



Land Use Scenario Developer

LUSDR

A Stochastic Microsimulation of Household and Business Location to Support Strategic Land Use and Transportation Planning

Presentation to Oregon Model Users Group
Brian Gregor
Transportation Planning Analysis Unit
June 1, 2006



Presentation Outline

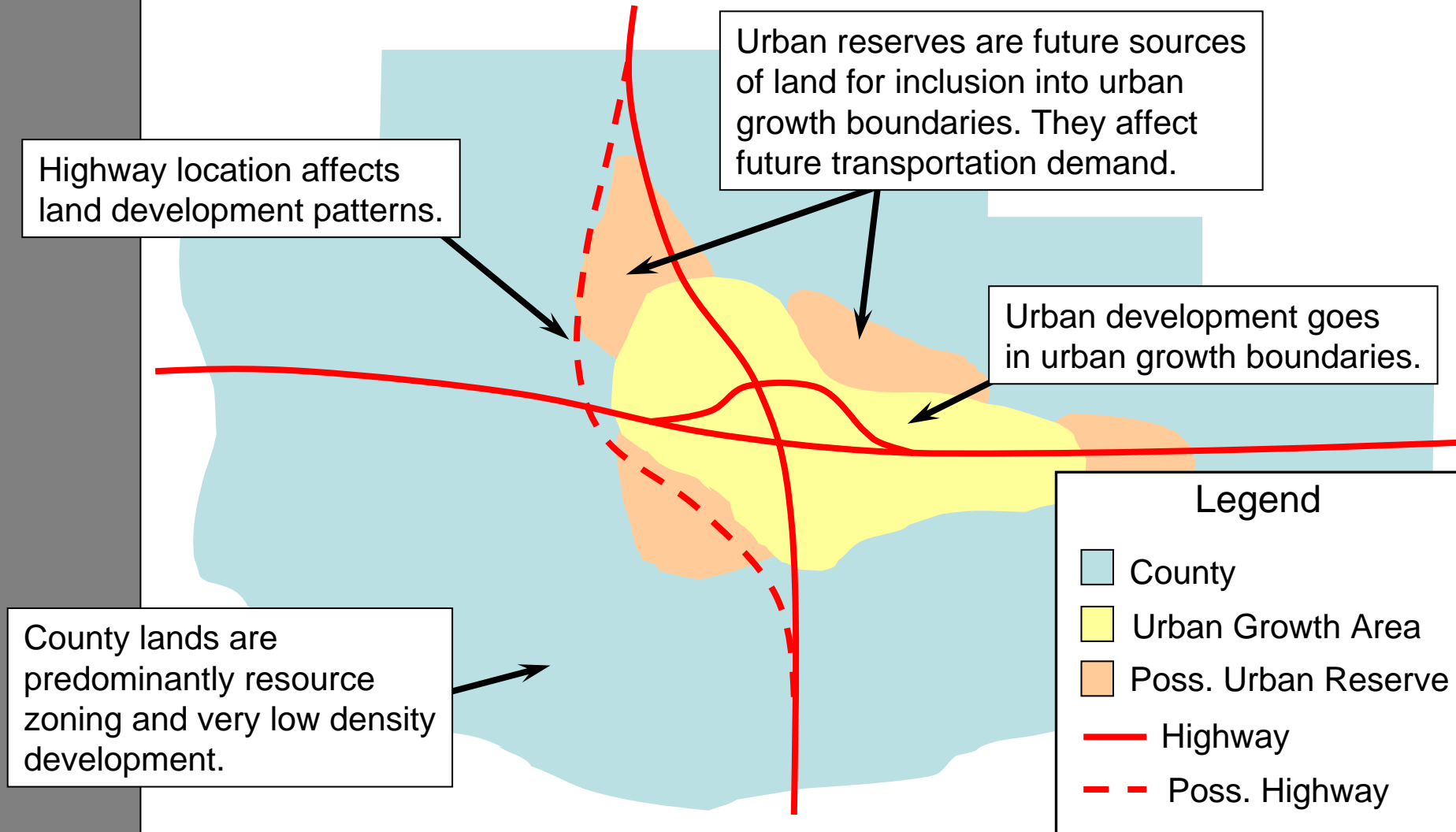
- Background:
 - Planning and modeling concepts related to LUSDR.
 - Description of the Jackson County regional problem solving study.
- Description of LUSDR
- Results
- Next steps



***Short Background on Land Use
and Transportation Planning
and Modeling Concepts***



Land Use and Transportation Planning



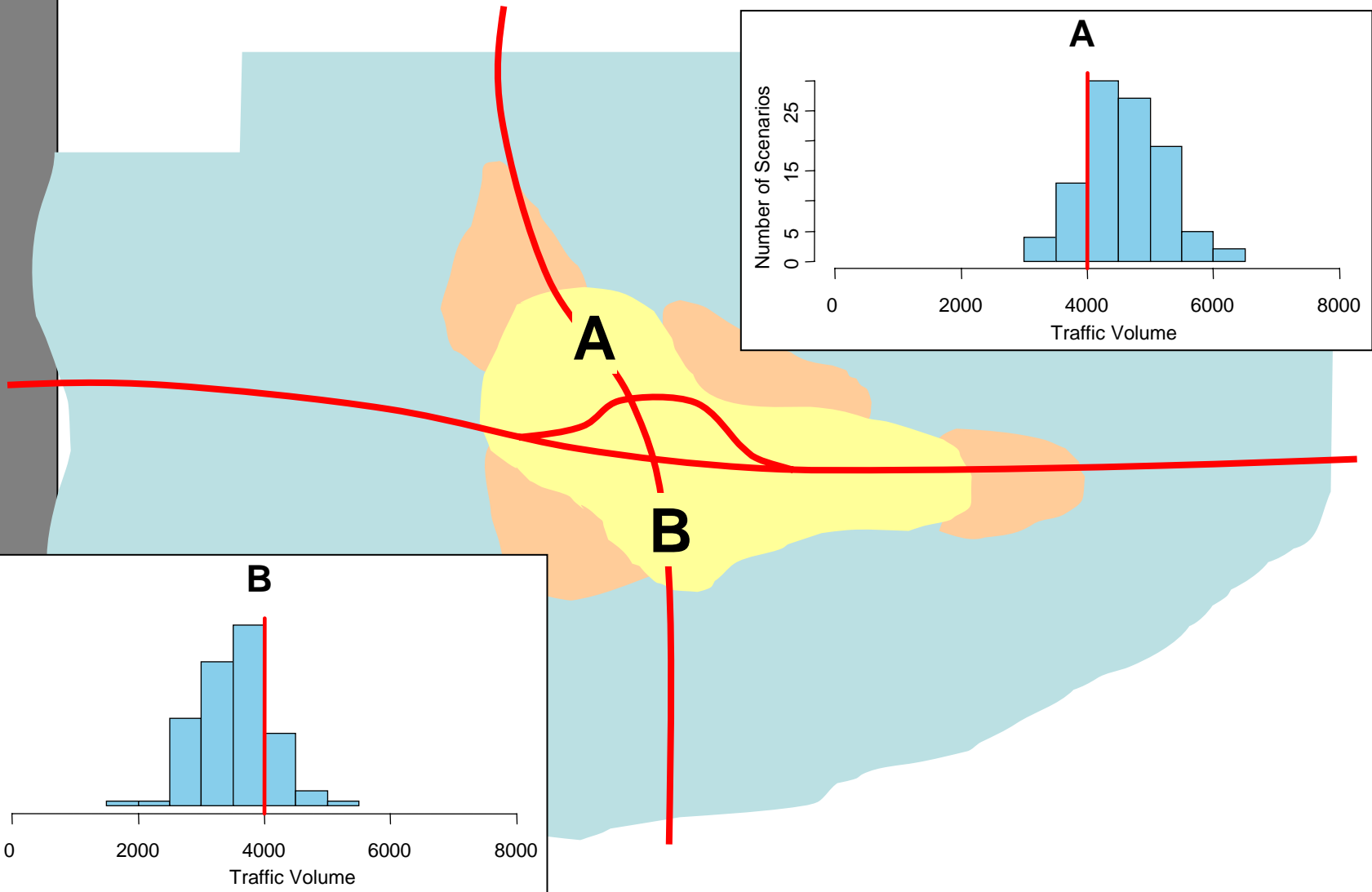


Approaches to Transportation and Land Use Modeling

- Standard transport models assume one invariant land use allocation unresponsive to transportation.
- With integrated land use and transport models, land use allocations vary with transportation, but most are equilibrium models.
- LUSDR also varies land use with transportation, but there are many possible solutions.



Modeling Multiple Scenarios to Assess Risks

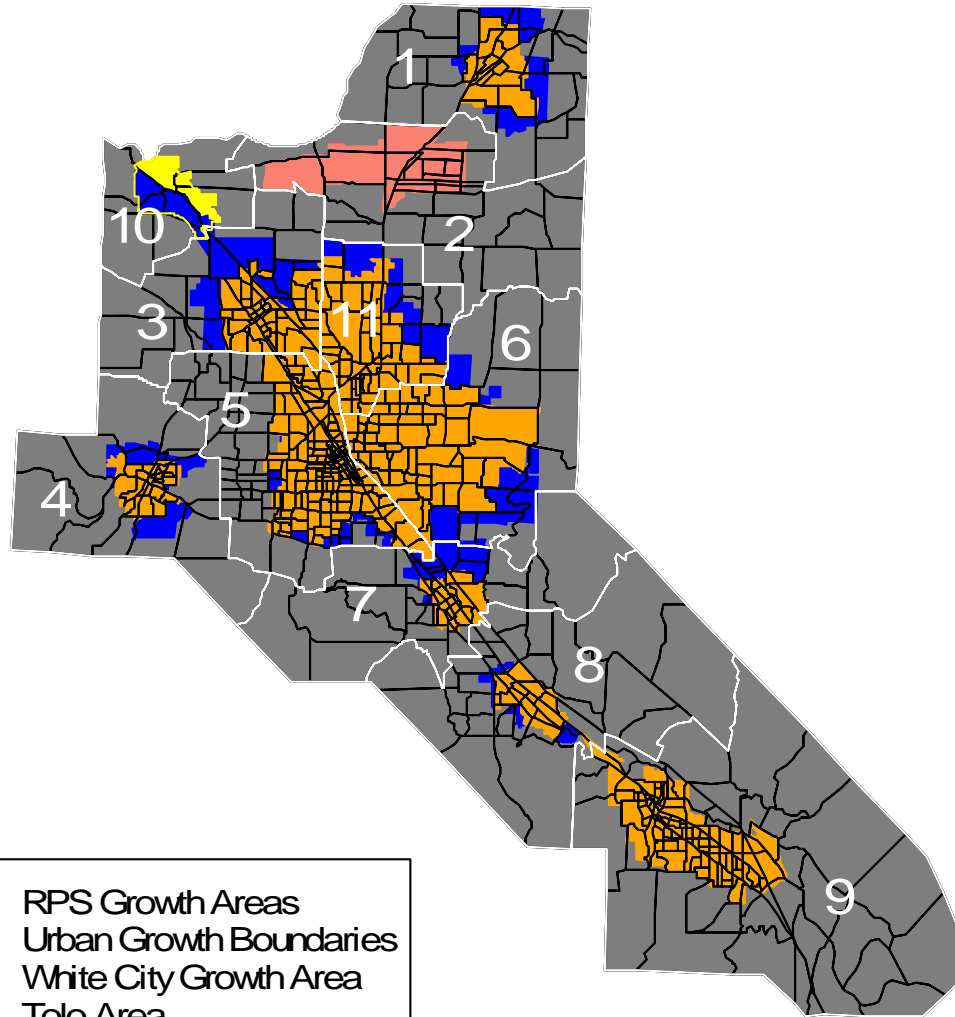




Jackson County Regional Problem Solving (RPS) Study

- Goal of RPS: To achieve regional consensus on where urban reserves should be designated to accommodate a doubling of population.
- Modeling Objectives
 - Develop a moderately large set of plausible future land use patterns.
 - Model the effects of the different land use patterns on the transportation system.
 - Identify key features of land use patterns affecting transportation performance.

Medford MPO Model Area Showing RPS Growth Study Areas

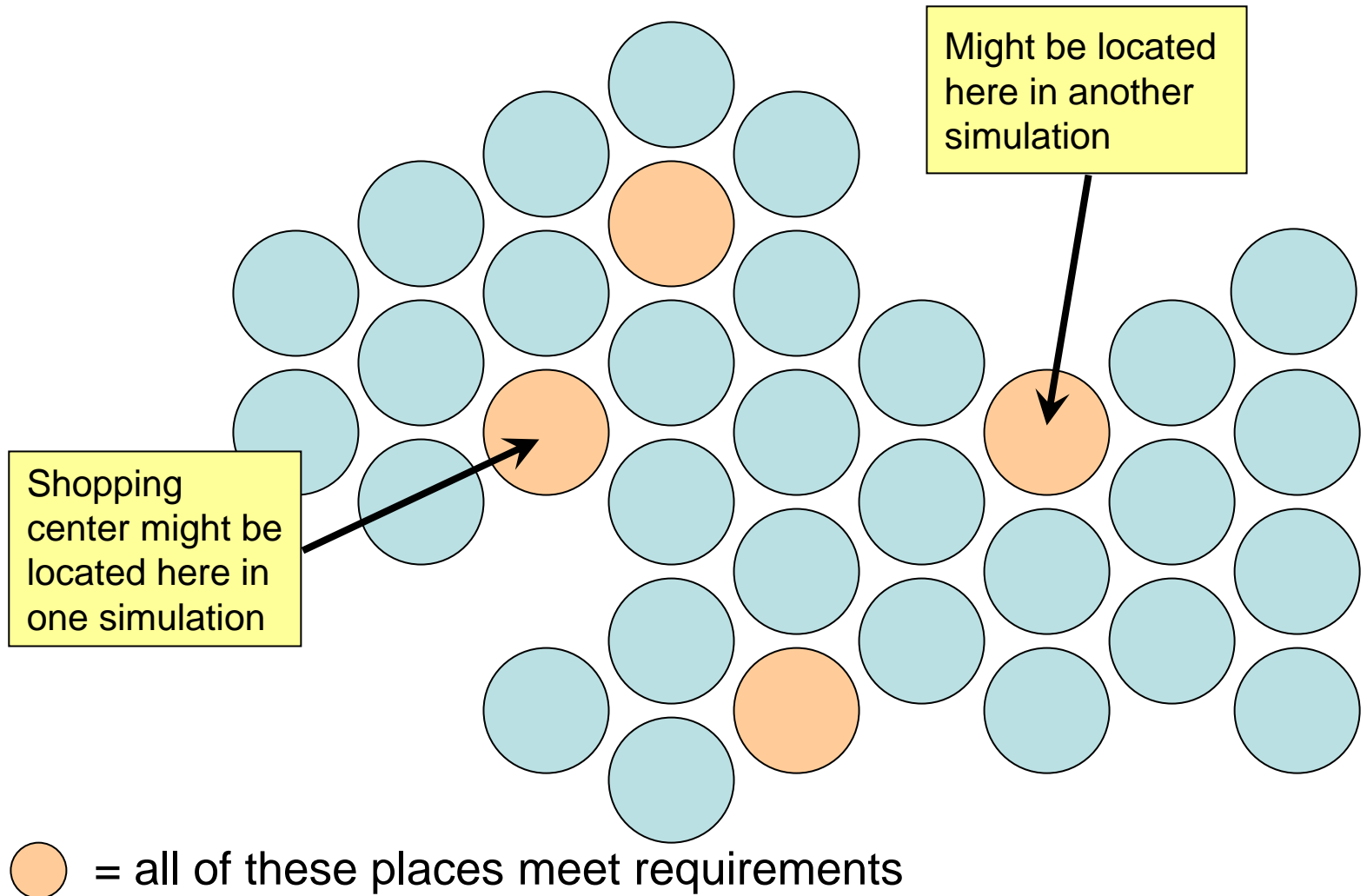


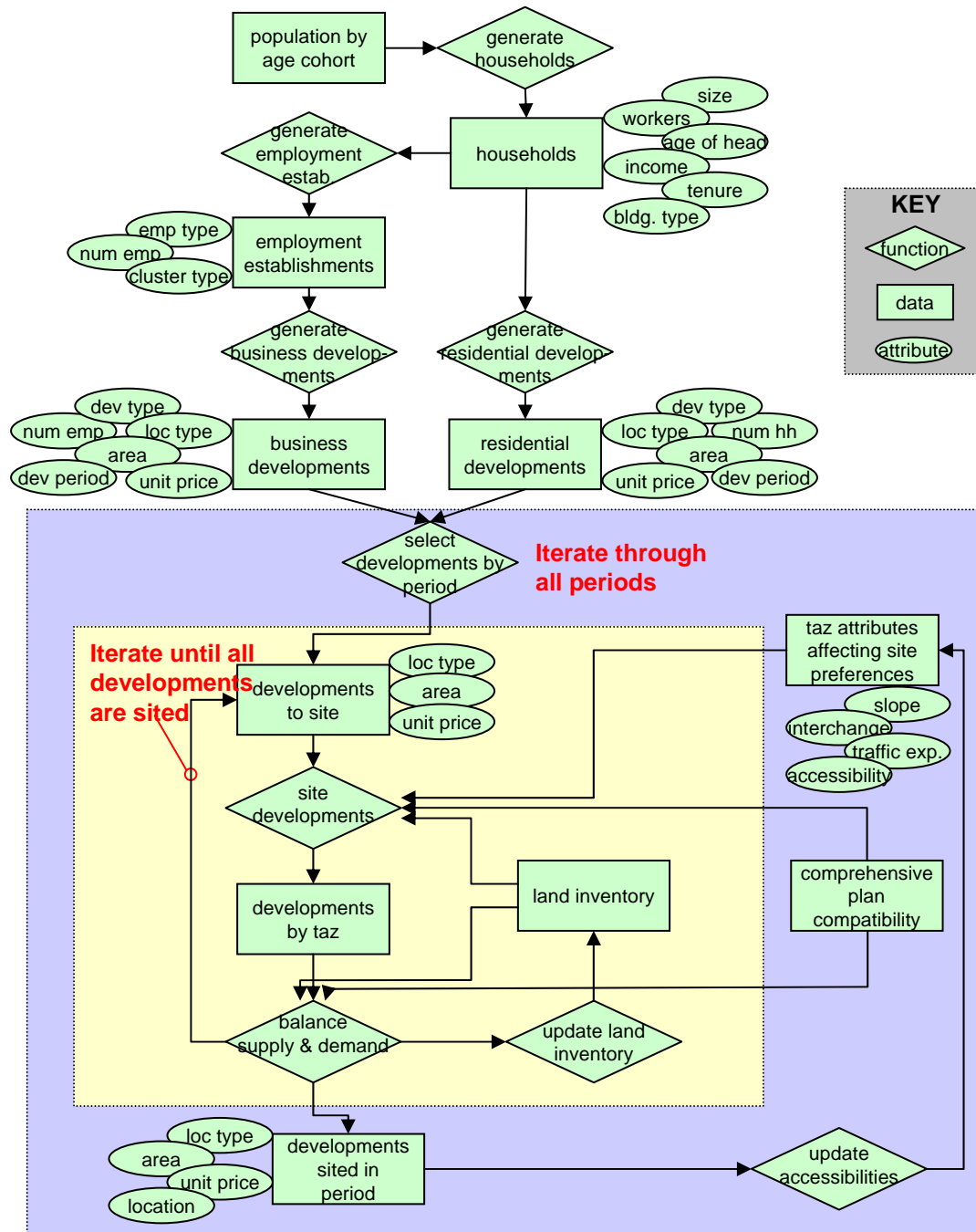


***What is LUSDR and
How Does It Work?***



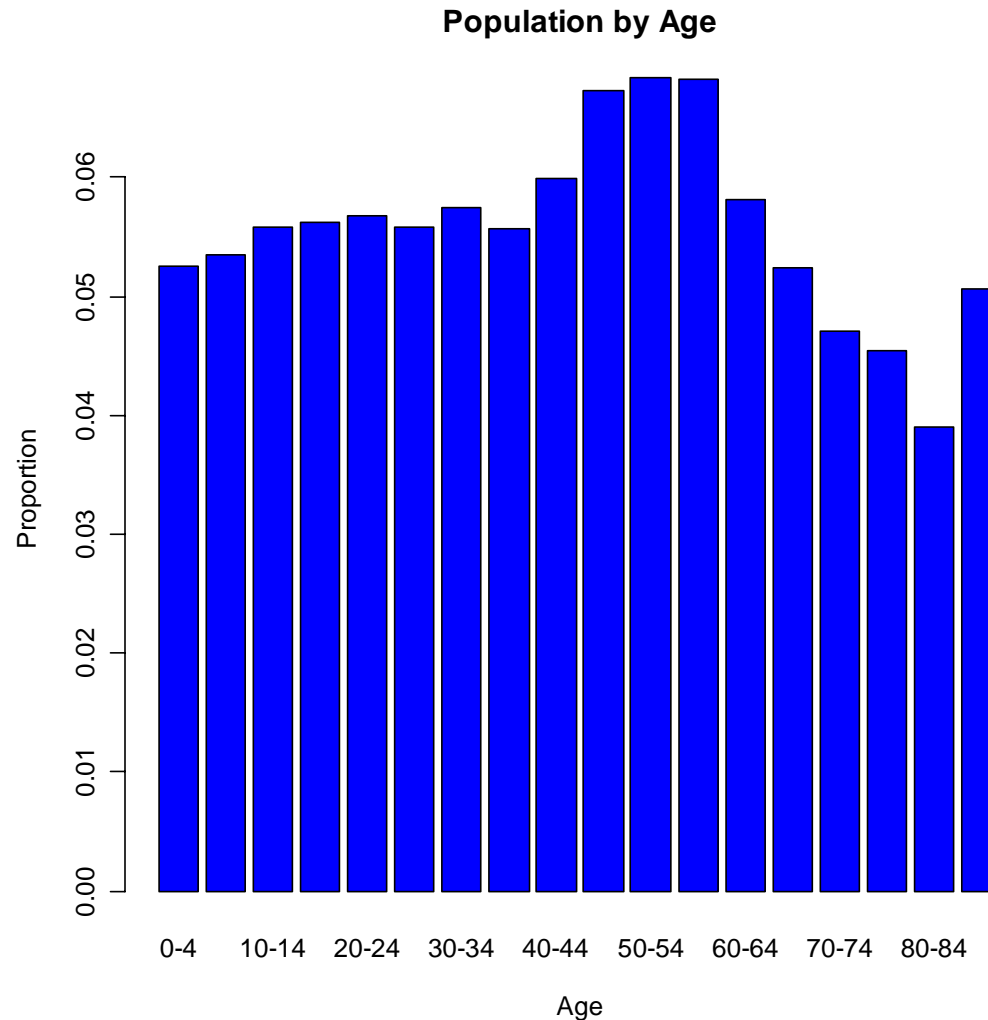
Stochastic Microsimulation







Start with Population by Age & Total Population Growth





Example of Household Records Generated by LUSDR

	HhSi ze	Worker	AgeOfHead	I ncome	Ownrent	Bl dgtype
Hh1	h2	w2	a1	i 4	rent	SFD
Hh2	h2	w1	a4	i 2	rent	SFD
Hh3	h2	w3	a1	i 2	rent	A5P
Hh4	h3	w2	a2	i 3	own	SFD
Hh5	h1	w2	a2	i 1	own	SFD
Hh6	h4	w4	a2	i 5	own	SFD
Hh7	h2	w3	a1	i 3	rent	SFD
Hh8	h2	w1	a2	i 5	own	SFD
Hh9	h2	w3	a3	i 1	rent	SFD
Hh10	h2	w1	a3	i 5	own	SFD
Hh11	h2	w1	a3	i 4	rent	SFA
Hh12	h3	w2	a4	i 4	rent	A24
Hh13	h4	w3	a2	i 4	rent	MH
Hh14	h2	w2	a2	i 2	own	SFD



Comparisons of Observed and Estimated Household Building Type Proportions

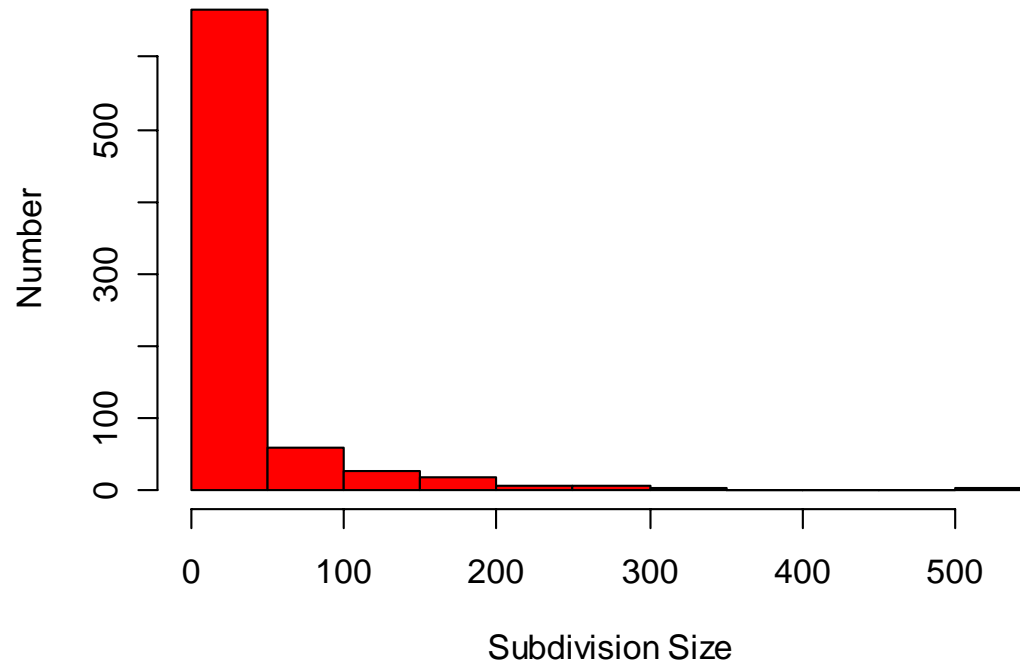
Building Type Categories	1990 Census	1990 Estimated	2000 Census	2000 Estimated
Single Family Detached	63.9	63.7	63.9	63.8
Single Family Attached	2.2	3.1	2.2	3.1
2-4 Unit Apartment	7.6	8.0	8.3	7.7
5+ Unit Apartment	8.0	8.7	9.3	8.6
Mobile Home	17.5	16.0	14.9	16.4
Other	0.8	0.4	0.5	0.4



Assign to Developments

	HhSize	Worker	AgeOfHead	Income	Ownrent	Bldgtype	DevId
Hh1	h1	w1	a1	i5	own	SFDH	SFDH-161
Hh2	h1	w1	a1	i3	own	MHpark	MHpark-1
Hh3	h1	w1	a1	i4	rent	SFDM	SFDM-126
Hh4	h1	w1	a1	i1	rent	SFDM	SFDM-207
Hh5	h1	w1	a1	i2	rent	SFDM	SFDM-758
Hh6	h1	w1	a1	i2	rent	SFDM	SFDM-660

Development Sizes of SFDM Subdivisions



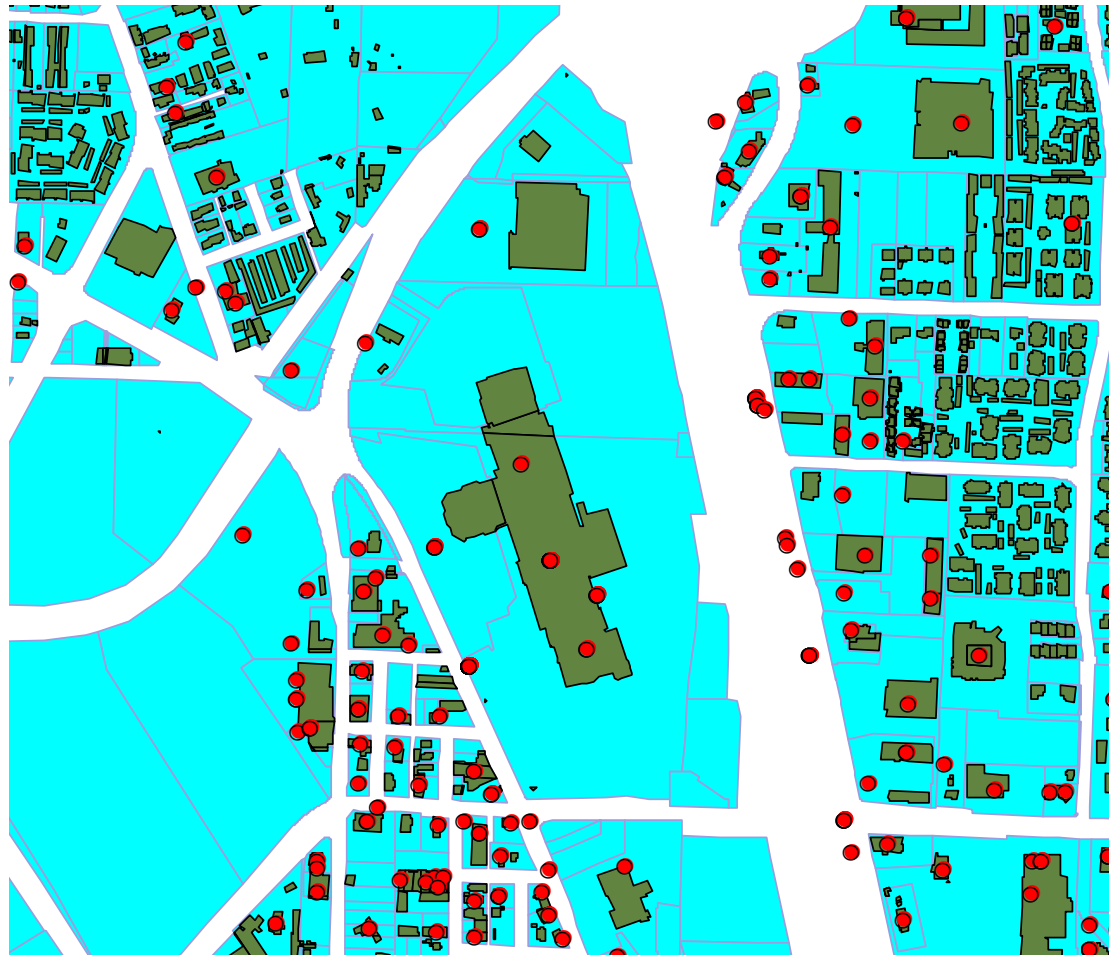


Employment Generated from Households

- Total employment calculated from household workers
- Total split jointly into 2-digit NAICS types and cluster type (see below)
- Employment split into establishments (firms) based on size distributions
- Establishments grouped into clusters based on size distributions



Clusters Identified by Analyzing Tax Assessment, Buildings and Employment Data

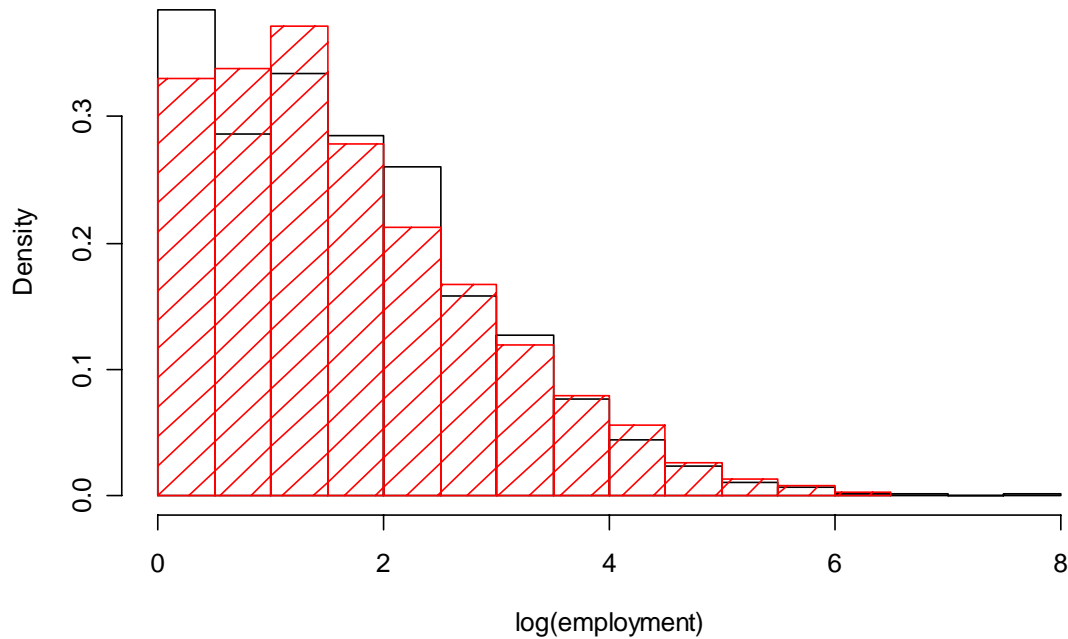


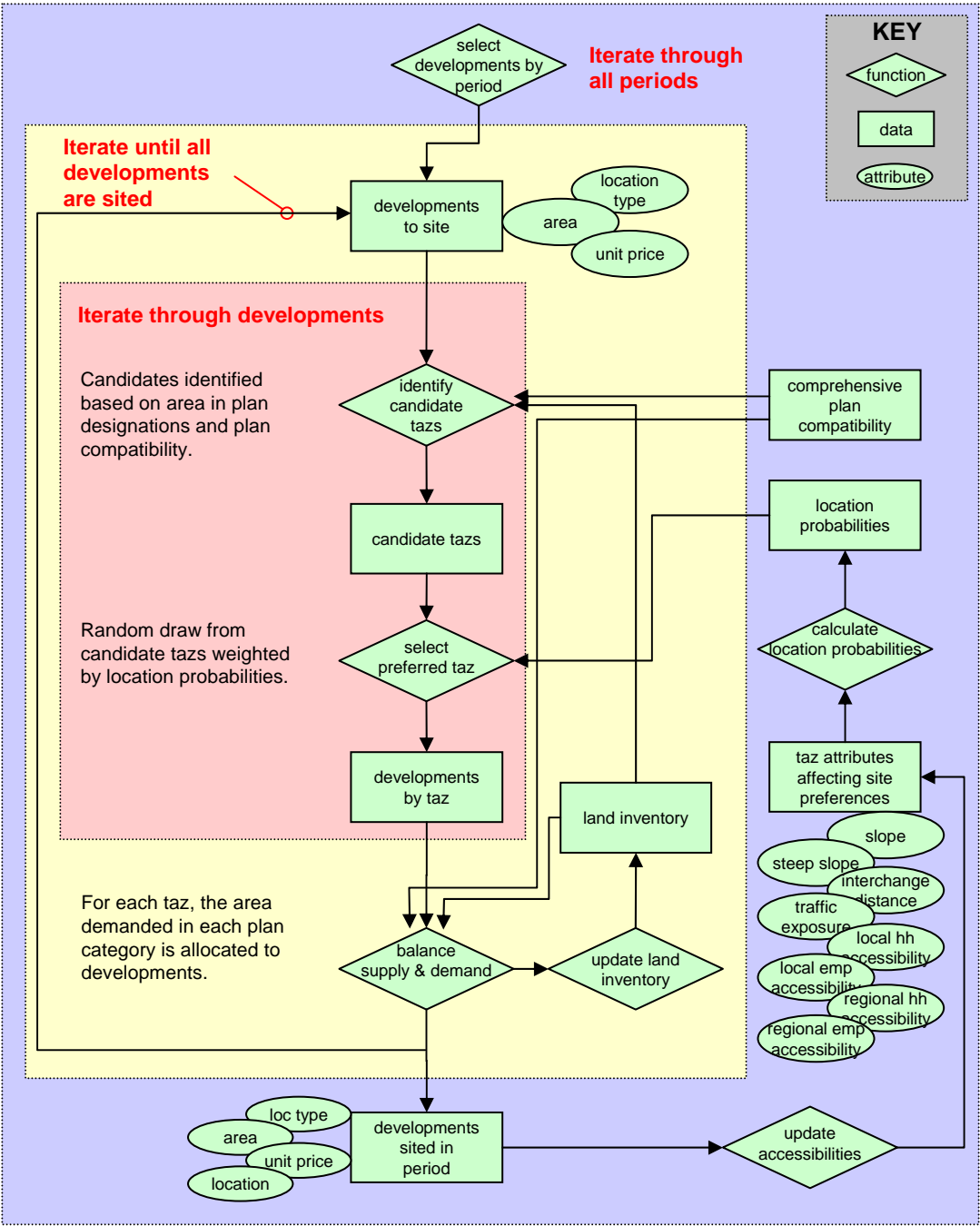


Generate Employment Establishments and Put in Developments

Id	DevType	LocType	NumEmp	UnitArea	TotArea	UnitPrice	Period
ACC-3	ACC	EmpGrp6	3	6256.882	22524.775	9.133772	p4
ACC-1	ACC	EmpGrp6	98	6256.882	735809.323	9.133772	p1
ACC-12	ACC	EmpGrp6	1	6256.882	7508.258	9.133772	p2
ACC-14	ACC	EmpGrp6	2	6256.882	15016.517	9.133772	p4
ACC-8	ACC	EmpGrp6	2	6256.882	15016.517	9.133772	p3
ACC-4	ACC	EmpGrp6	6	6256.882	45049.550	9.133772	p1

Histogram of Observed and Simulated Firm Sizes







Find suitable TAZs based on having enough land with compatible planning categories

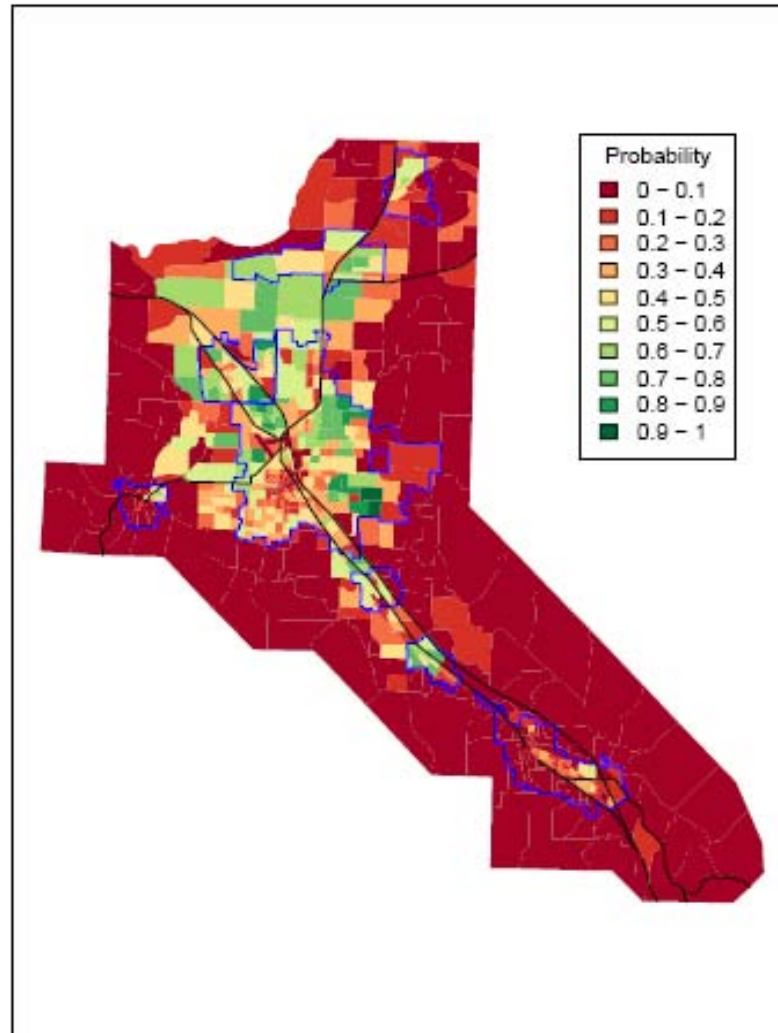
Plan Compatibility Ratings

ModelType	Res	Com	Ind	Os	Rur
A5P	1.00	0.50	0.00	0.0	0.00
SFA	1.00	0.50	0.00	0.0	0.00
MHpark	1.00	0.50	0.20	0.0	0.00
MHsub	1.00	0.50	0.10	0.0	0.01
SFDH	1.00	0.50	0.10	0.0	0.01
SFDM	1.00	0.50	0.10	0.0	0.01
ACC	0.00	1.00	0.25	0.0	0.00
ADM	0.25	1.00	0.25	0.0	0.00
AGF	0.00	0.25	1.00	0.0	1.00
CNS	0.00	0.50	1.00	0.0	0.00
EDU	0.75	0.25	0.00	0.0	0.00
FIN	0.25	1.00	0.25	0.0	0.00
FIN_CLUST	0.25	1.00	0.25	0.0	0.00
HLH	0.30	1.00	0.20	0.0	0.00
HLH_CLUST	0.30	1.00	0.20	0.0	0.00
INF	0.25	1.00	0.25	0.0	0.00
MFG	0.00	0.25	1.00	0.0	0.00
MFG_CLUST	0.00	0.25	1.00	0.0	0.00

ModelType	Res	Com	Ind	Os	Rur
MIN	0.00	0.00	1.00	0.0	1.00
MNG	0.25	1.00	0.25	0.0	0.00
OSV	0.25	1.00	0.25	0.0	0.00
OSV_CLUST	0.25	1.00	0.25	0.0	0.00
PRF	0.25	1.00	0.25	0.0	0.00
PRF_CLUST	0.25	1.00	0.25	0.0	0.00
PUB	0.75	1.00	0.50	0.0	0.00
REC	0.20	1.00	0.00	0.1	0.00
REL	0.00	0.75	0.50	0.0	0.00
RST	0.10	1.00	0.25	0.0	0.00
RST_CLUST	0.10	1.00	0.25	0.0	0.00
RTL	0.25	1.00	0.25	0.0	0.00
RTL_CLUST	0.25	1.00	0.25	0.0	0.00
TRN	0.00	0.50	1.00	0.0	0.00
UTL	0.00	0.50	1.00	0.0	0.00
WHL	0.00	0.25	1.00	0.0	0.00
WHL_CLUST	0.00	0.25	1.00	0.0	0.00



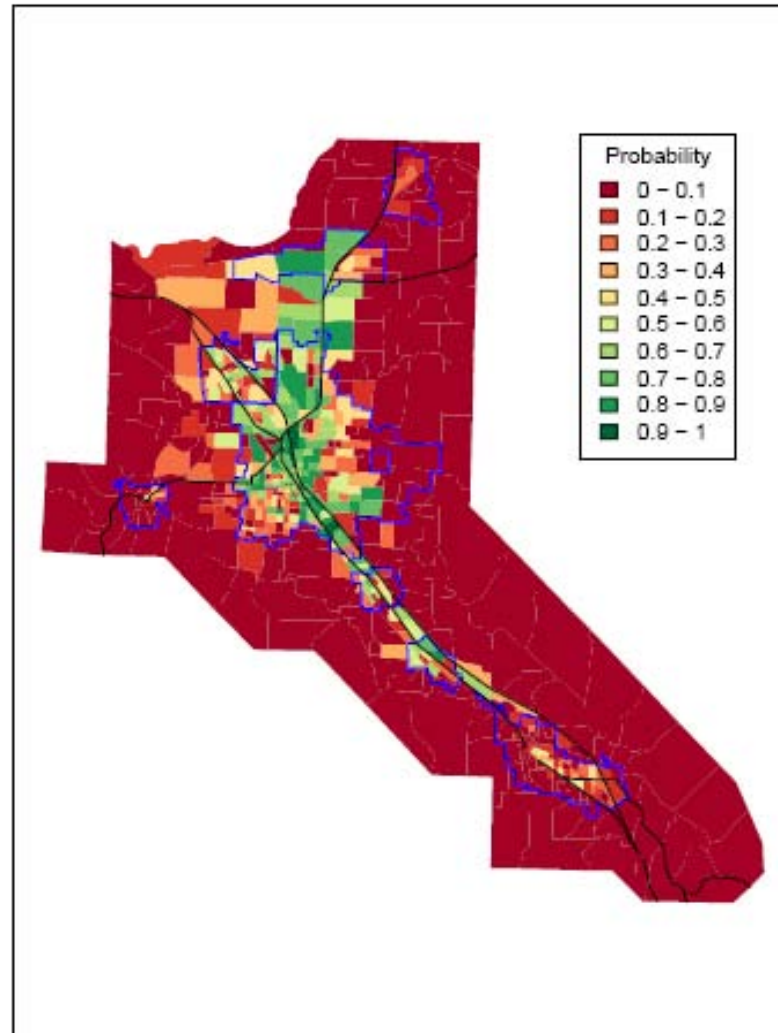
Construction & Manufacturing Preference Probabilities



CNS , MFG



Retail Preference Probabilities



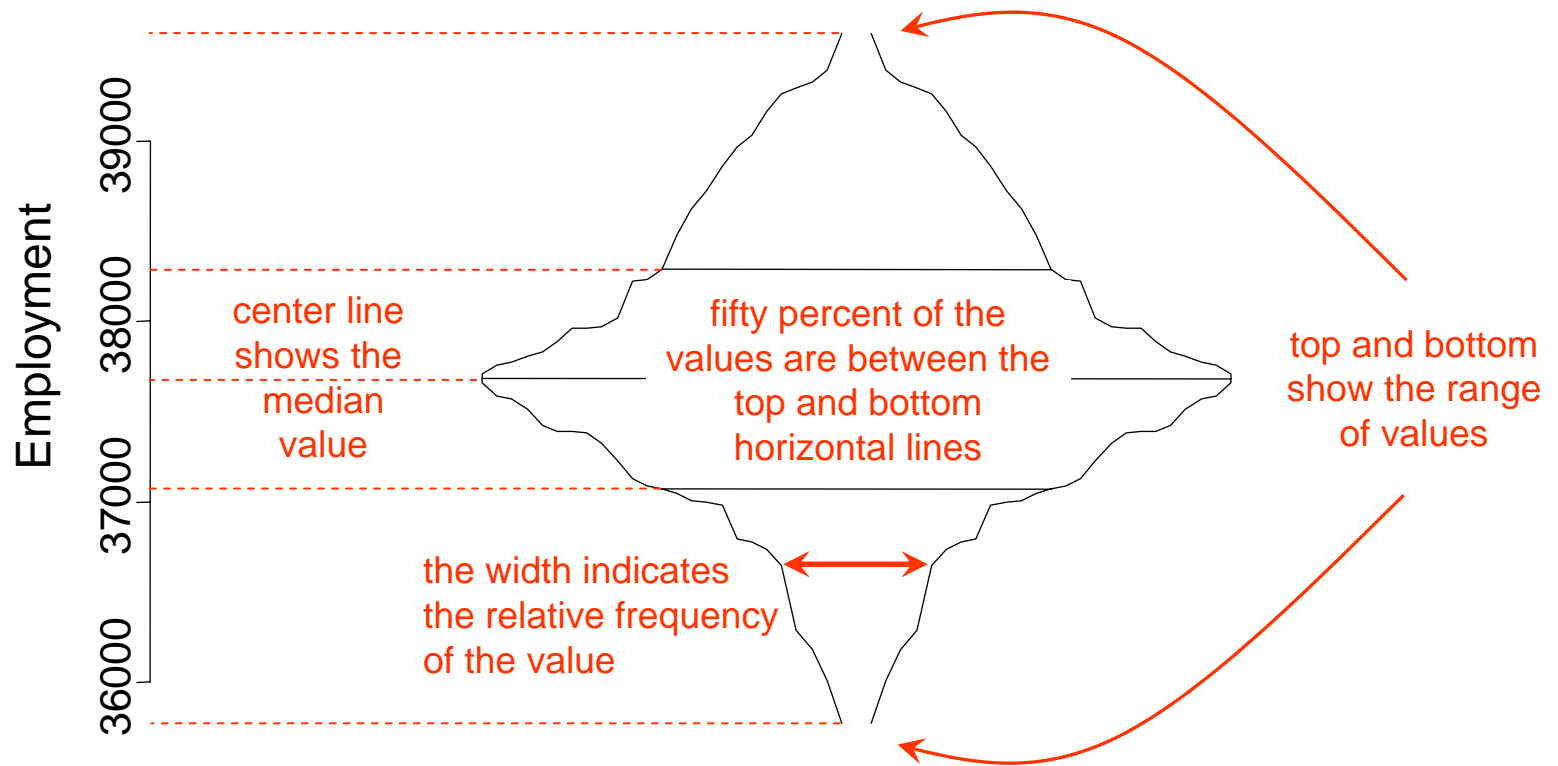
RTL_CLUSTER, ACC, OSV_CLUSTER, RTL, RST, REC



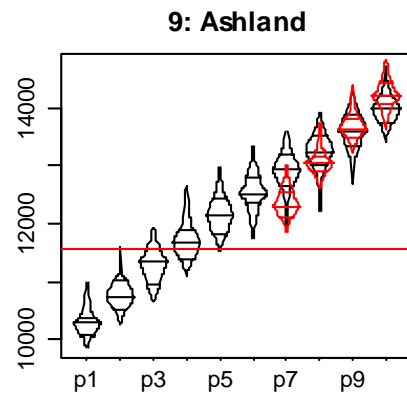
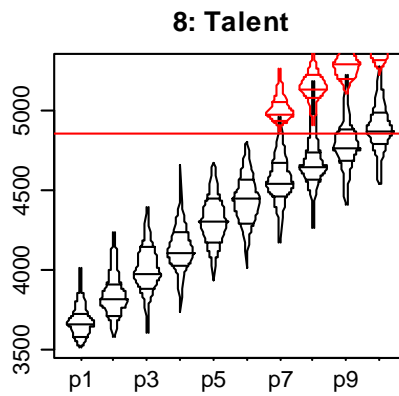
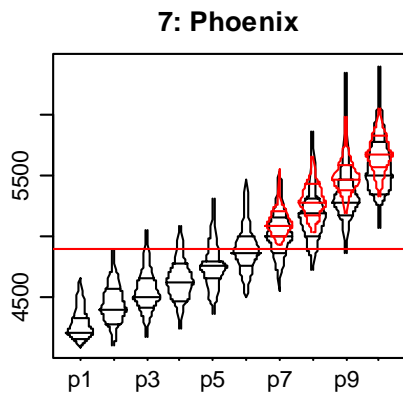
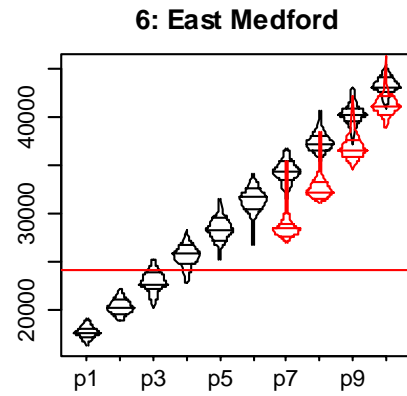
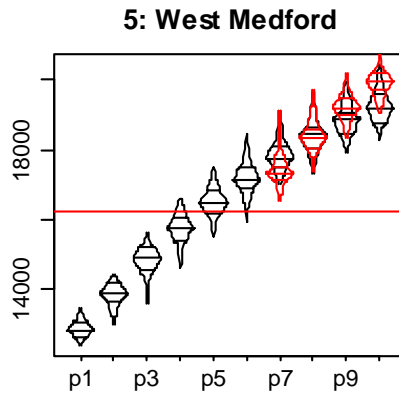
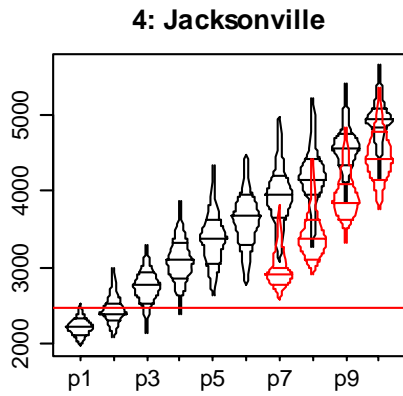
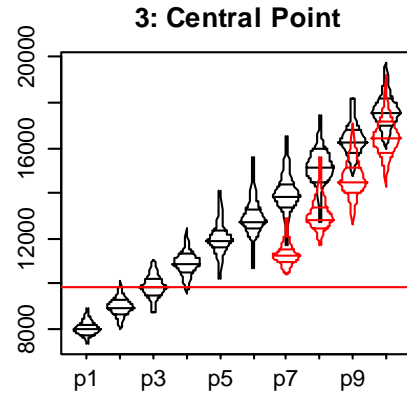
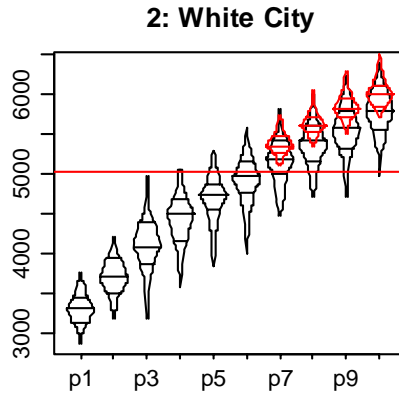
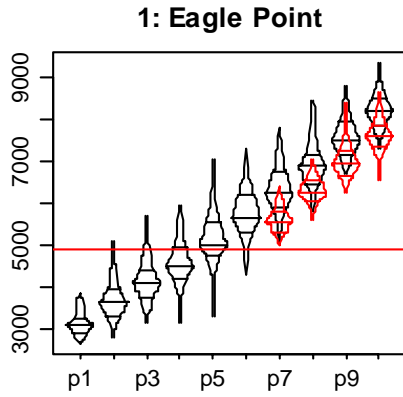
Results



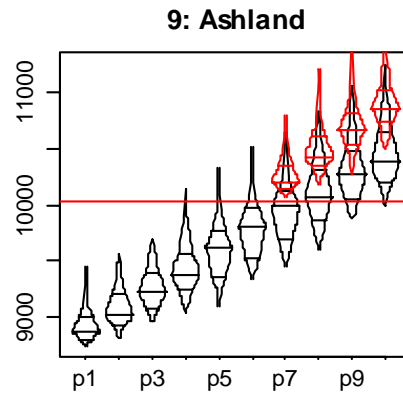
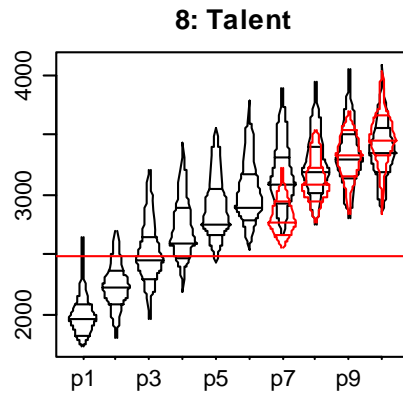
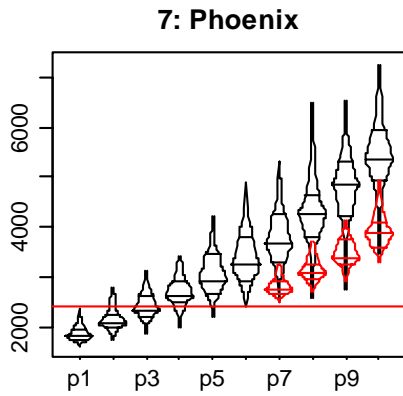
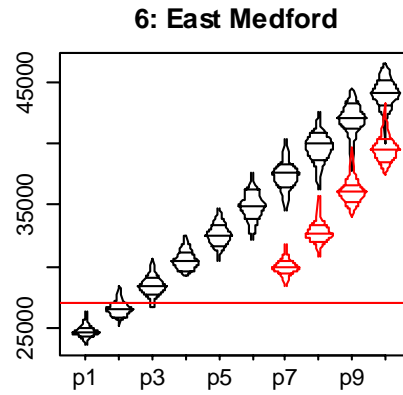
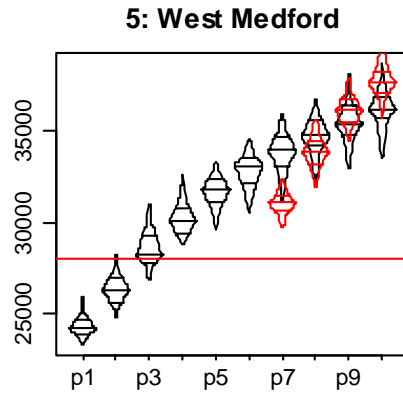
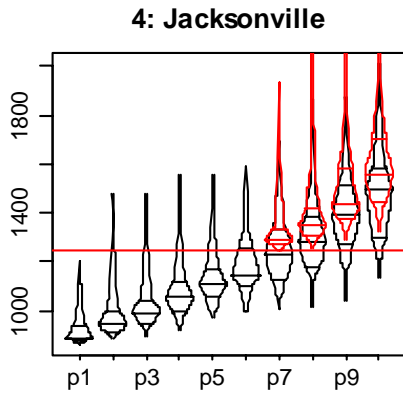
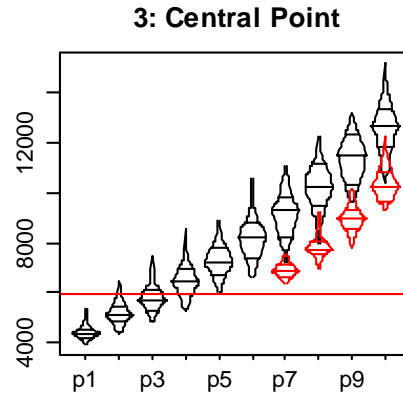
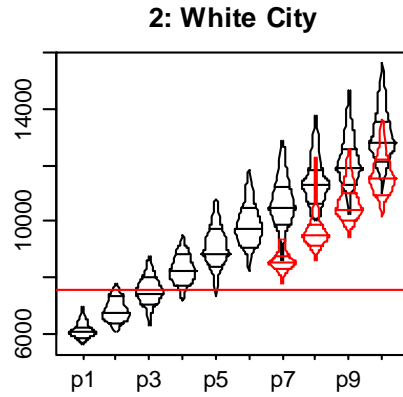
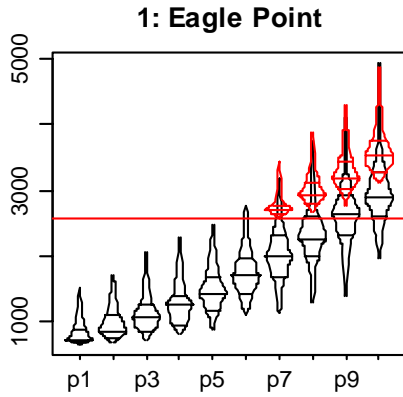
How to Interpret the Shapes of Box Percentile Plots



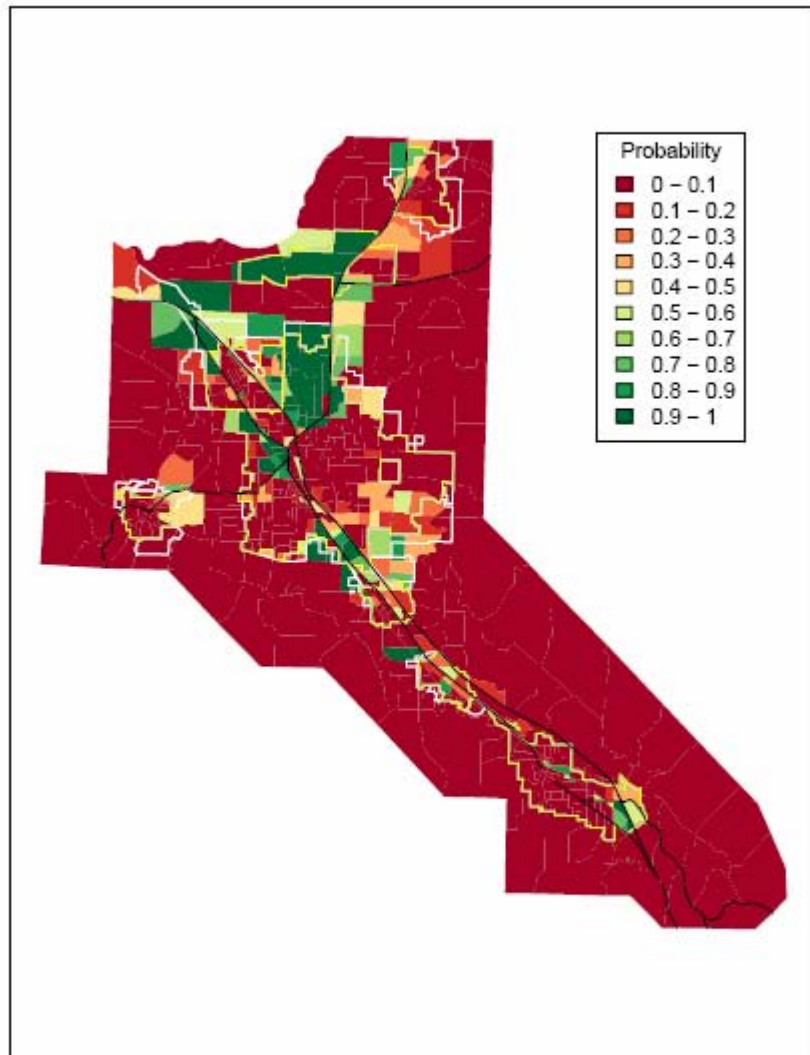
Comparison of Households for Runs Starting at 2002(black) and 2030(red)
(horizontal red line = 2030 base)



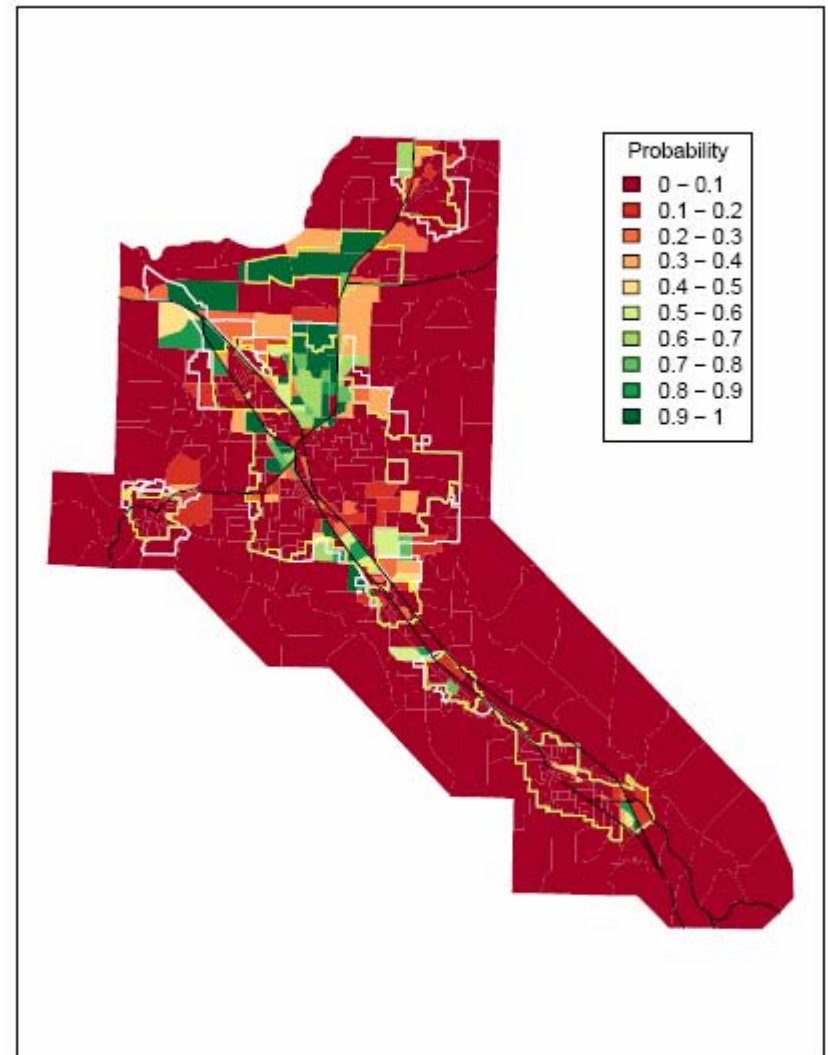
Comparison of Employment for Runs Starting at 2002(black) and 2030(red)
(horizontal red line = 2030 base)



Probability of Construction Employment Occurring
(Results of 45 LUSDR Runs)



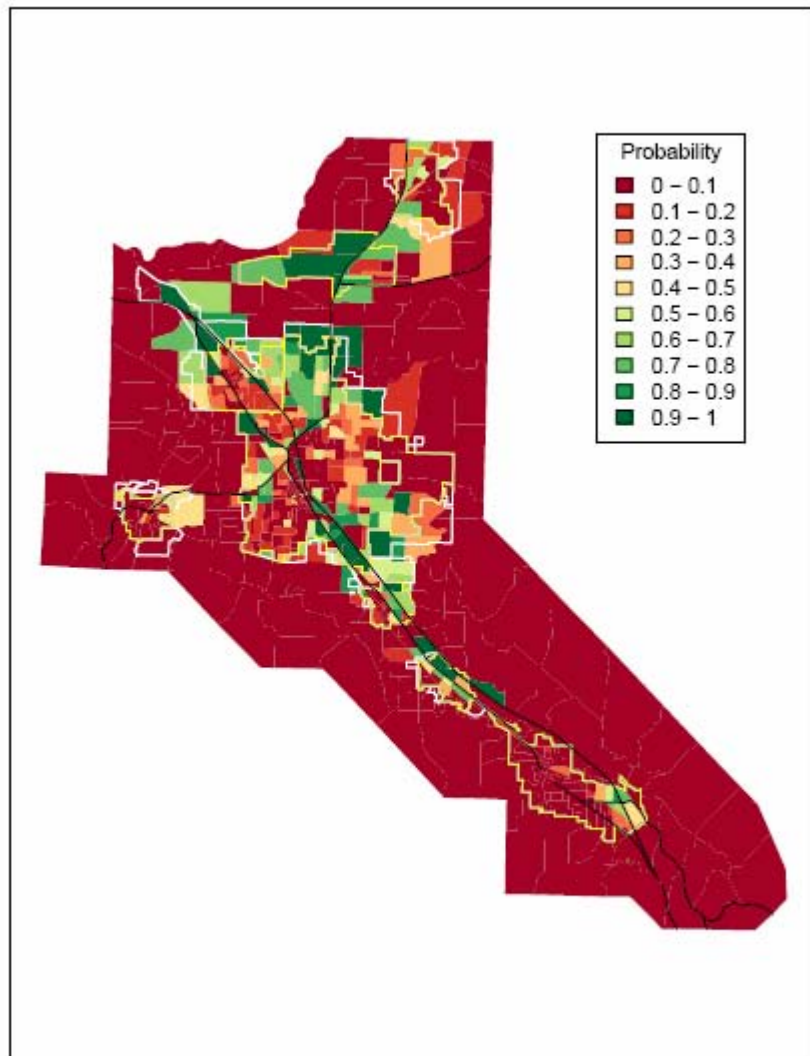
Probability of Manufacturing Employment Occurring
(Results of 45 LUSDR Runs)



NOTE: TAZs overlap the boundaries of UGBs and growth areas with rural lands. Some rural areas are shown as having relatively high probability because of this. The probabilities for urban uses though, only refer to the portions of the TAZs that are located in UGBs and growth areas.

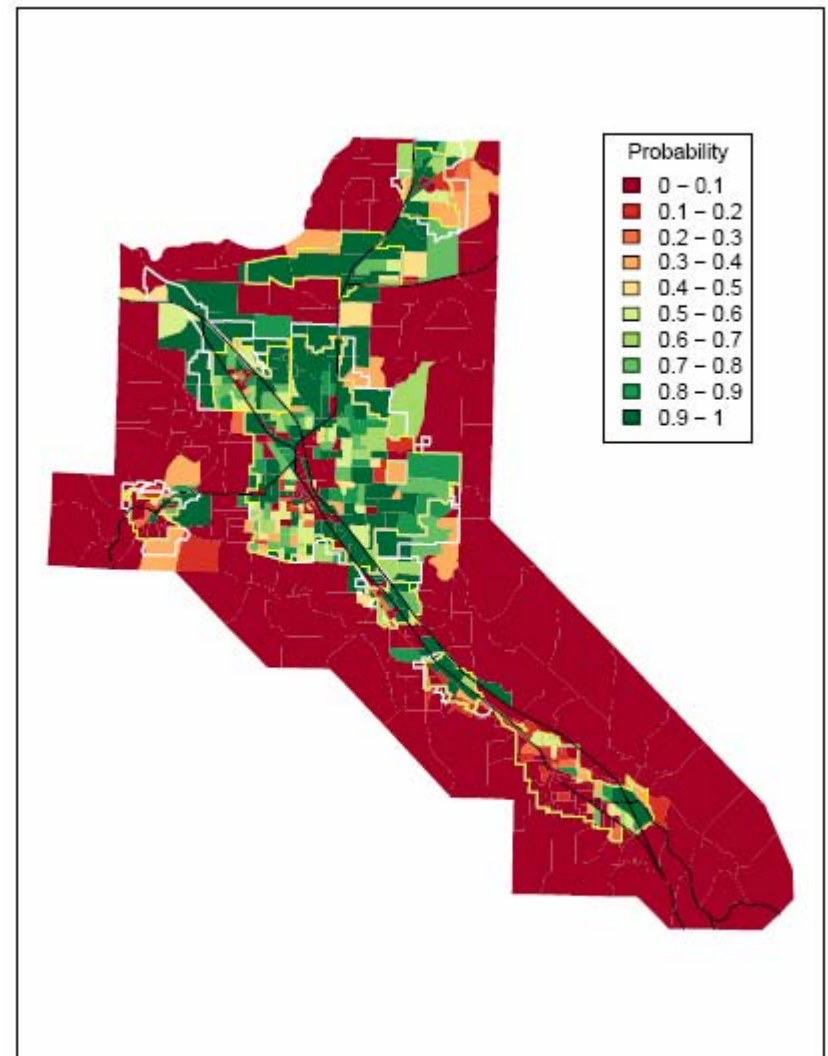
NOTE: TAZs overlap the boundaries of UGBs and growth areas with rural lands. Some rural areas are shown as having relatively high probability because of this. The probabilities for urban uses though, only refer to the portions of the TAZs that are located in UGBs and growth areas.

Probability of Retail Employment Occurring
(Results of 45 LUSDR Runs)



NOTE: TAZs overlap the boundaries of UGBs and growth areas with rural lands. Some rural areas are shown as having relatively high probability because of this. The probabilities for urban uses though, only refer to the portions of the TAZs that are located in UGBs and growth areas.

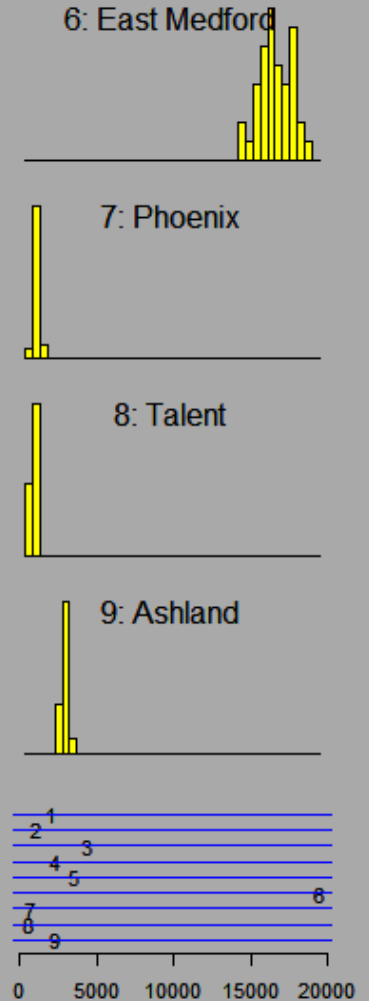
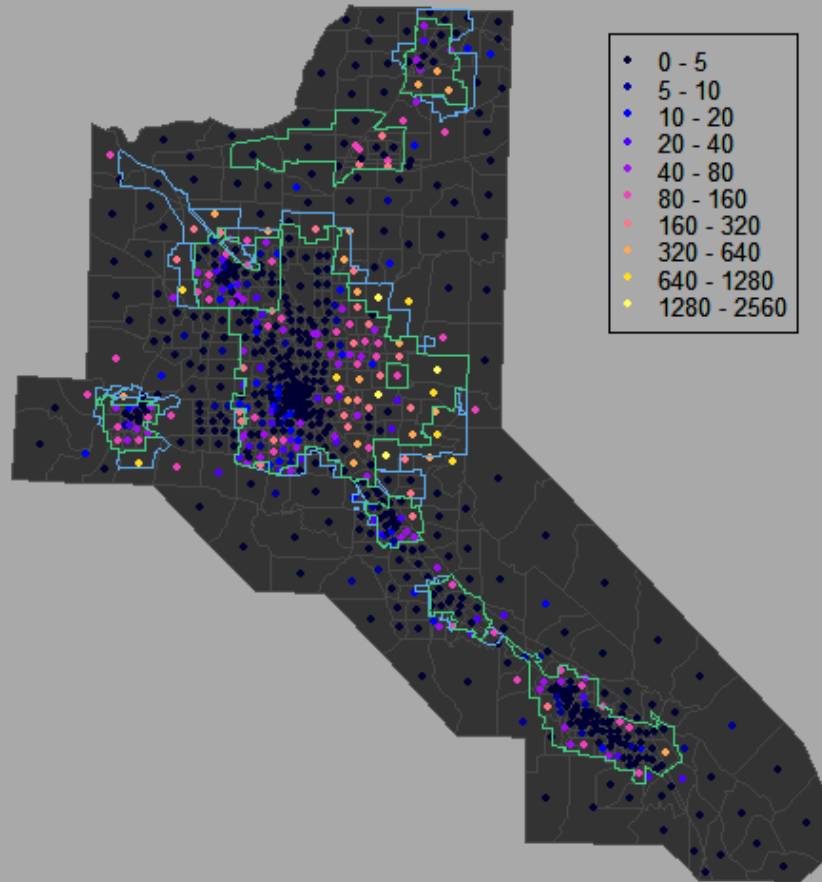
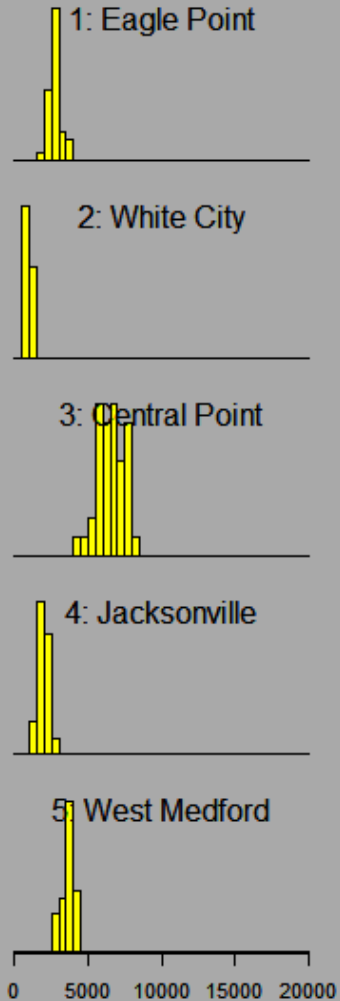
Probability of Service Employment Occurring
(Results of 45 LUSDR Runs)



NOTE: TAZs overlap the boundaries of UGBs and growth areas with rural lands. Some rural areas are shown as having relatively high probability because of this. The probabilities for urban uses though, only refer to the portions of the TAZs that are located in UGBs and growth areas.

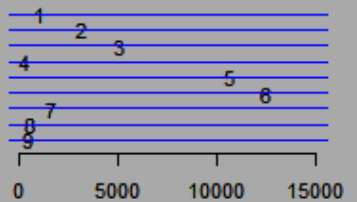
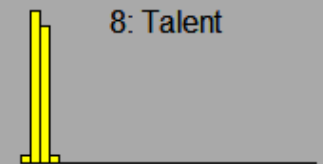
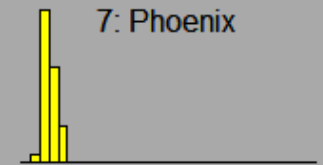
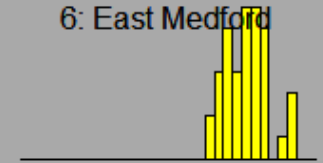
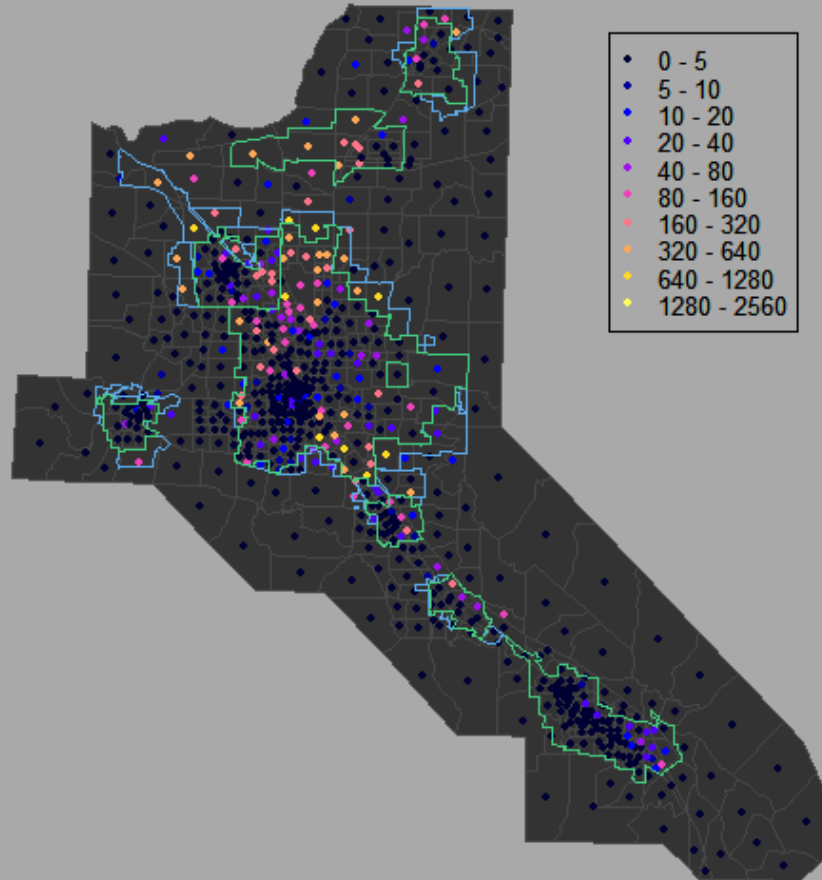
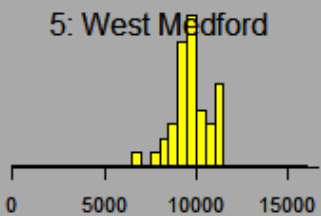
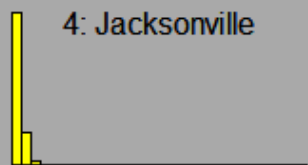
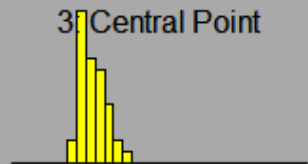
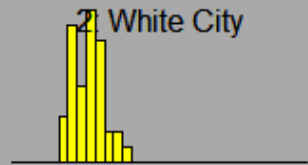
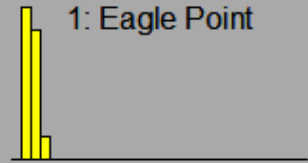


Household Growth 2030-2055 Results of 40 LUSDR Runs

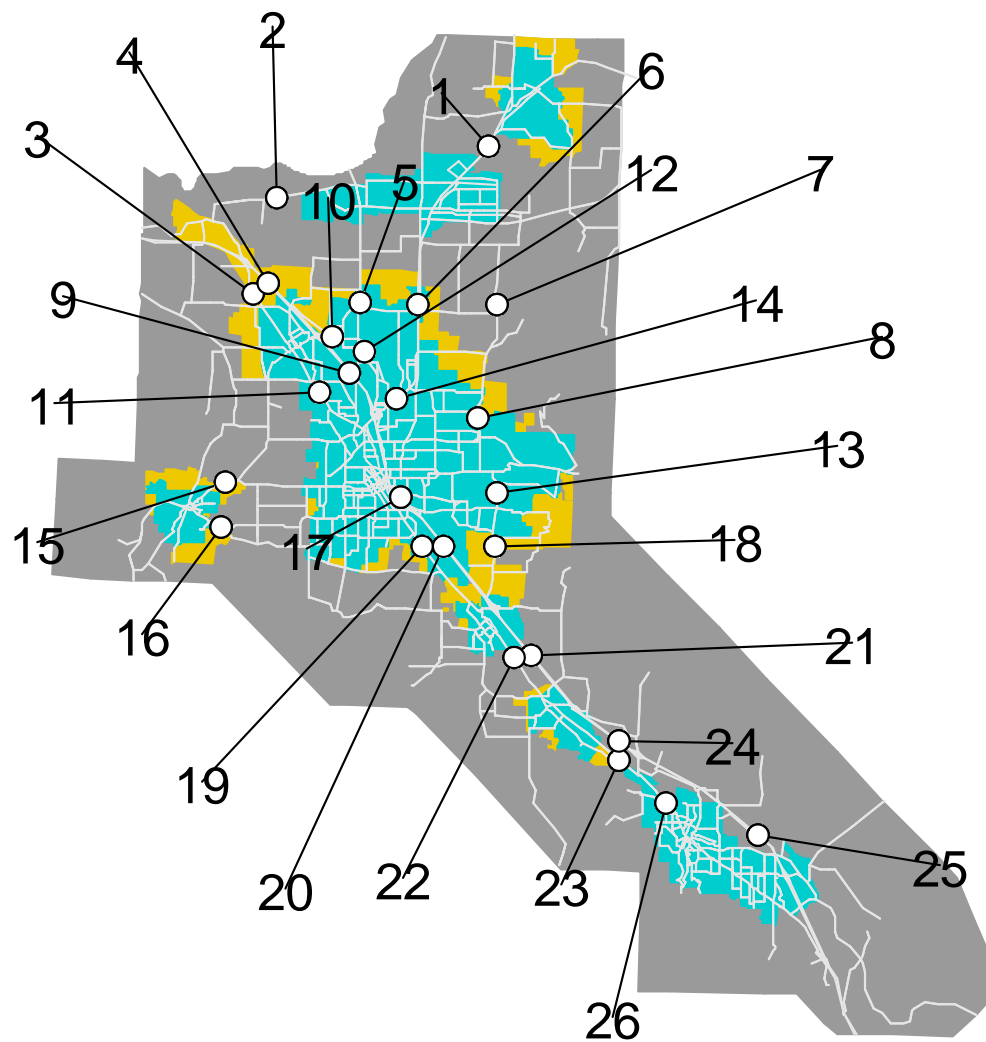




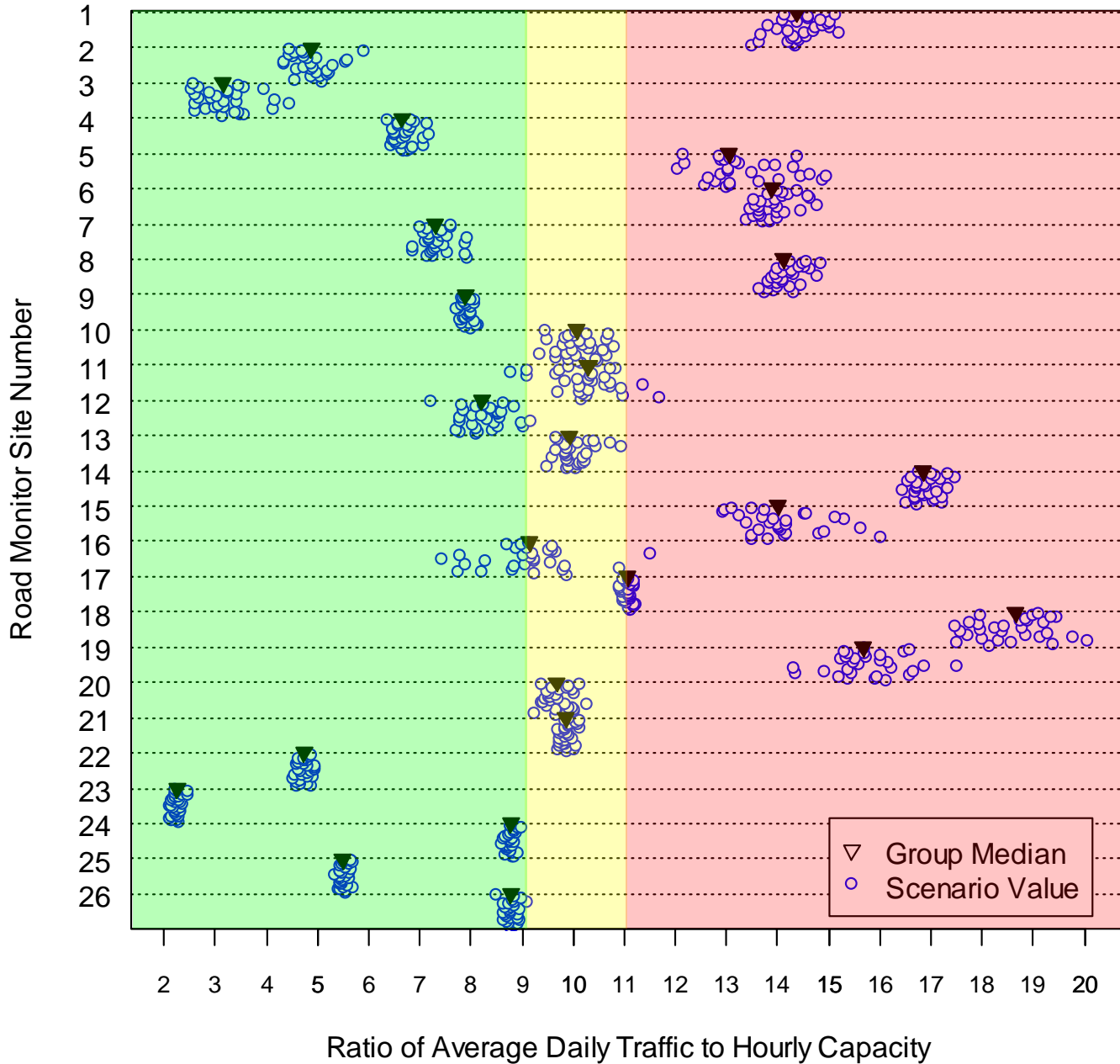
Employment Growth 2030-2055 Results of 40 LUSDR Runs



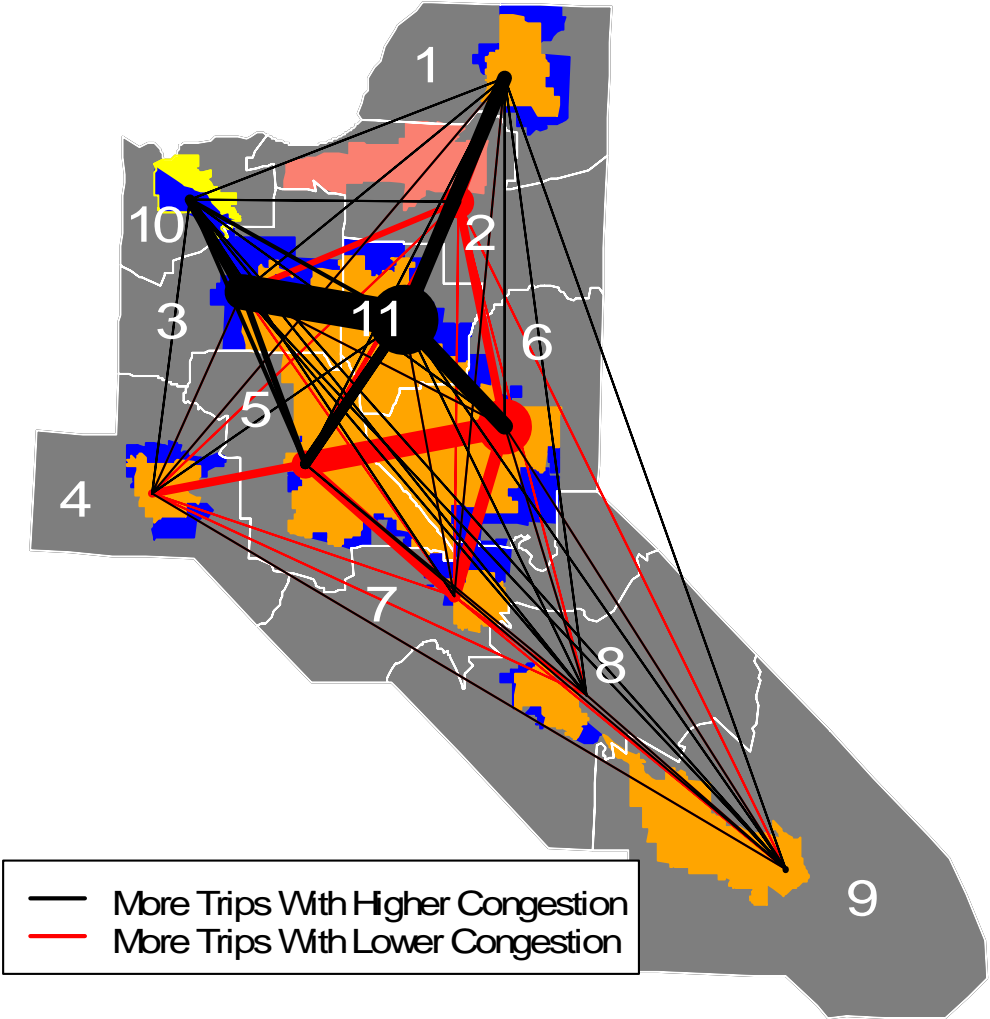
Monitor Sites



Congestion at Road Monitor Sites

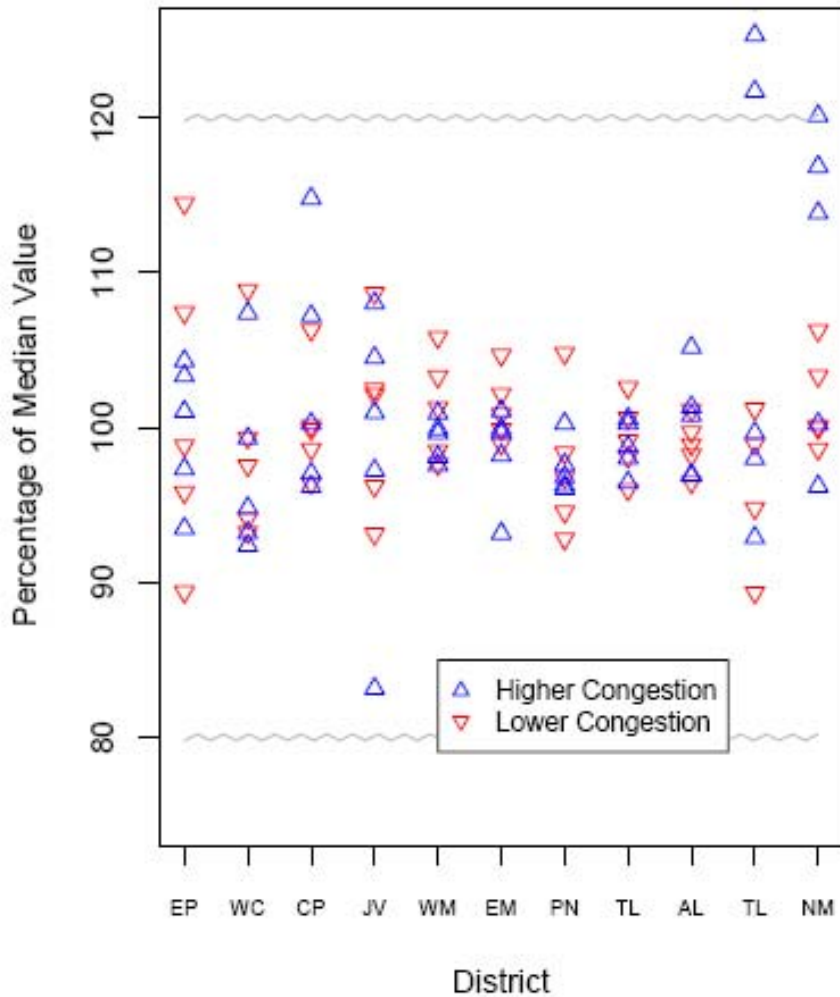


District Flows Corresponding to High and Low Congestion At Monitor Station 10

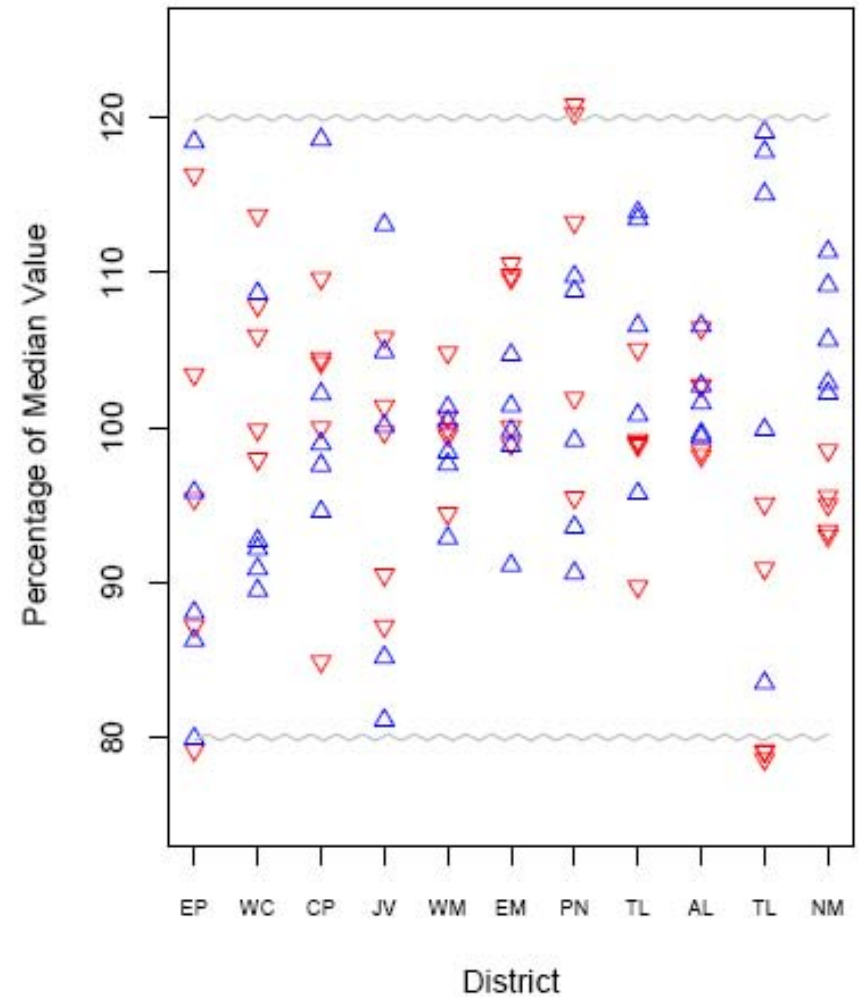


District Households and Employments Associated With Higher and Lower Congestion at Monitor Site Number 10

Households



Employment





Next Steps



Objectives

- To make LUSDR a tool that can help with land use forecasting and strategic planning throughout the state.
- To integrate LUSDR with transportation models for metropolitan and small urban areas.
- To connect LUSDR models with the next statewide model.



Tasks

- Incorporate densification, mixed use development, and redevelopment into LUSDR.
- Fully connect LUSDR with travel demand models.
- Get data from more places and develop transferrable components.
- Develop an interface and standard graphical outputs.