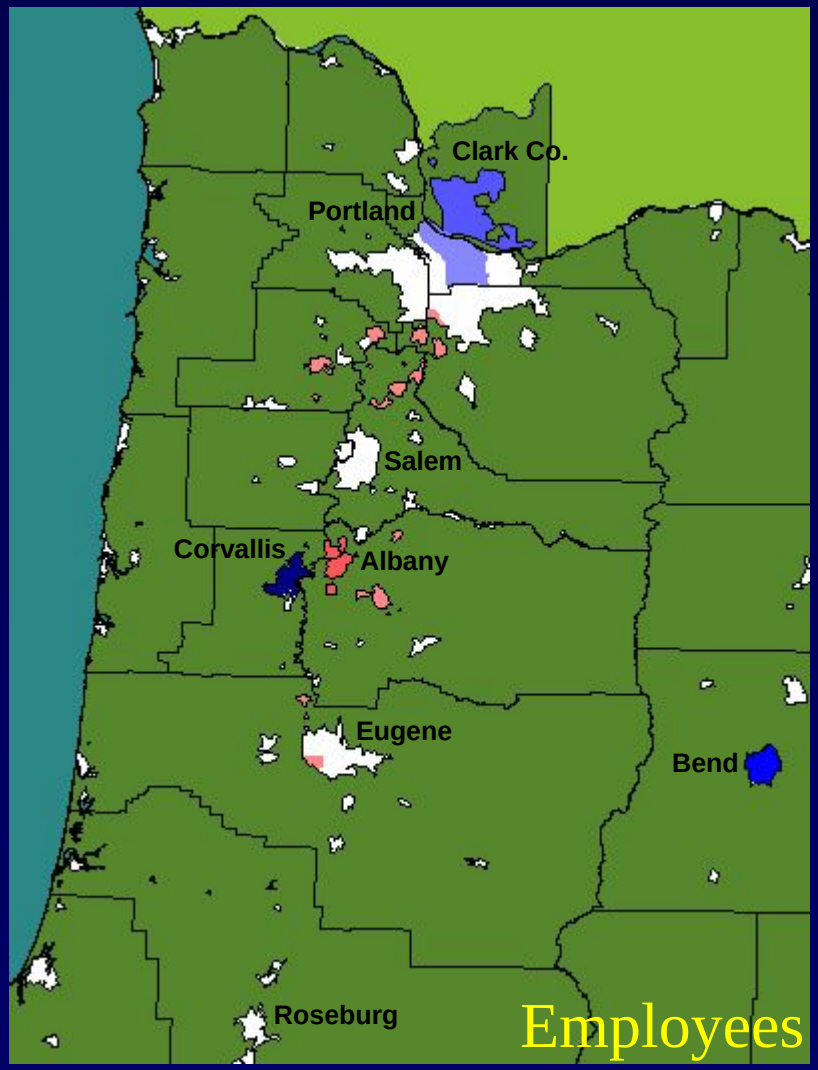


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2040 Historic/Highway Differences



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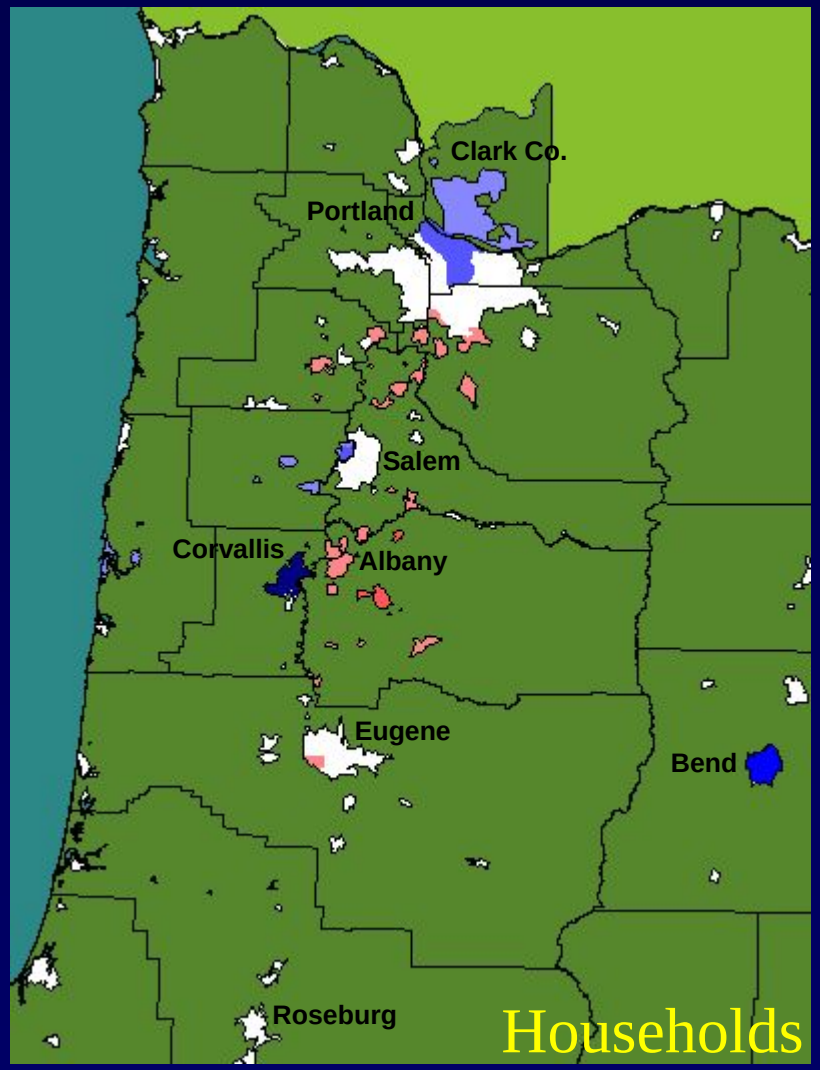
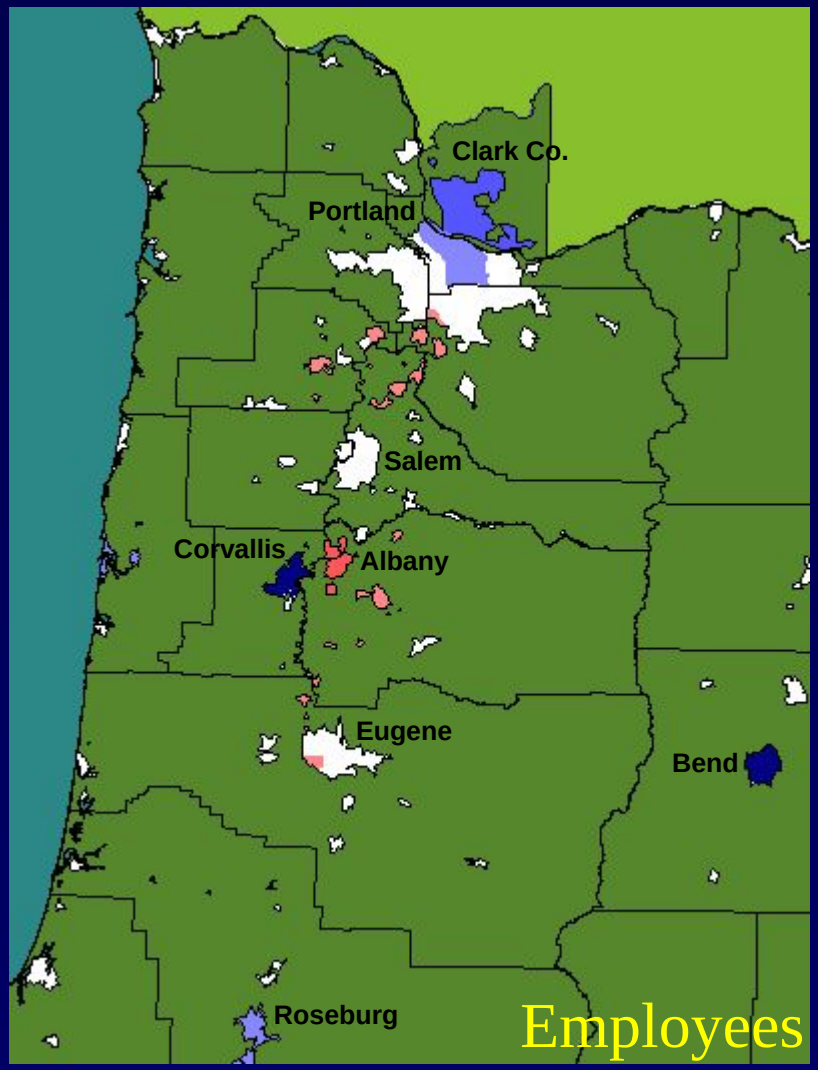


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2045 Historic/Highway Differences



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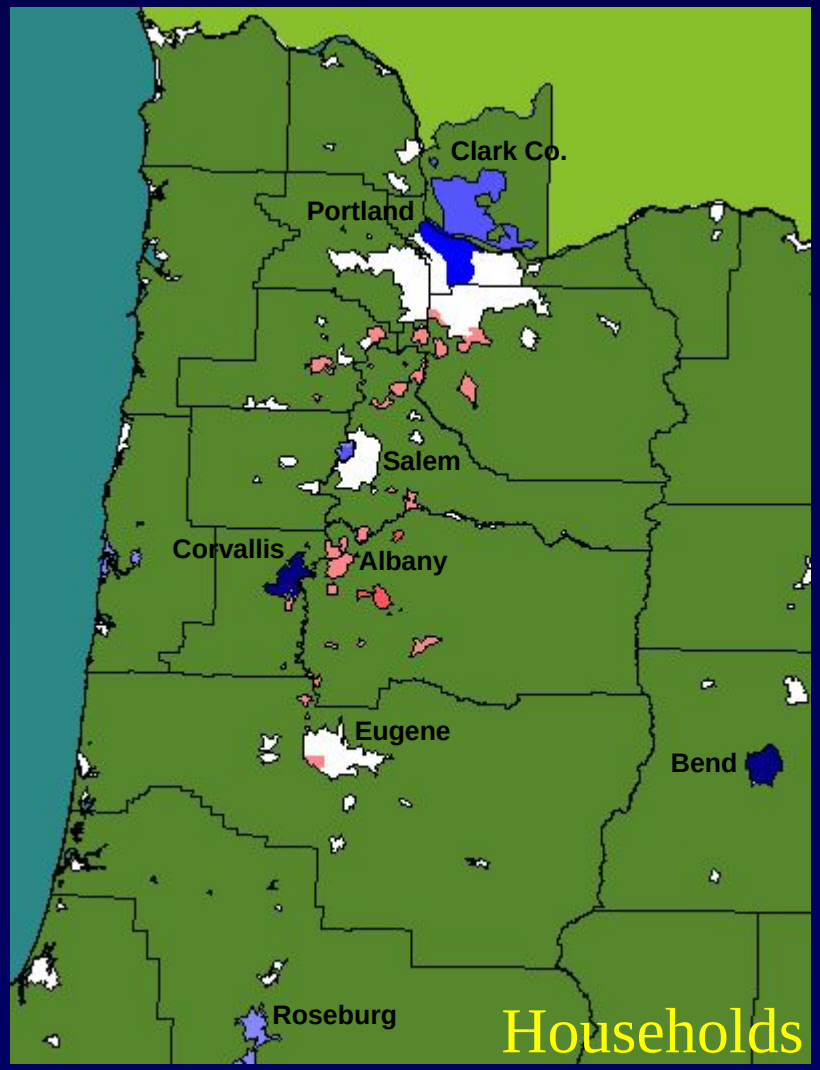
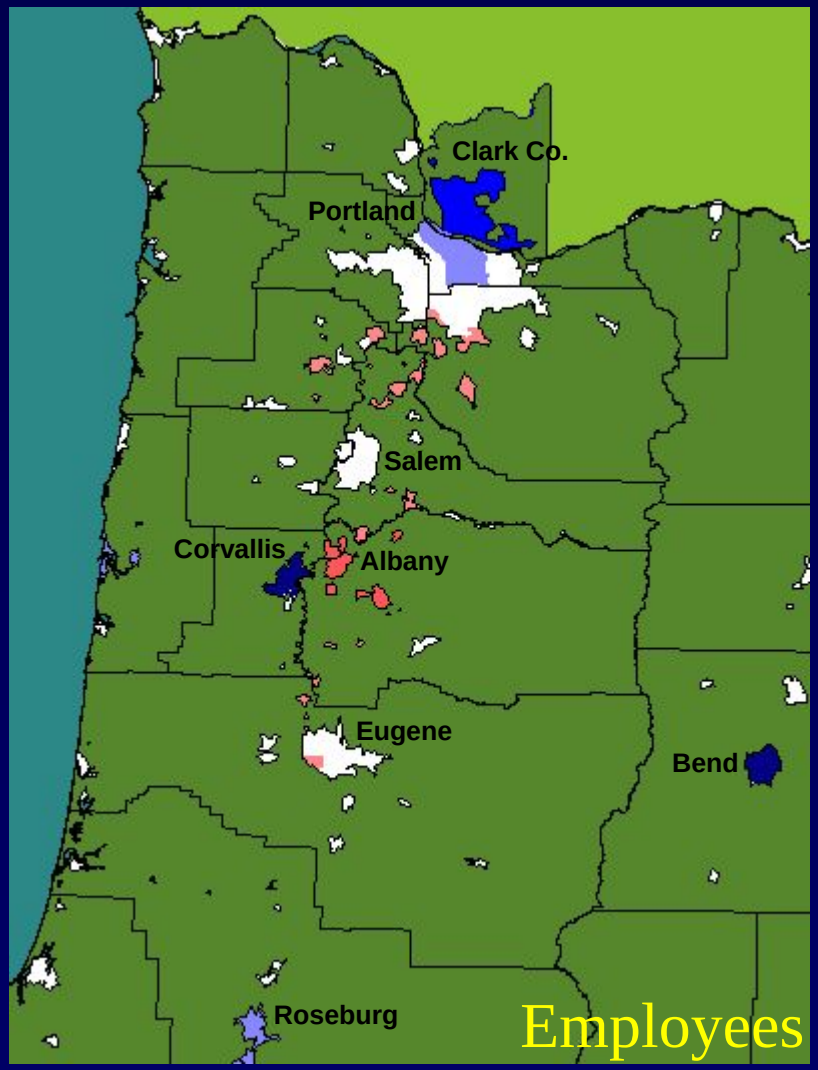


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2050 Historic/Highway Differences



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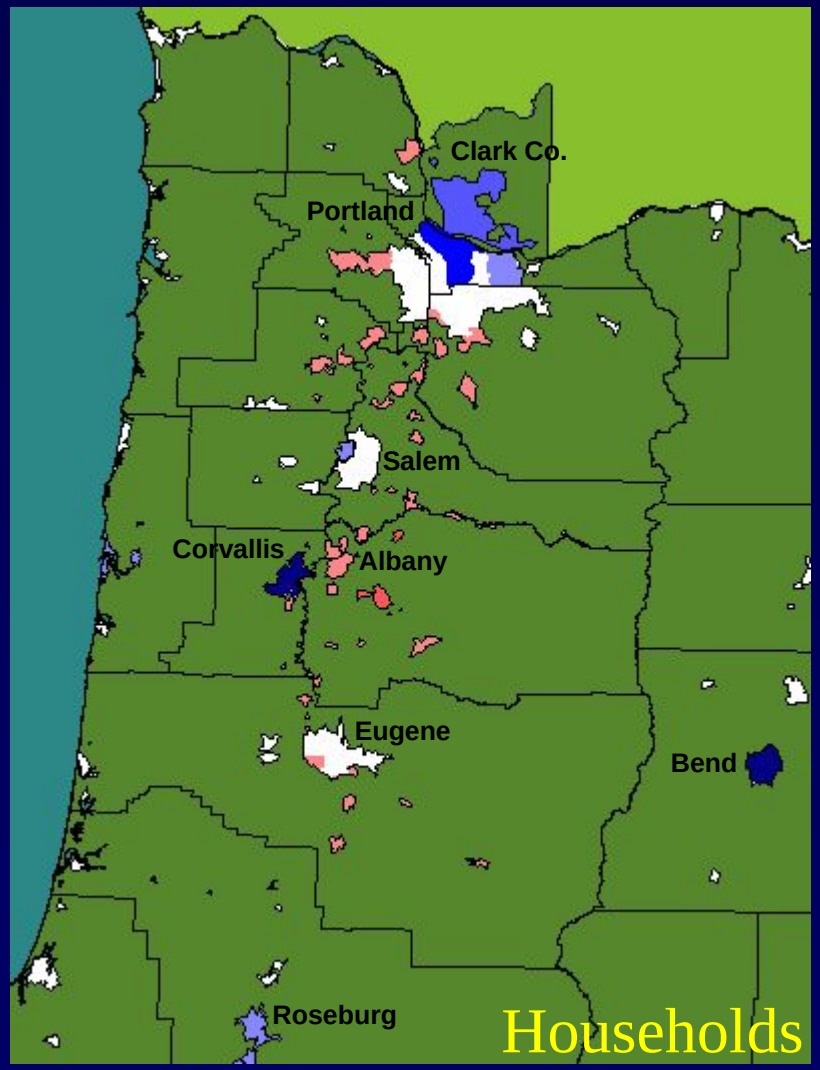
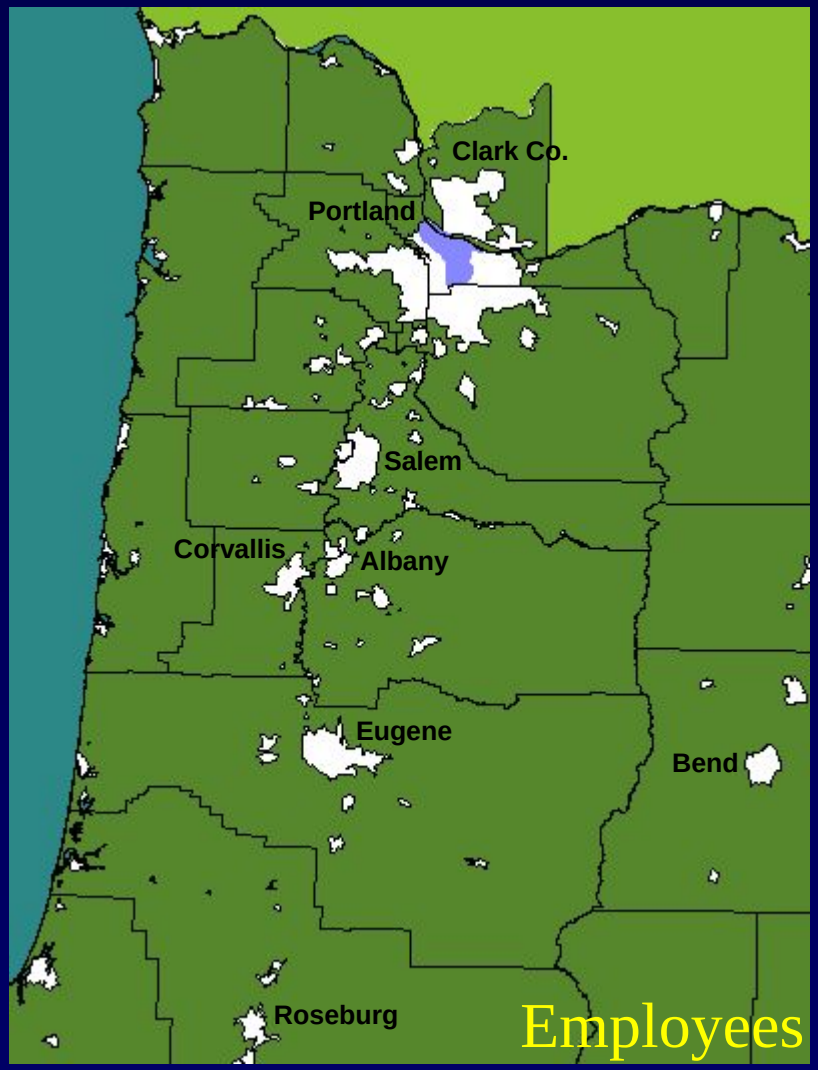


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2000 Historic/TDM Differences



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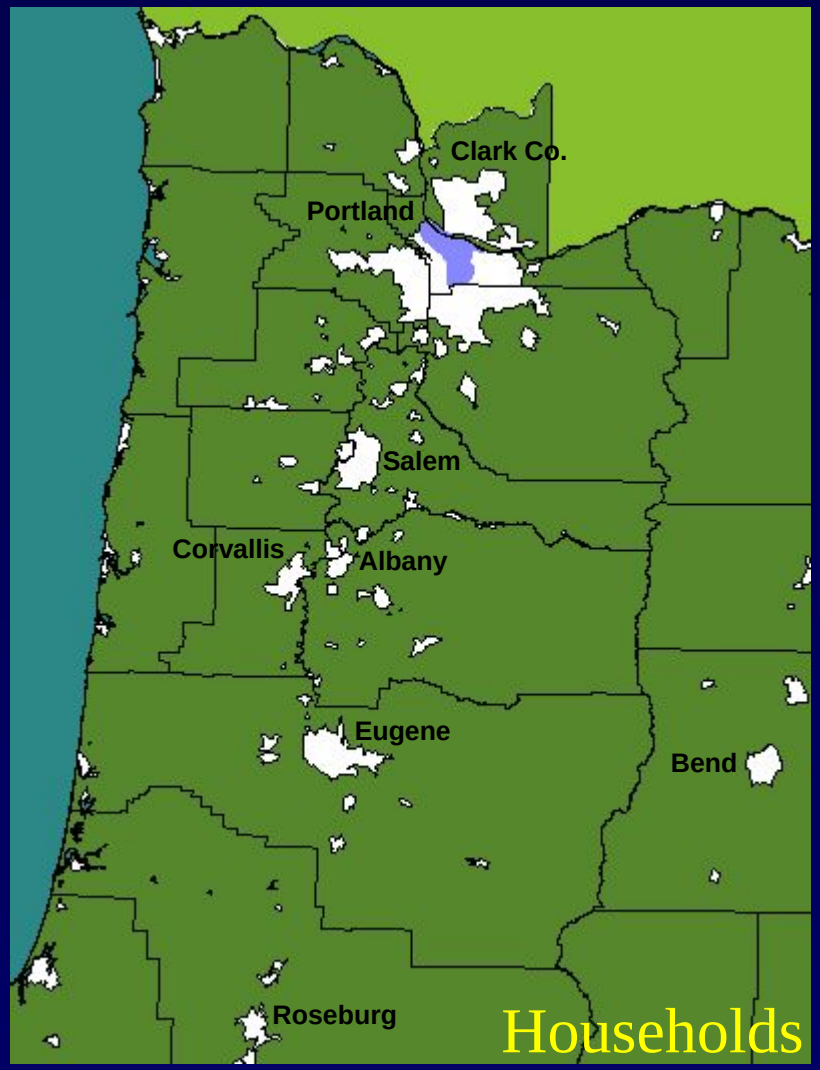
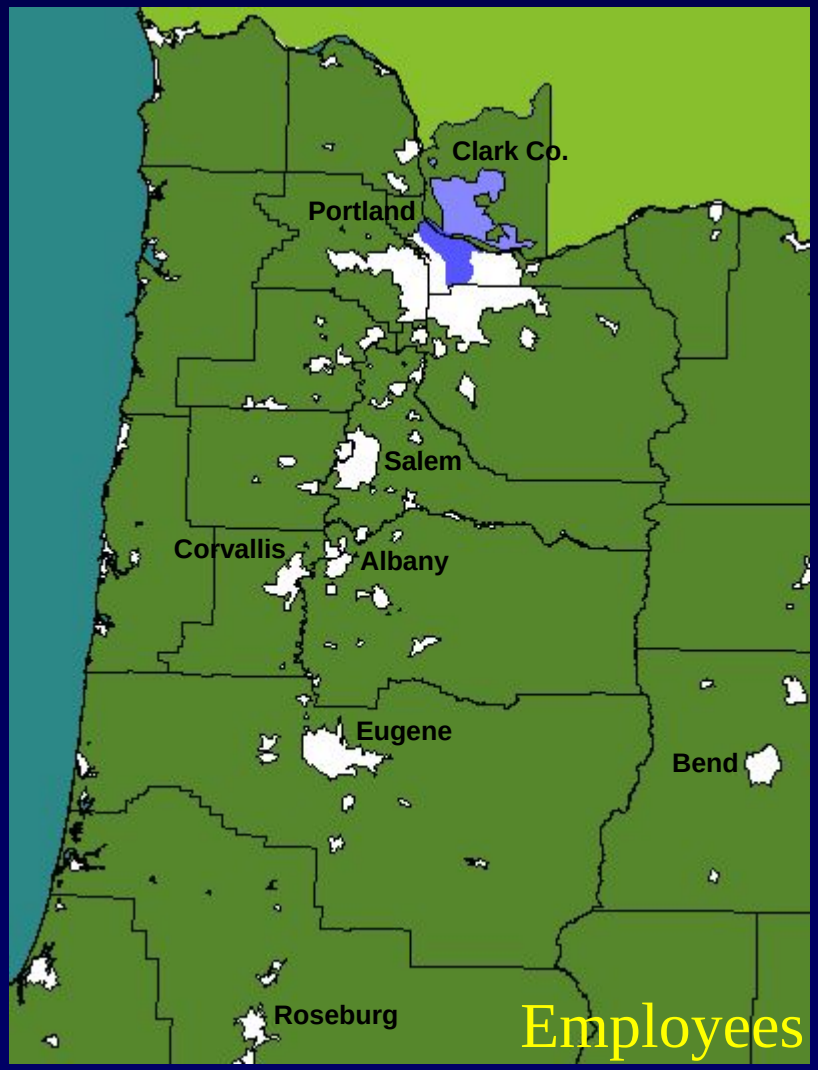


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2005 Historic/TDM Differences



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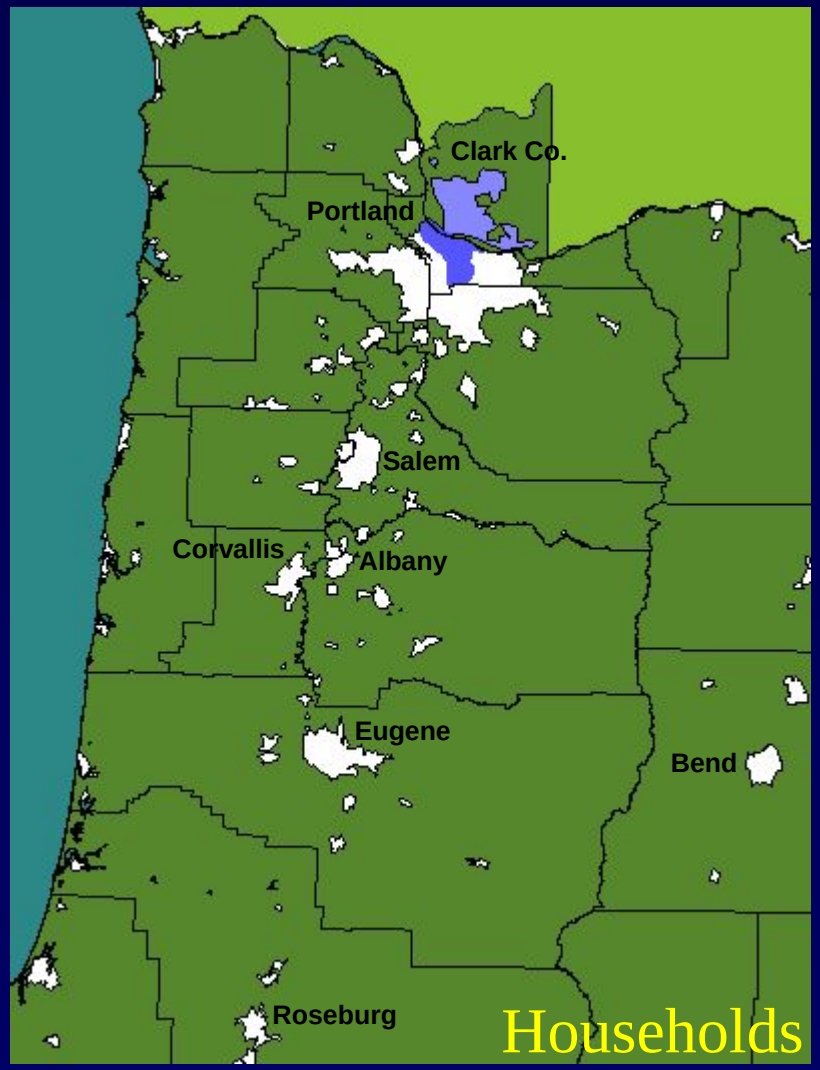
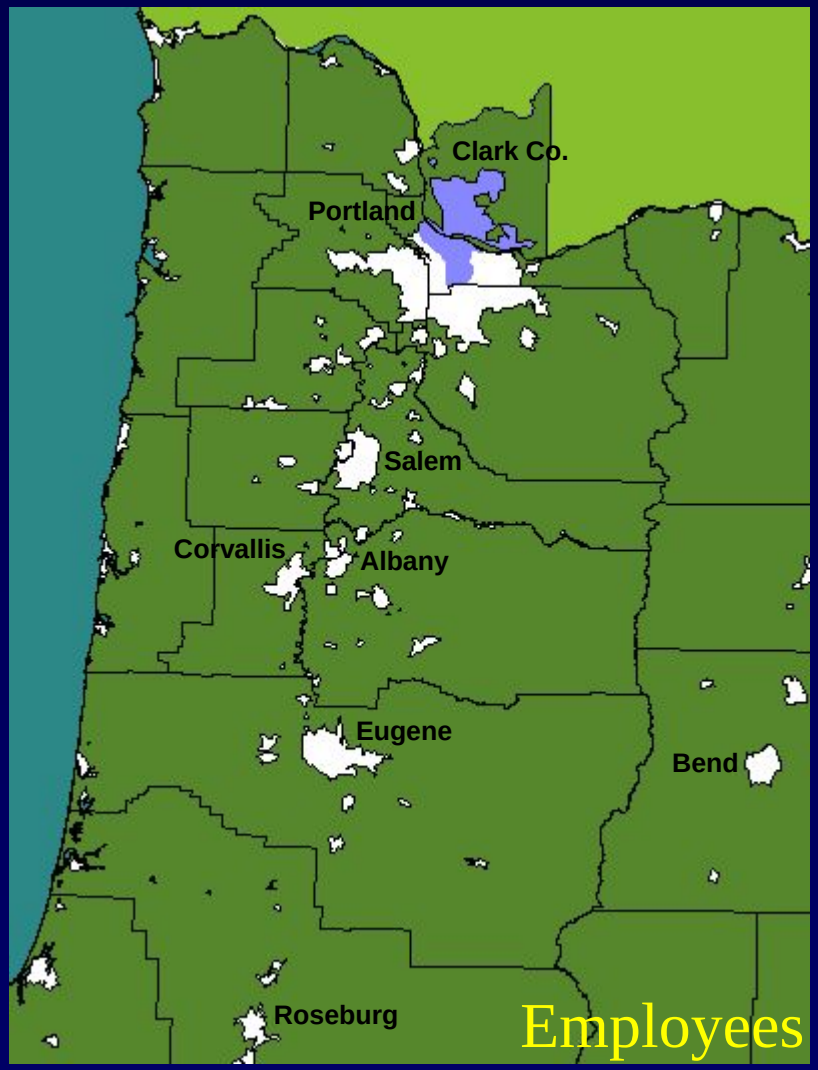


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2010 Historic/TDM Differences



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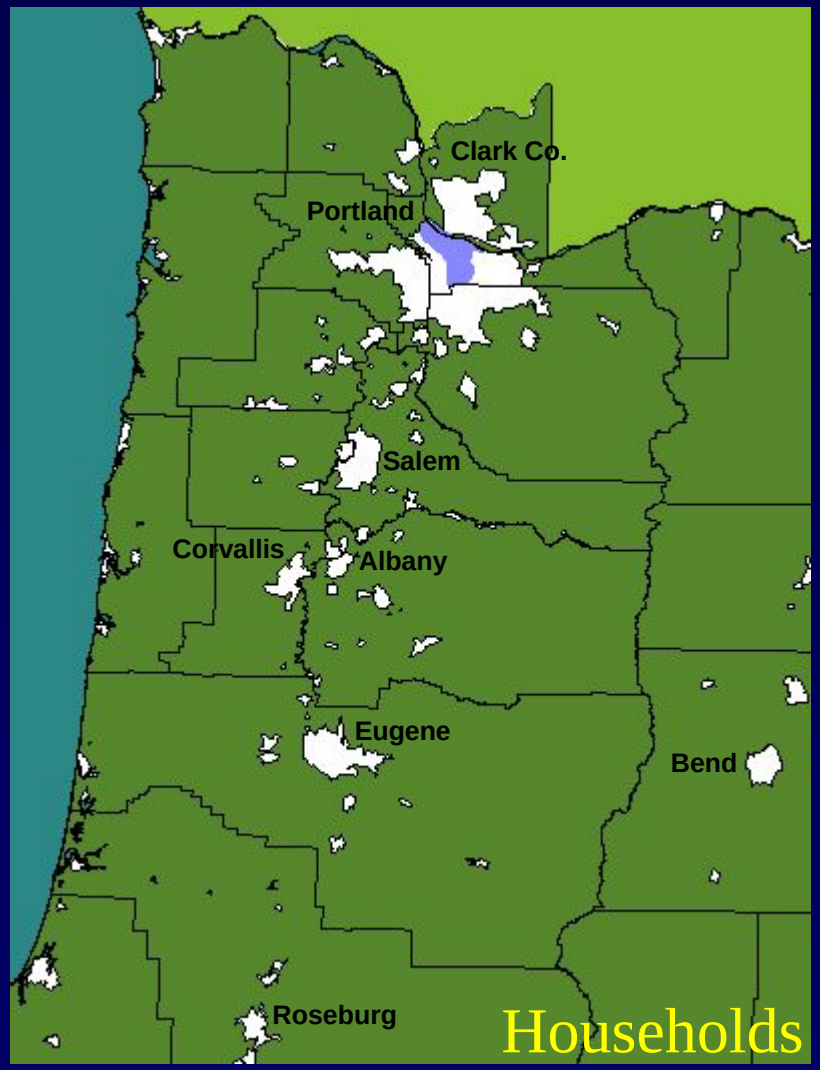
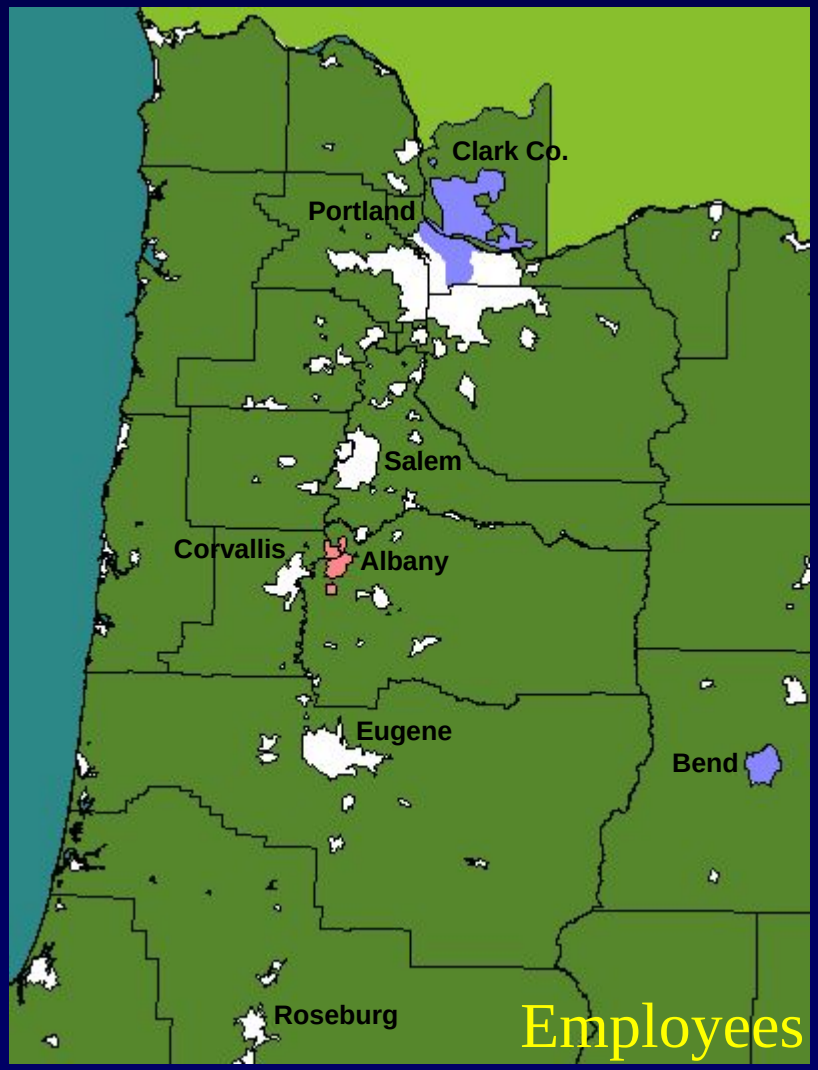


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2015 Historic/TDM Differences



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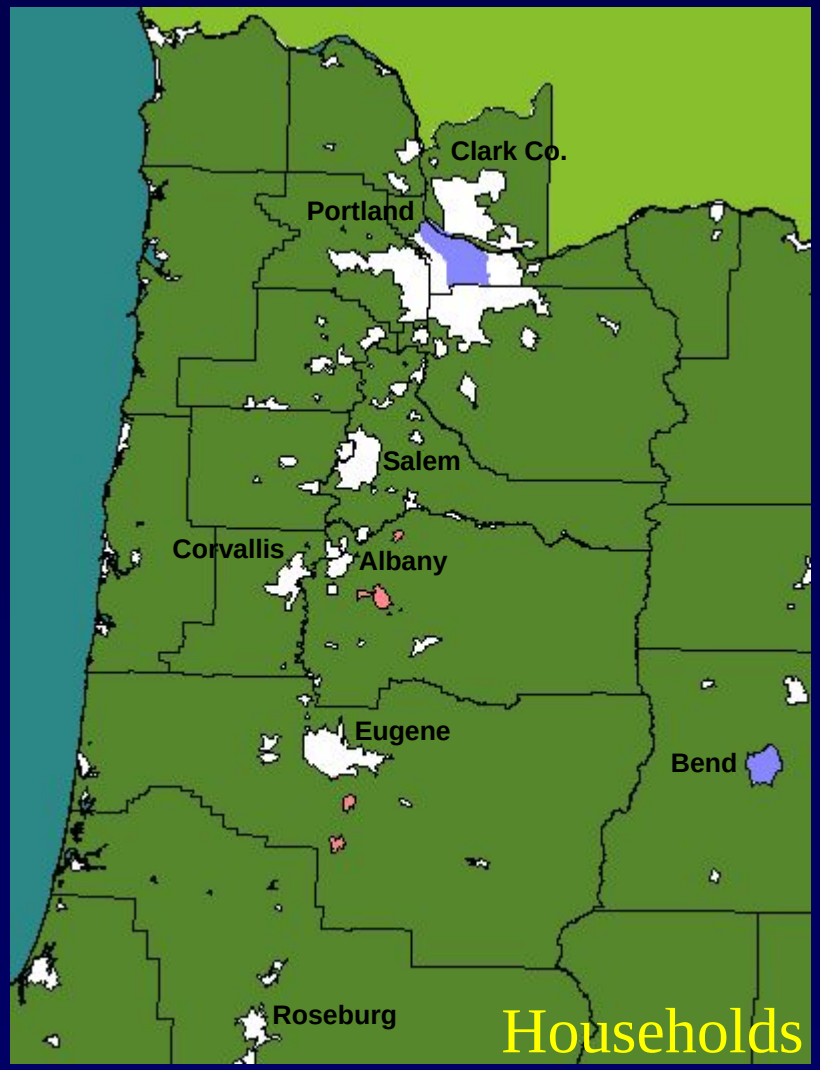
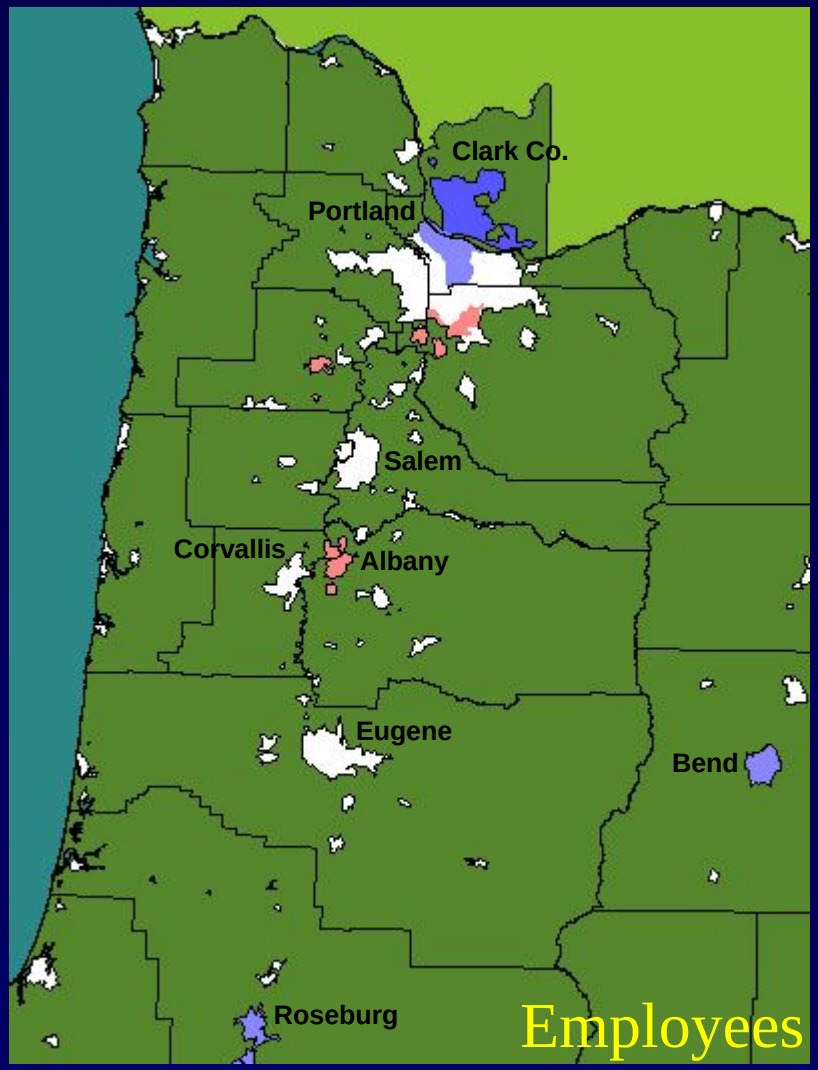


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2020 Historic/TDM Differences



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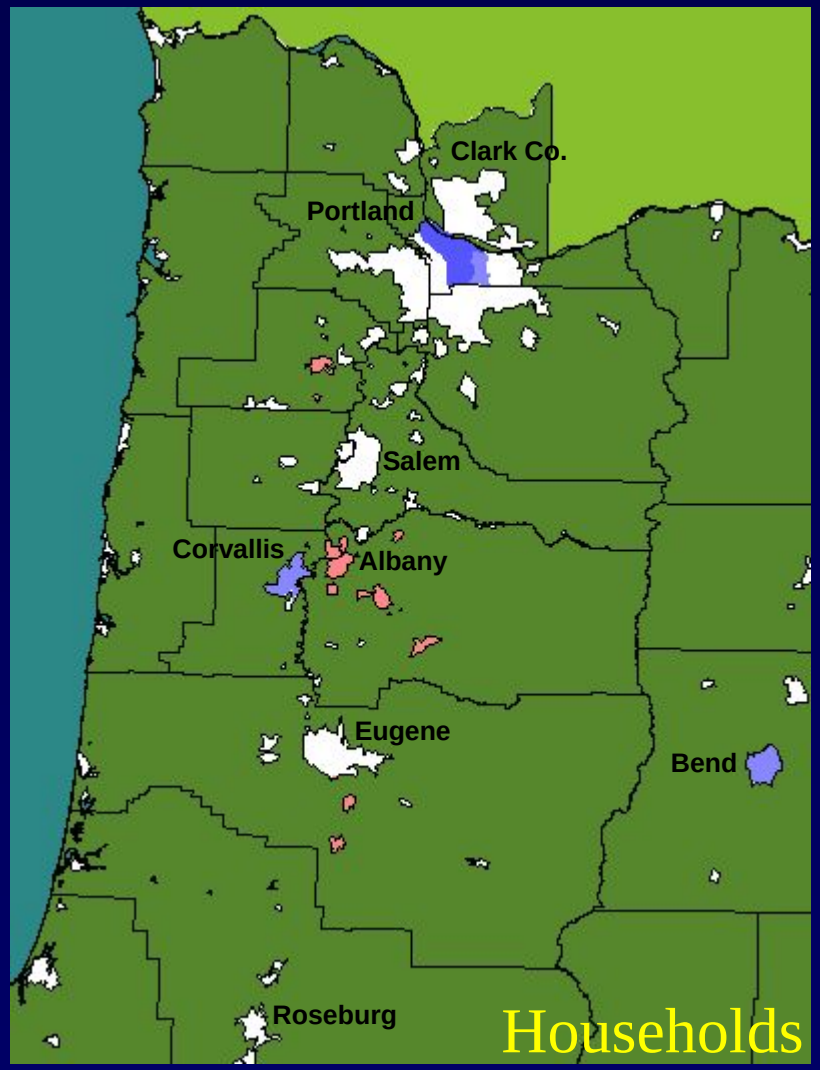
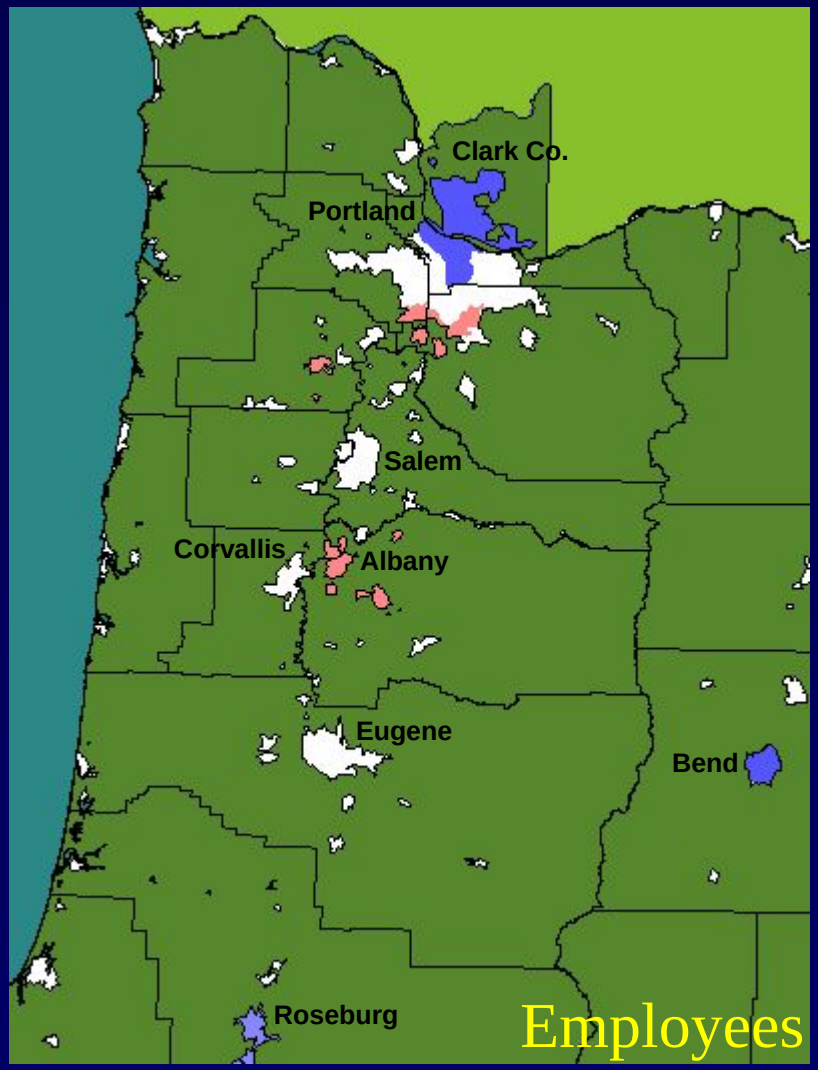


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2025 Historic/TDM Differences



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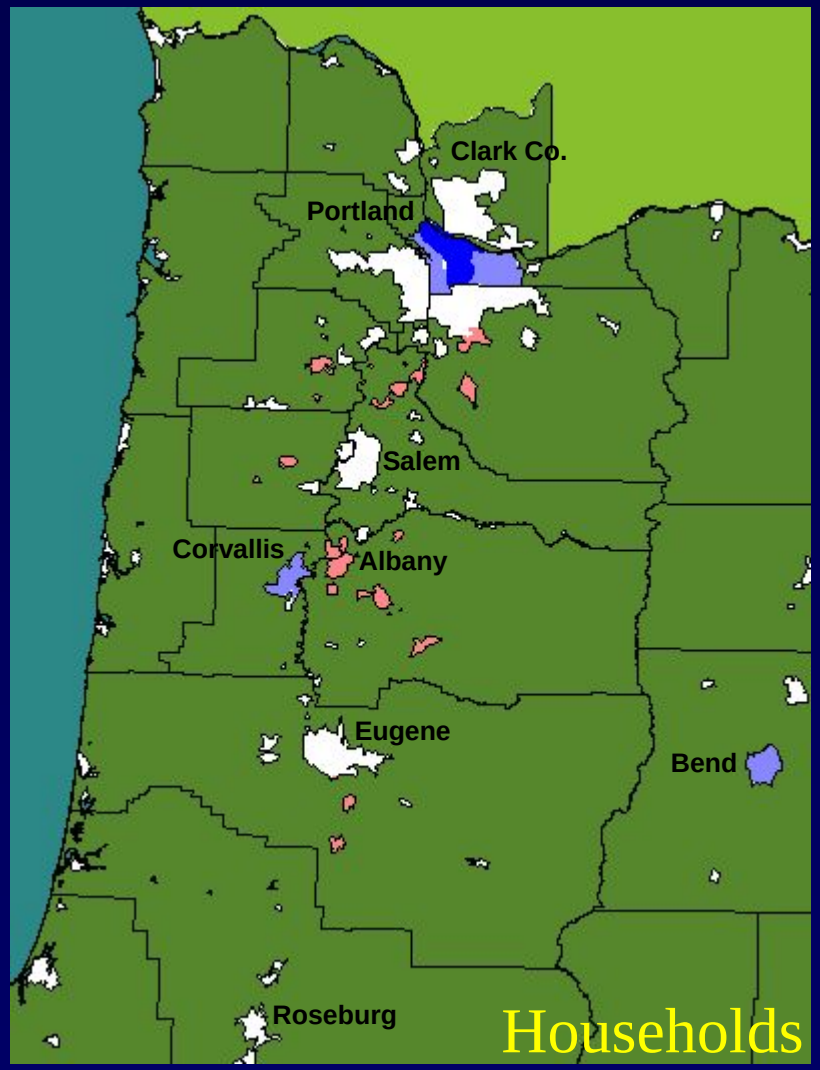
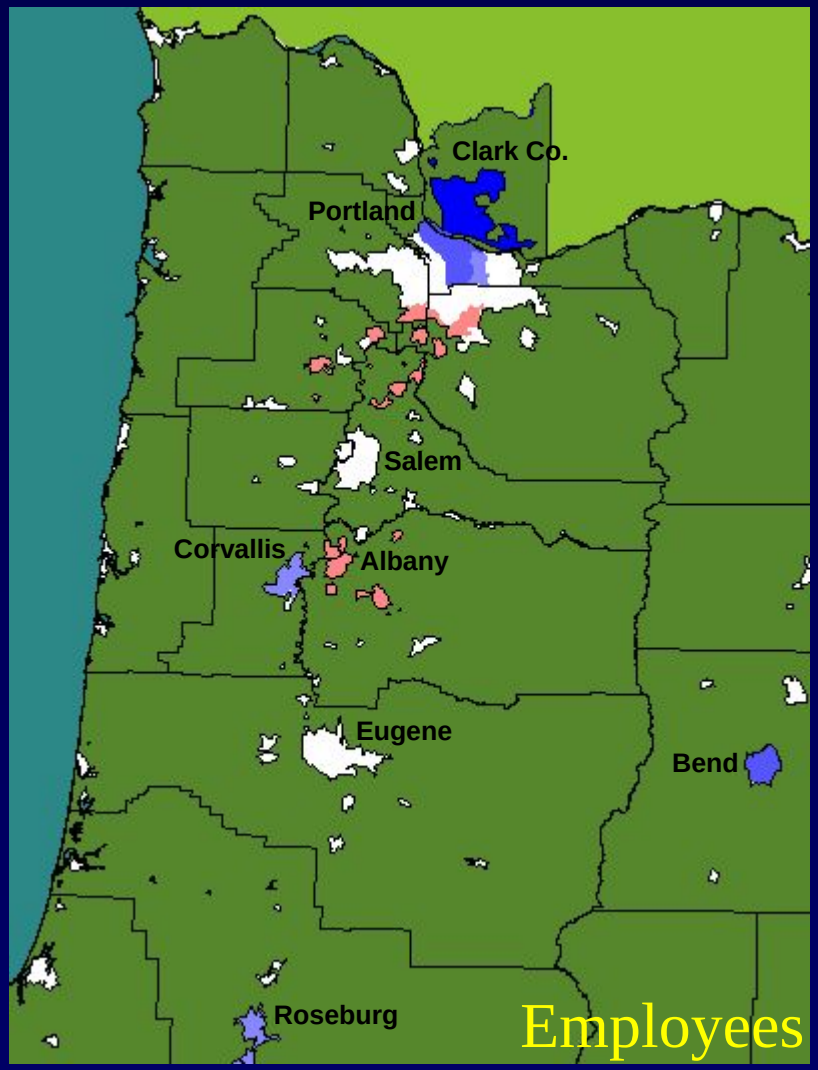


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2030 Historic/TDM Differences



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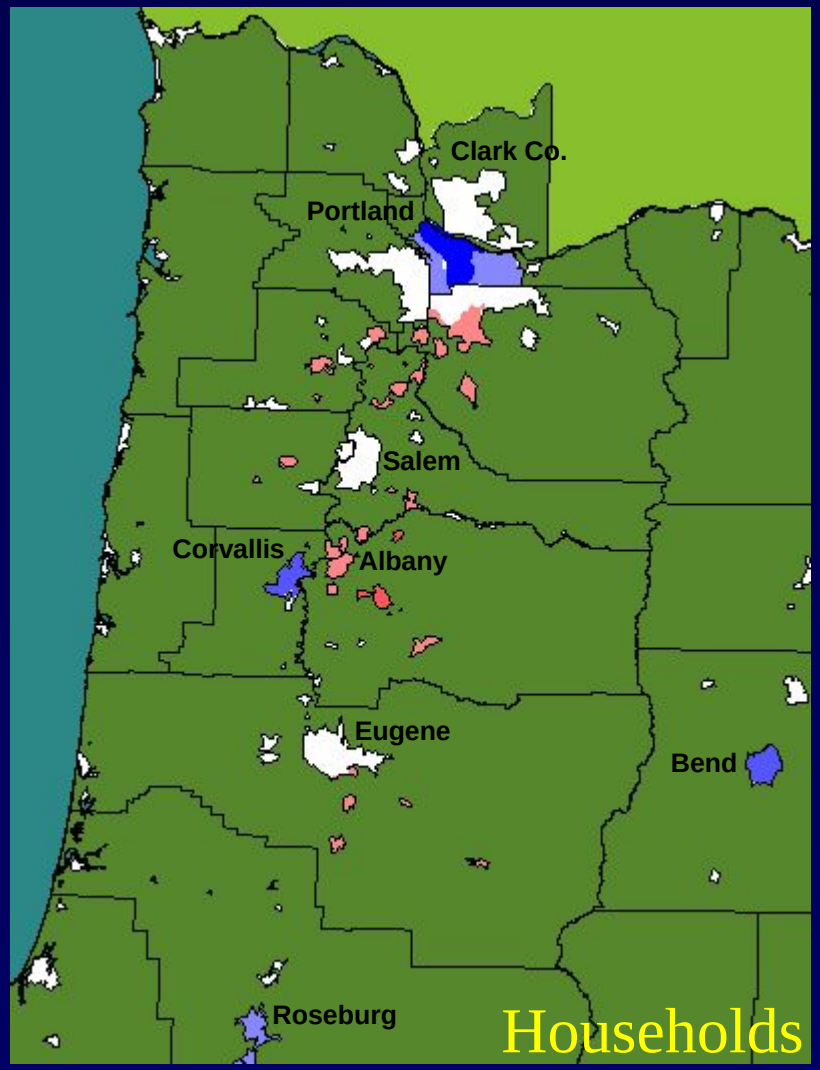
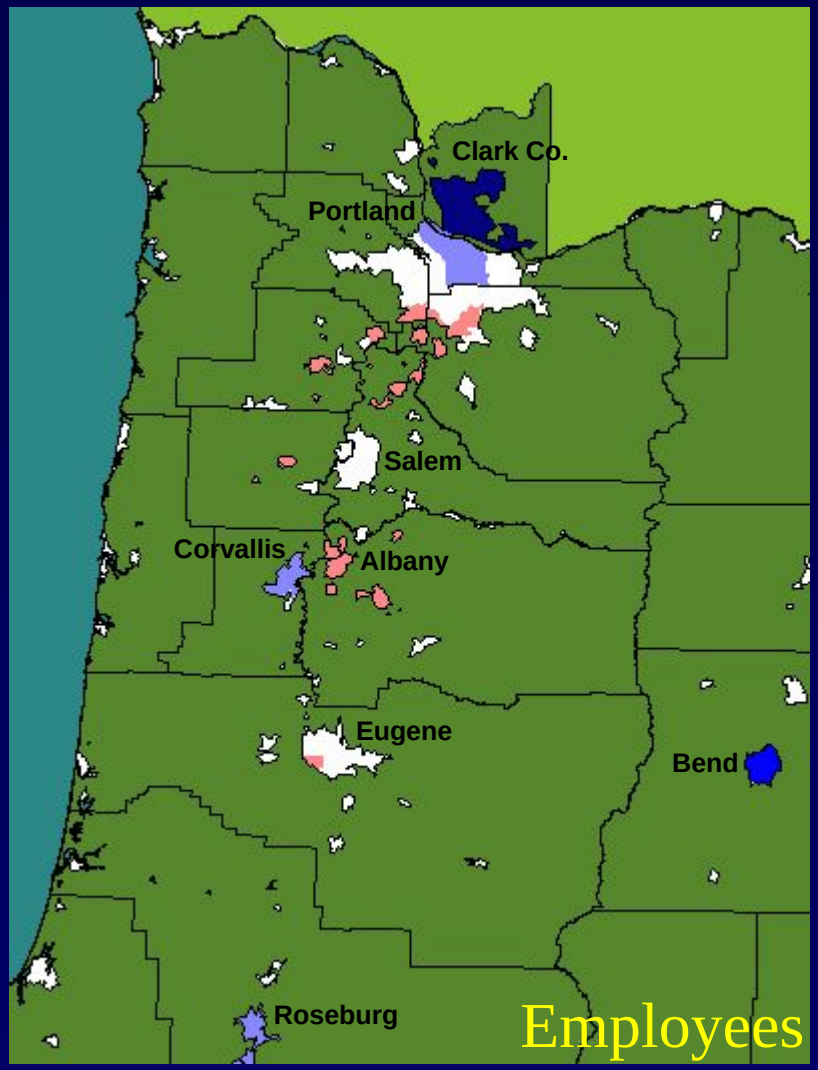


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2035 Historic/TDM Differences



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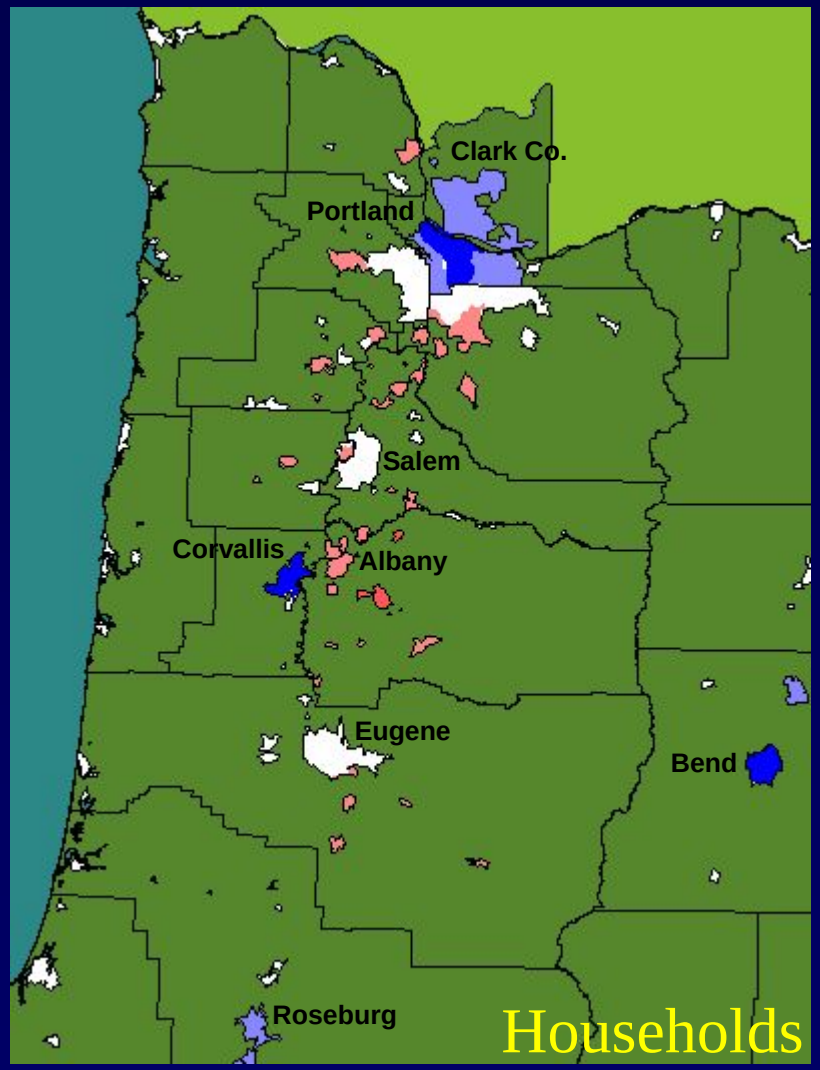
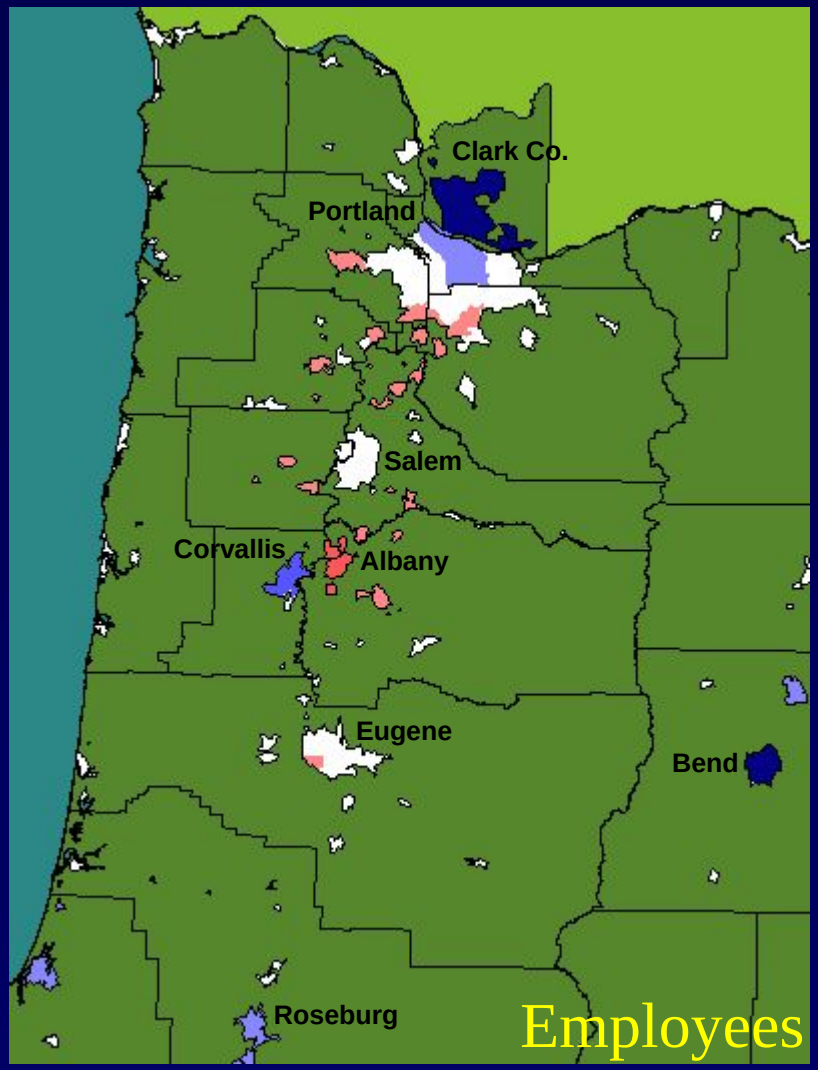


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2040 Historic/TDM Differences



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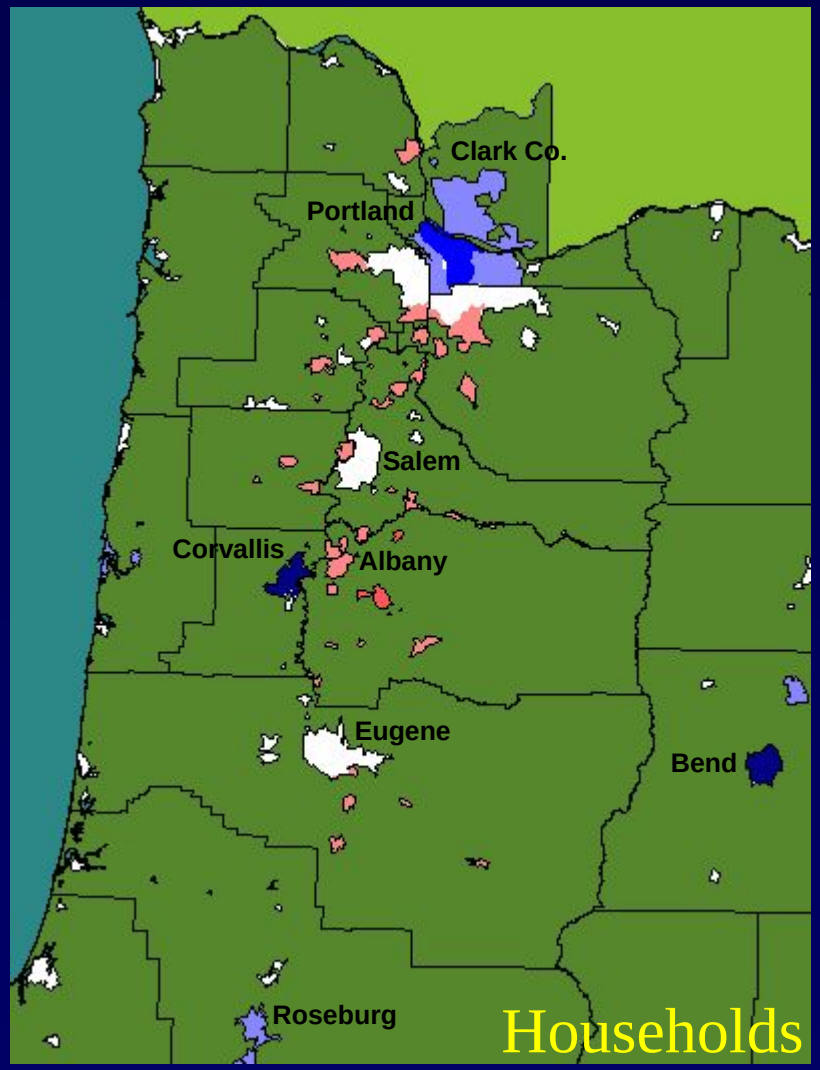
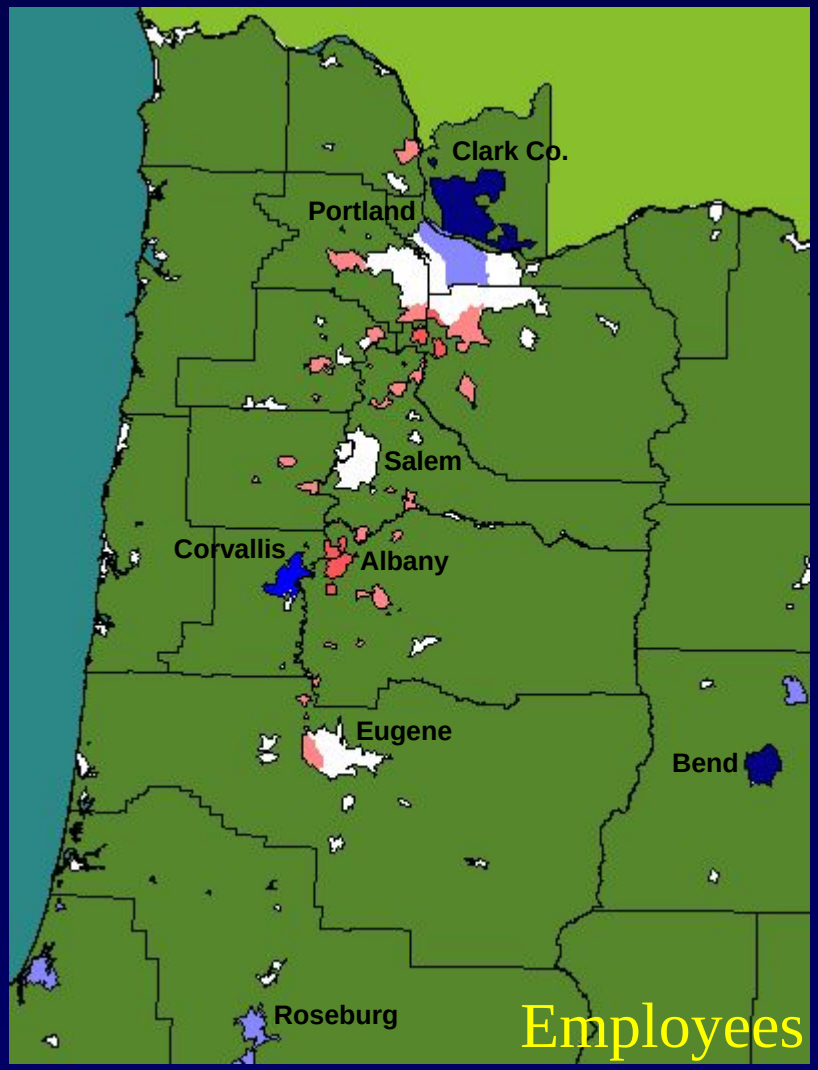


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2045 Historic/TDM Differences



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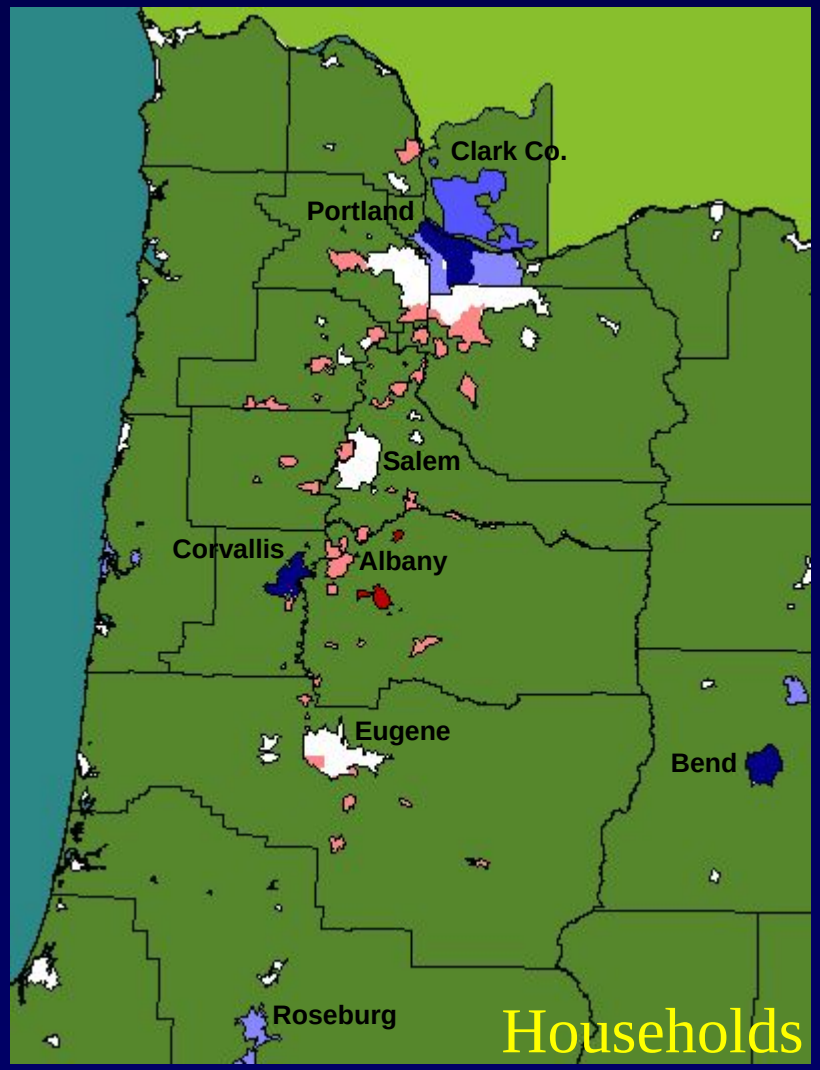
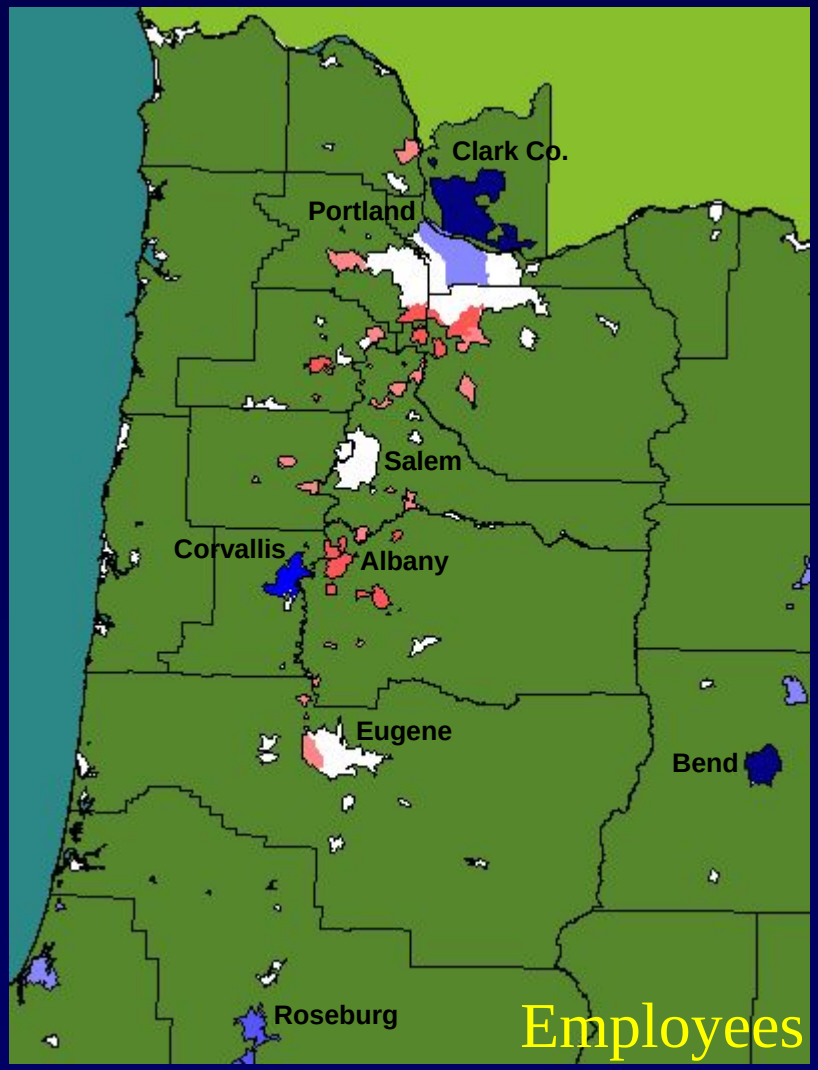


Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM

2050 Historic/TDM Differences



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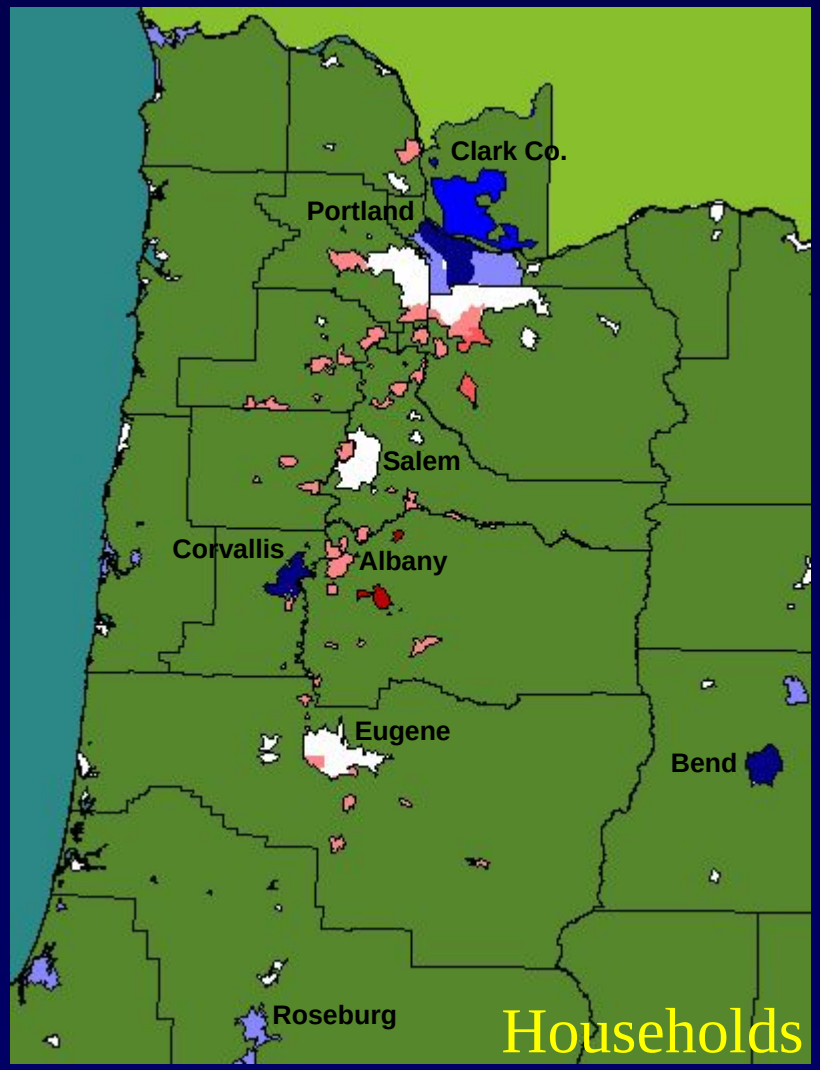

Region Emp | Region HHs | Transport | Maps

Scenarios | HNB | CNB | HHWY | HTDM