Willamette Valley Wet-prairie restoration Model

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What is a Willamette Valley Wet-prairie

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- Native species (Forbes and Graminoids)
- Rare plant species
- Less than 5% woody plant species
- Often dominated by Tufted Hairgrass and found in Oak Savannah
- Seasonally wet
- Inclusions of vernal pools
- High plant diversity
- Flood plain and lower elevation valley terraces
- Hydric soils

Importance of Wet-Prairies

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- Historically covered a large portion of the Willamette Valley
- Habitat for rare and imperiled species
  - i.e. Nelson's Checkermallow, Bradshaw's Lomatium, Willamette Daisy.
- Provide important ecological services
- Impoverished, fragmented, and blinking out of existence
- Templates for ecosystem recovery

Current Status of Wet-Prairie

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- Less than 1% of the 1850 Willamette Valley wet-prairie remains intact today
- Wet-prairie habitat is a priority for restoration by State, Federal, and Non-governmental organizations
- Restoration efforts are currently actively in progress on both private and public lands

Research Questions

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- What areas in the Willamette Valley eco-region provide various levels of suitable opportunities for wet-prairie restoration?
- Are there discernible landscape patterns in the GIS model that show suitable wet-prairie restoration areas?
- Is there a visual correlation between the placement of existing wet-prairie mitigation projects and areas identified as suitable for restoration by the GIS wet-prairie restoration model?
- How many acres in each class does the restoration model identify as suitable for wet prairie restoration?

Methods

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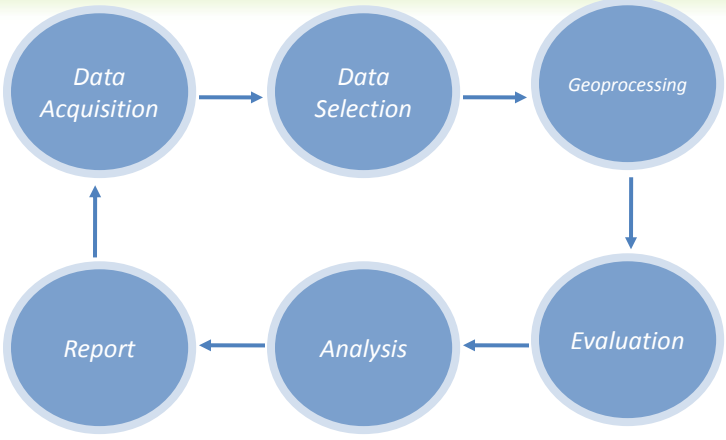

Data Acquisition

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- County Soils
- Rare Plants
- Land Ownership
- Historic Vegetation
- Current Wetlands
- Stream/Rivers
- Flood Plain
- State Line
- Wetlands
- Land Use
- Cites
- Major Highways
- Mitigation Banks
- WV Eco-regions boundary
- Hydrologic Units
- County Borders
- Anadromous Fish
- Wildlife

Data Selection

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Primary Data Layers

- County Soils
- Rare Plants
- Land Ownership
- Historic Vegetation
- Current Wetlands
- Land Use

Secondary Data Layers

- Cites
- Major Highways
- Mitigation Banks
- WV Eco-regions boundary

Geoprocessing

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Standard Protocol Applied to All Data Layers

- "Select by Attribute" to identify records needed for the analysis
- Export to separate feature class
- Union to clip of Willamette Valley Ecoregion
- Add field to attribute table and use field calculator to assign value "0" or "1"
- Polygon-to-Raster Conversion
- Reclassify

Geoprocessing - Hydric Soils

Geoprocessing

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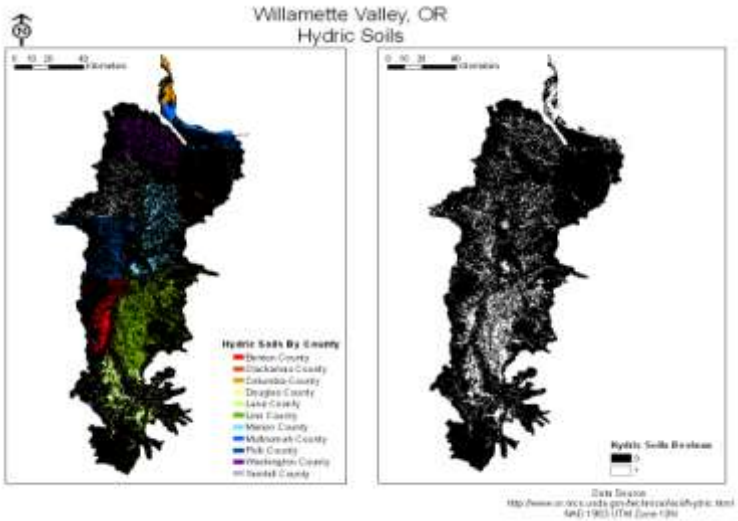
Final Overlay



Geoprocessing
Current Wetlands

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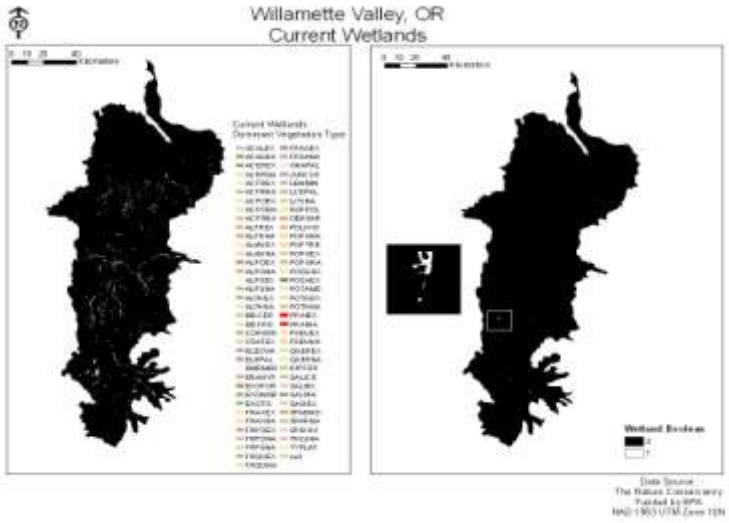

Geoprocessing
Historic Vegetation

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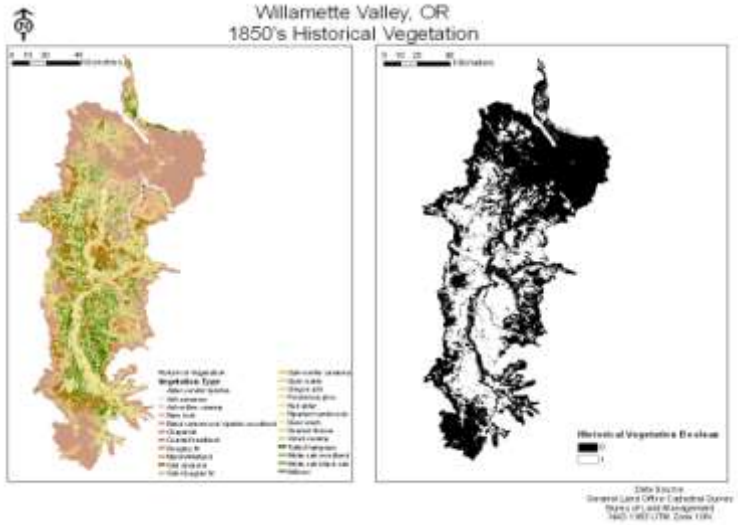

GEOPROCESSING
RARE PLANTS

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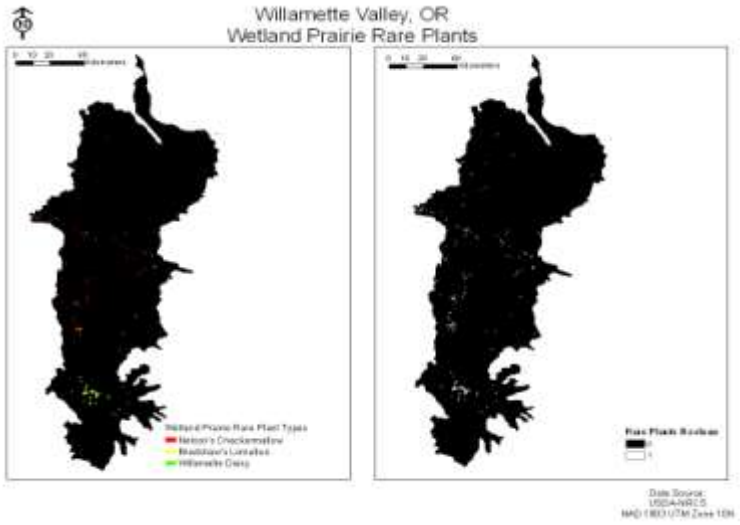

GEOPROCESSING
LAND USE

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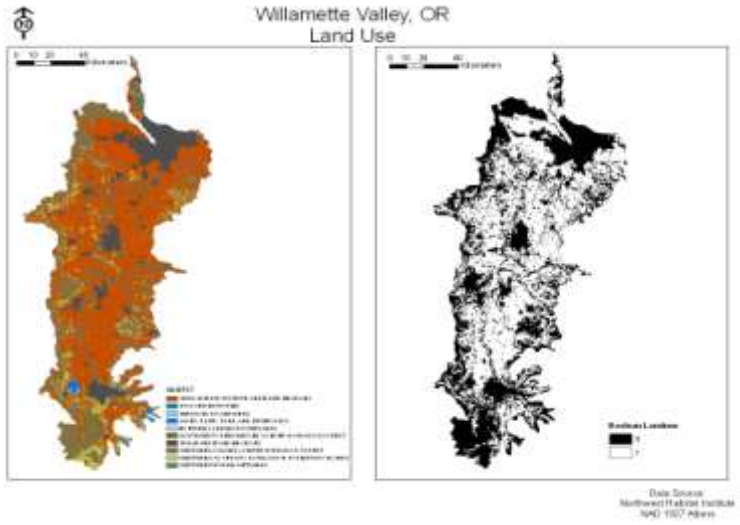

GEOPROCESSING
LAND OWNERSHIP

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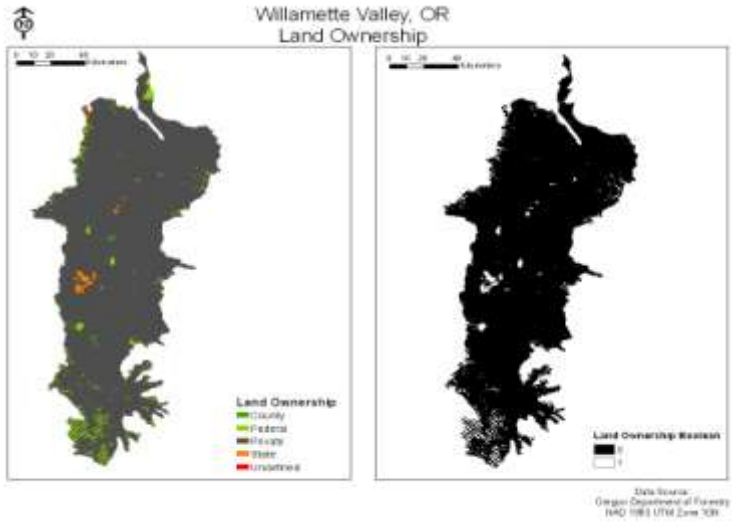

FINAL GEOPROCESSING STEPS

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- "Weighted Sum", Add all six layers
- Assign weights of each layers
- Select "SUM" as weighting measurement
- Use "Times" function to remove cities and highways from model analysis
- Reclassify Raster
- Using Field calculator in the attribute table we generated acres field for number of acres per class
- Convert Raster to Vector in order to perform analyses

Assigning Priority

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Layer Name	Weighted Value
Ownership	1
Land Use	2
Hydric Soils	3
Rare Plant Species	4
Historic Vegetation	4
Current Wetlands	5

Final Overlay

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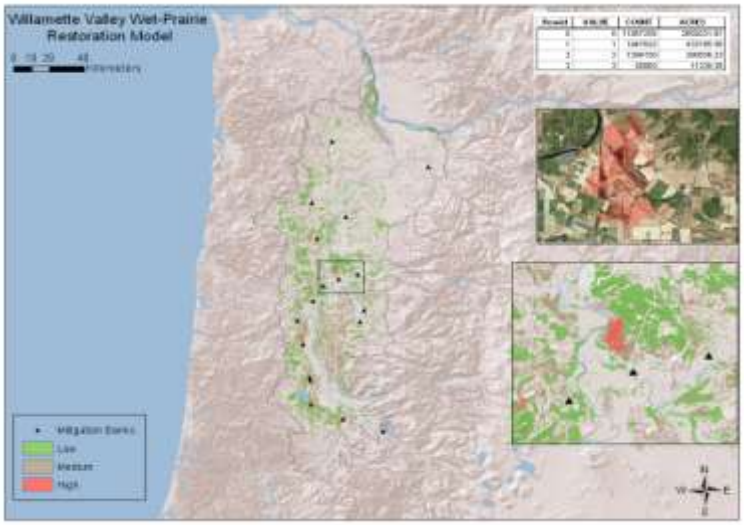

Analysis
Hot Spot Getis-Ord

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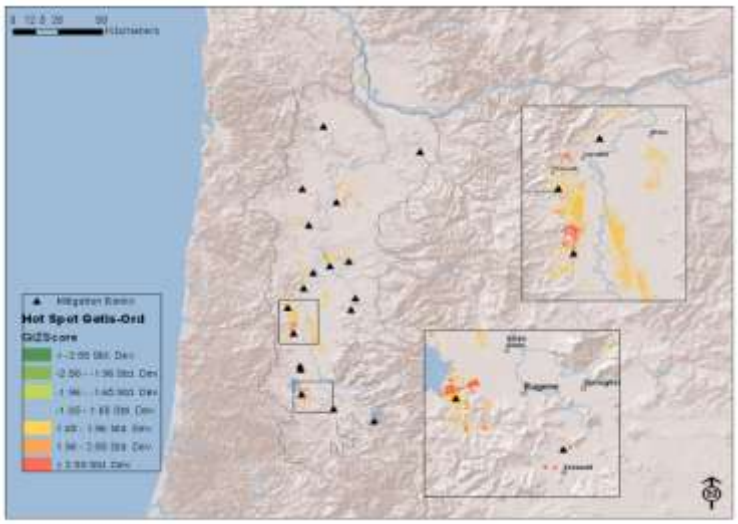

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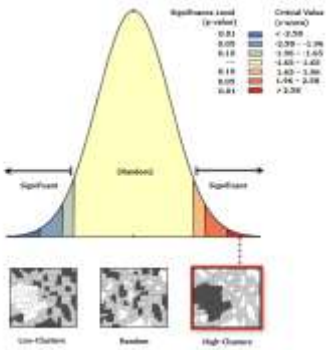
High-Low Clustering Report (Getis-Ord General G)

General G Summary	
Observed General G:	0.000006
Expected General G:	0.000004
Variance:	0.000000
z-score:	108.658518
p-value:	0.000000



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Cluster and Outlier Morans I

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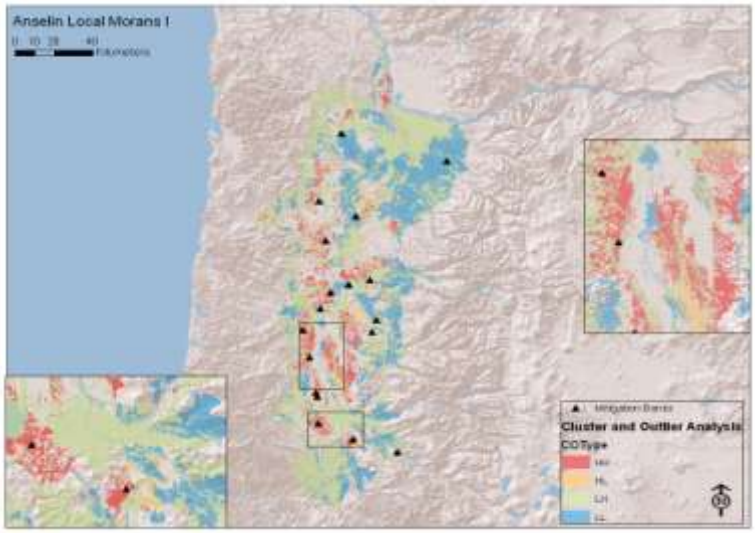

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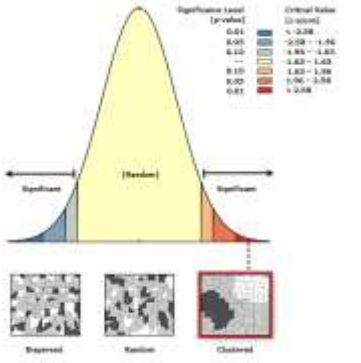
Spatial Autocorrelation Report (Morans I)

Moran's Index:	0.156152
Expected Index:	-0.000009
Variance:	0.000000
z-score:	483.637900
p-value:	0.000000



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- **What areas in the Willamette Valley eco-region provide various levels of suitable opportunities for wet-prairie restoration?**

  Mid to Southern Valley

- Are there discernible landscape patterns in the GIS model that show suitable wet-prairie restoration areas?
- Is there a visual correlation between the placement of existing wet-prairie mitigation projects and areas identified as suitable for restoration by the GIS wet-prairie restoration model?
- How many acres in each class does the restoration model identify as suitable for wet prairie restoration?

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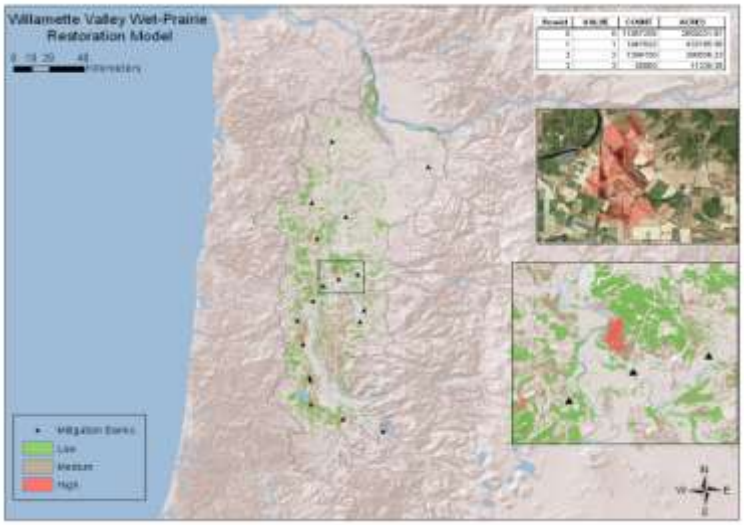

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- What areas in the Willamette Valley eco-region provide various levels of suitable opportunities for wet-prairie restoration?
- **Are there discernible landscape patterns in the GIS model that show suitable wet-prairie restoration areas?**

  Yes. Clustering and hot spot analysis showed these patterns.
- Is there a visual correlation between the placement of existing wet-prairie mitigation projects and areas identified as suitable for restoration by the GIS wet-prairie restoration model?
- How many acres in each class does the restoration model identify as suitable for wet prairie restoration?

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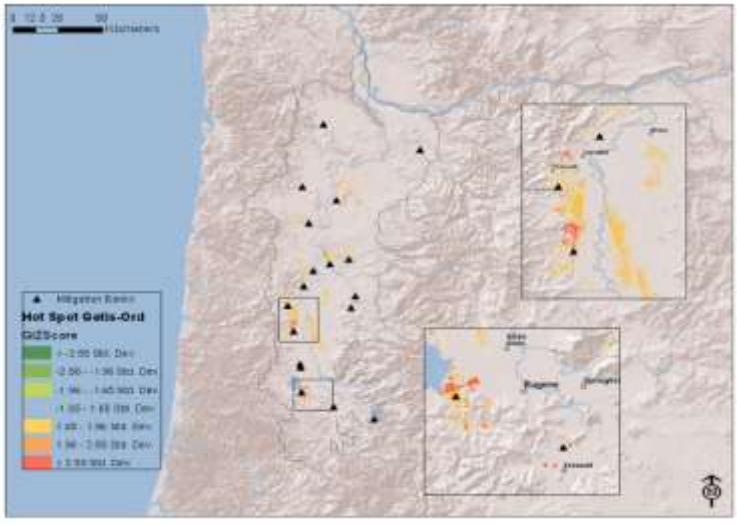

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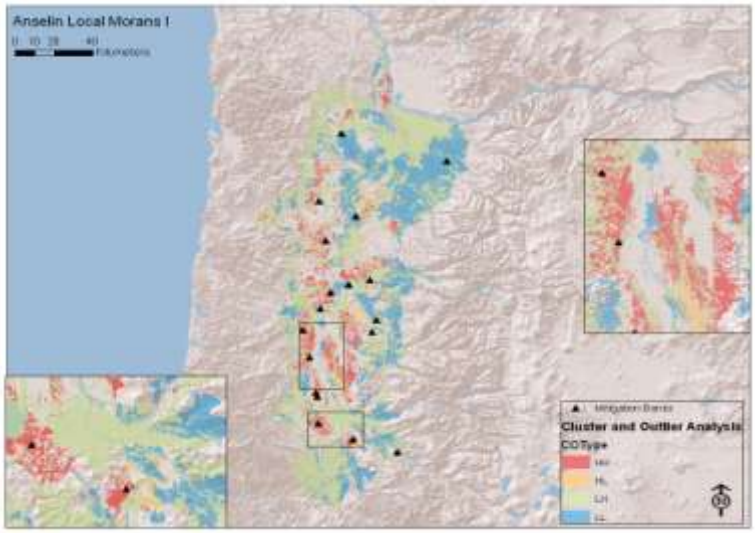

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- Are there discernible landscape patterns in the GIS model that show suitable wet-prairie restoration areas?
- **Is there a visual correlation between the placement of existing wet-prairie mitigation projects and areas identified as suitable for restoration by the GIS wet-prairie restoration model?**

  Yes. Mitigation banks appeared to be visually correlated.
- How many acres in each class does the restoration model identify as suitable for wet prairie restoration?

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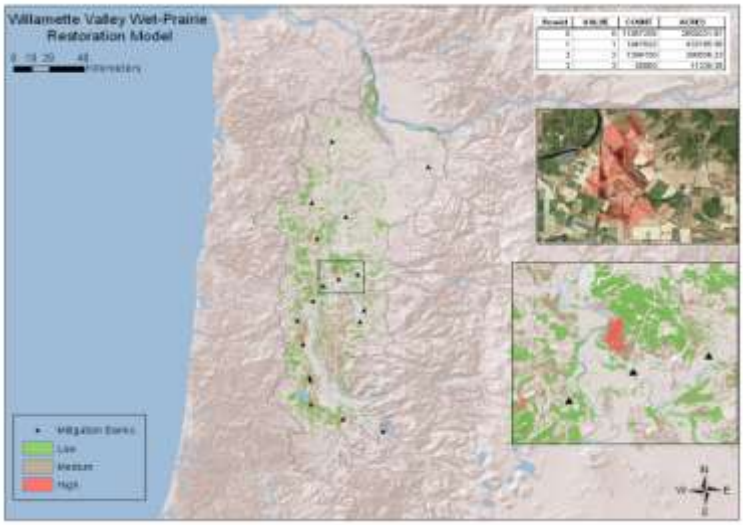

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- **How many acres in each class does the restoration model identify as suitable for wet prairie restoration?**

  734,560 acres in the top three classes.

Future Directions

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- Conduct a formal aerial photo investigation to eliminate unsuitable areas
- Develop a methodology to validate model though field observations
- Perform a random sampling of visits to potential sites indicated by the analysis
- Add flood plain layer to analysis
- Select a fourth field hydrologic unit to do a more detailed analysis of how well the model performs

QUESTIONS ?

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Sources

- City Boundaries - Geographic Information Services Unit, Oregon Department of Transportation (ODOT);
- Highways – Earth Systems Research Institute;
- Land Cover – Northwest Habitat Institute;
- Mitigation Banks – Oregon Office U.S. Fish and Wildlife Service;
- Soils – Natural Resource Conservation Service - http://soildatamart.nrcs.usda.gov/;
- Willamette Valley Ecoregion – World Wildlife Fund;
- Historic Vegetation – Oregon Natural Heritage Program;
- Willamette Valley Wetlands – Oregon Natural Heritage Program; and
- Rare Plants – Oregon Office U.S. Fish and Wildlife Service.