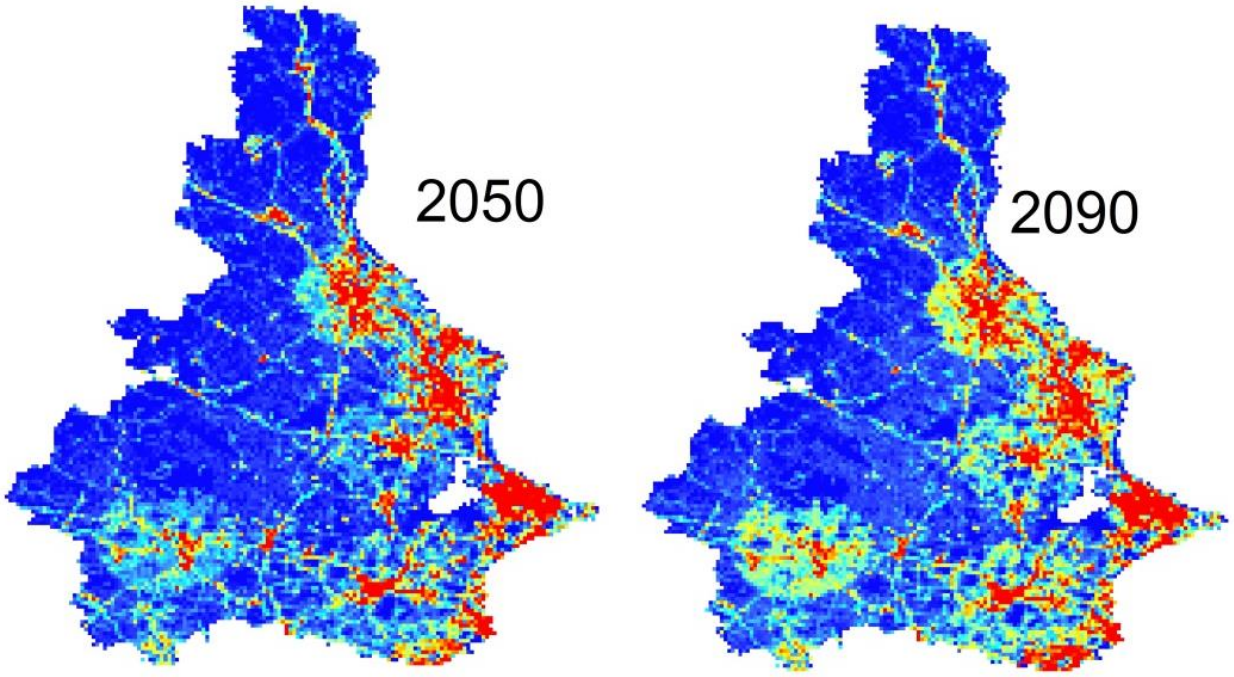
Projected land use change following current trends and associated effects on nitrogen export



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Introduction

- Land use change is a leading threat to water quality

- Coastal NH is particularly at high risk for adverse water quality from land conversion from forest to developed

Question

What is the effect of projected land use change on watershed nitrogen export?

- Land cover scenarios
- River network model

Scenarios to Land Cover

Initial conditions

Existing land cover types
- Forest *
- Wetlands
- Rivers & lakes
- Developed *
- Agriculture/grass *
- Other

Physical characteristics
- Elevation
- Slope
- Soil/drainage
- Floodplains

Social characteristics
- Population *
- Conserved land *

* change in scenarios

Land cover change

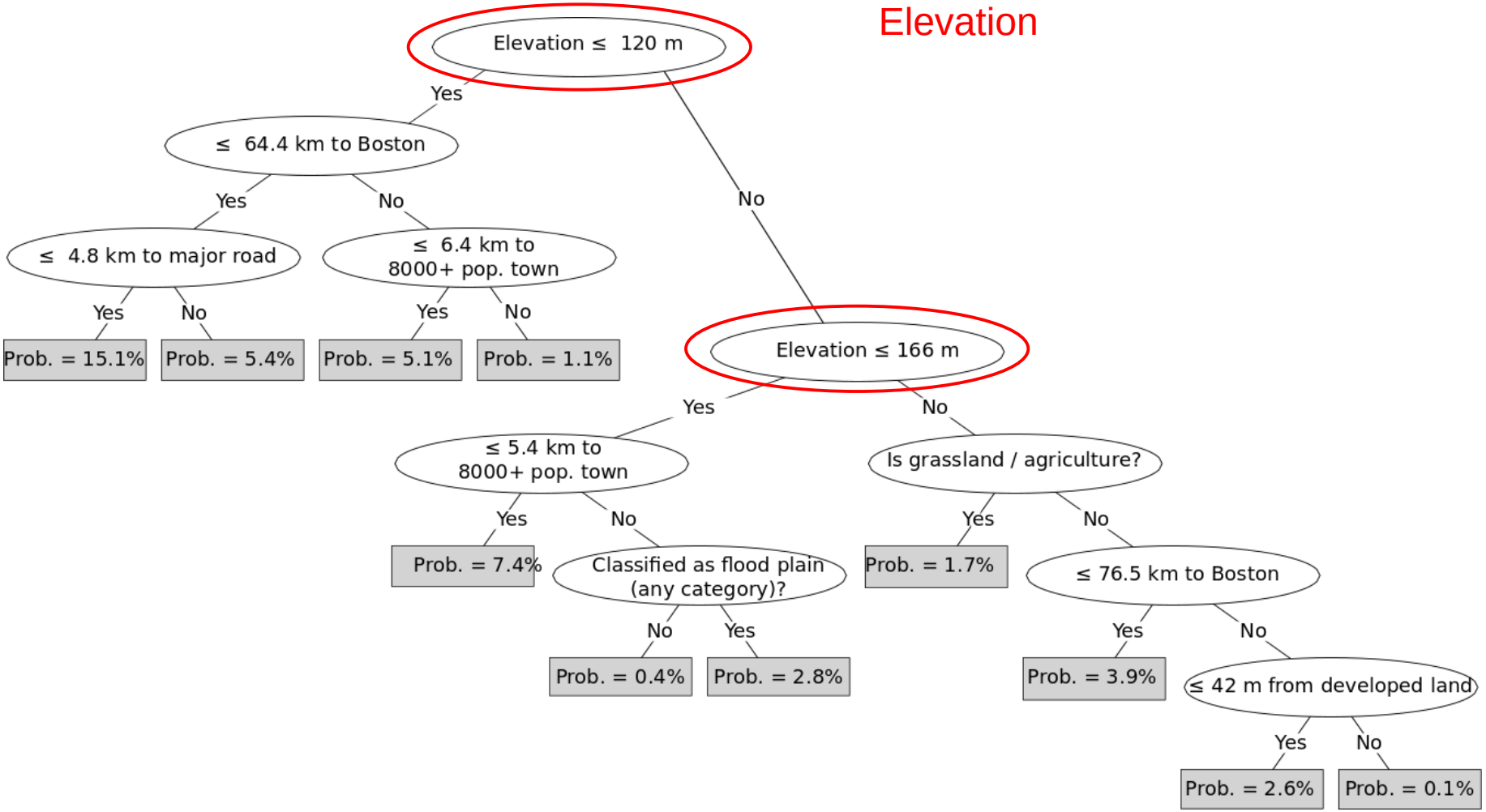
DEVELOPMENT
Current trends:
Extrapolate recent trends
Community amenity:
NH Climate Action Plan
Backyard amenity:
Population + zoning

Output

Decadal land cover maps for each scenario

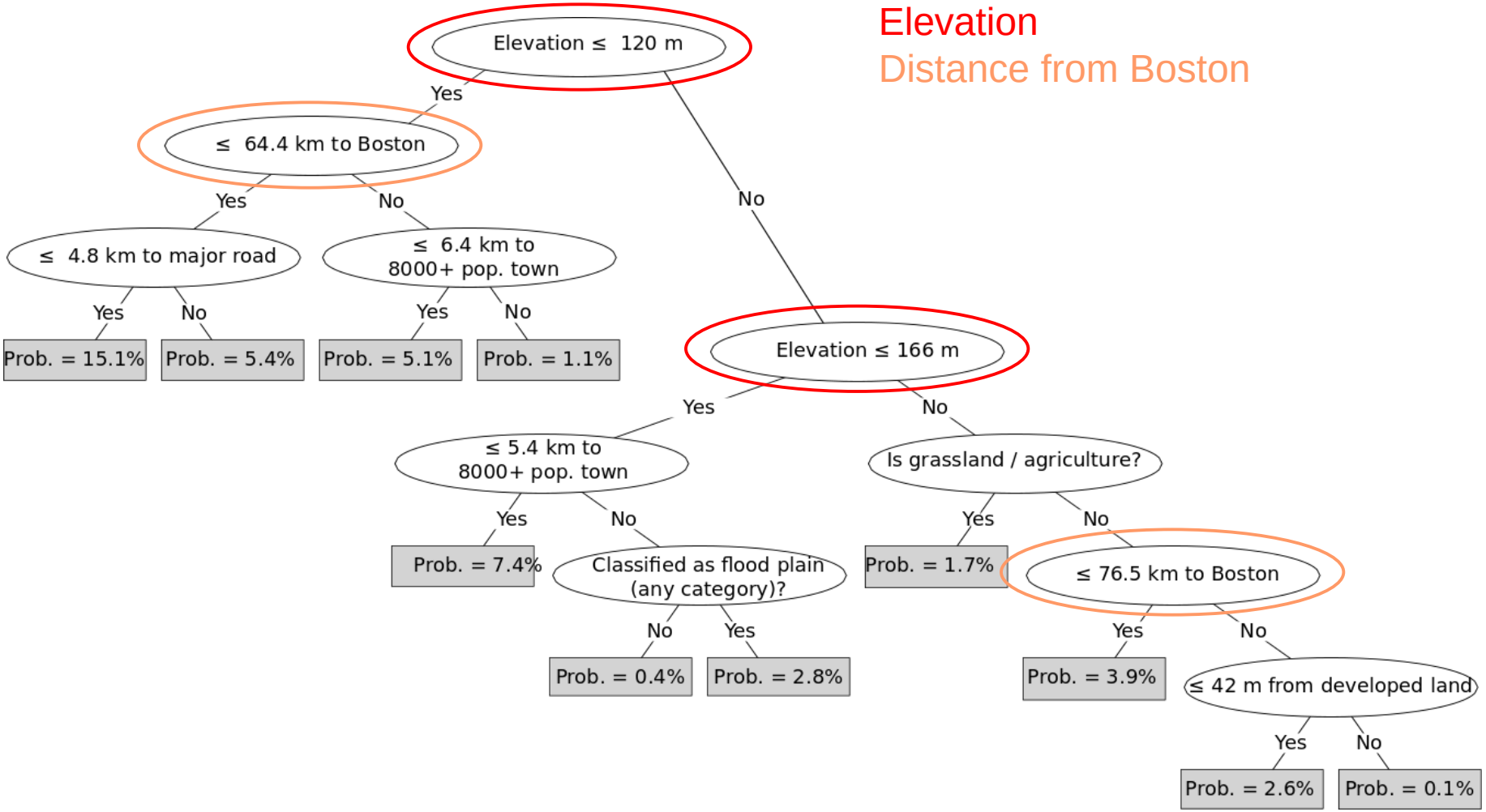
Thorn et al. Unpublished

Probability Developed



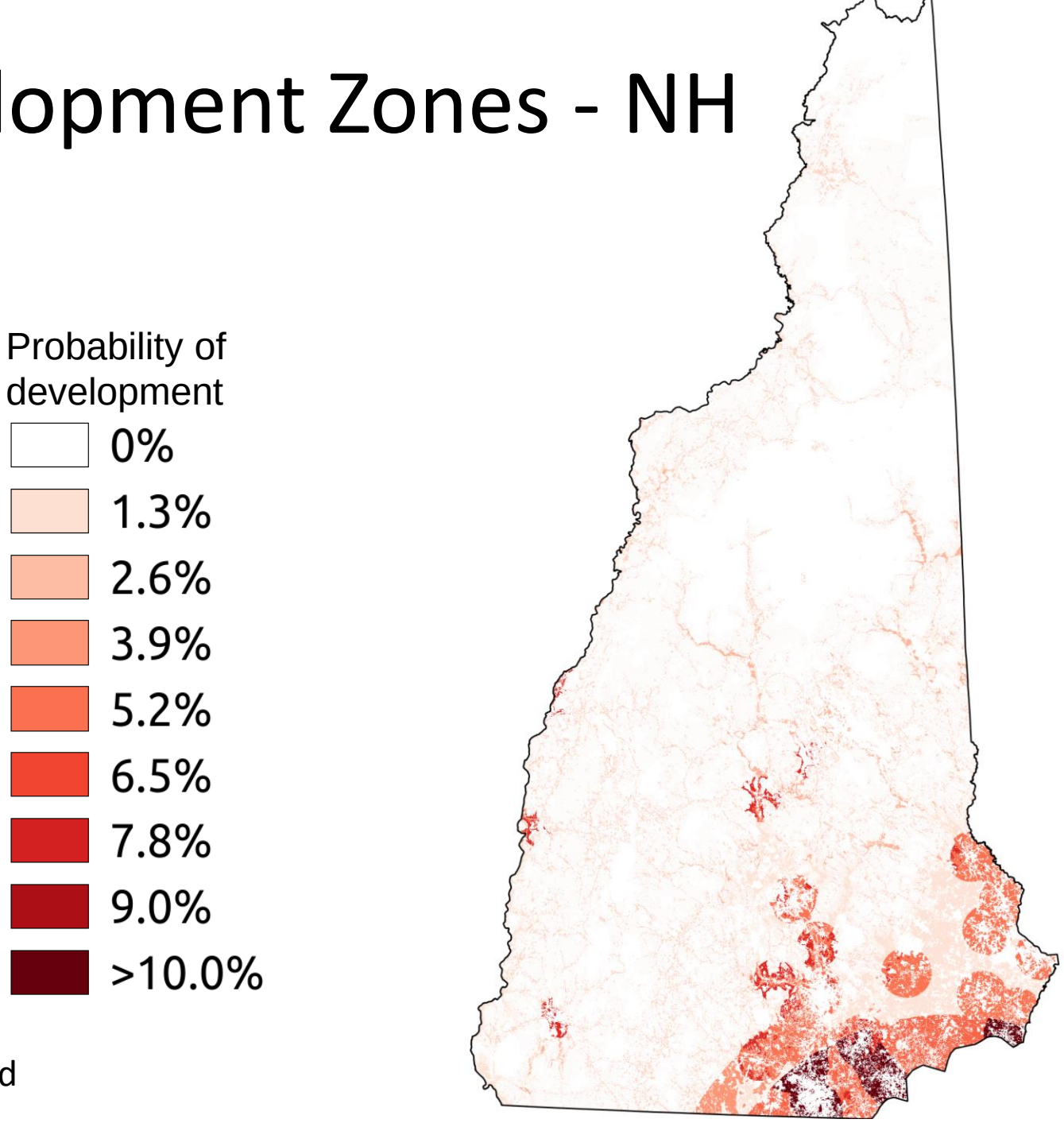
Thorn et al. Unpublished

Probability Developed



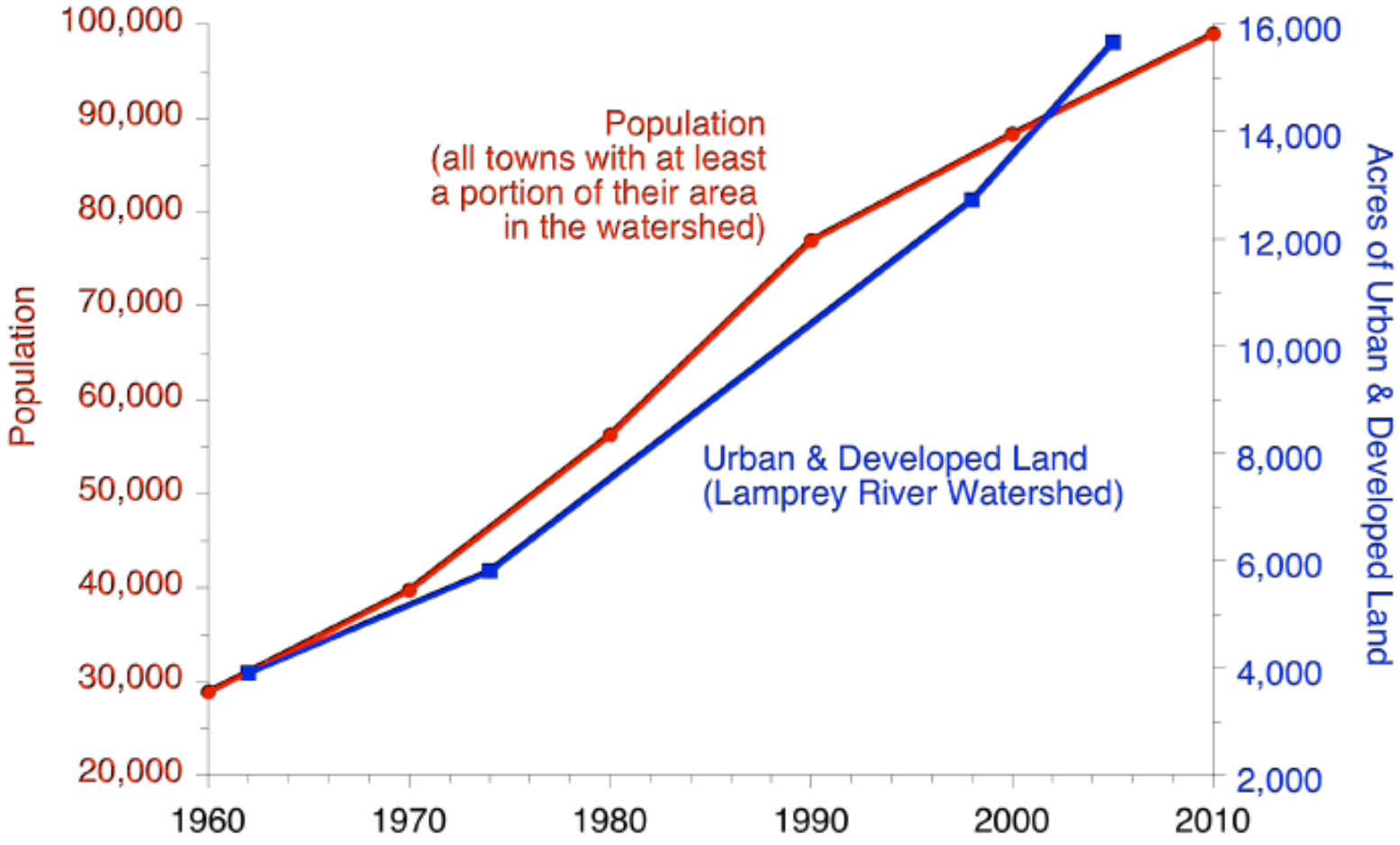
Thorn et al. Unpublished

Development Zones - NH

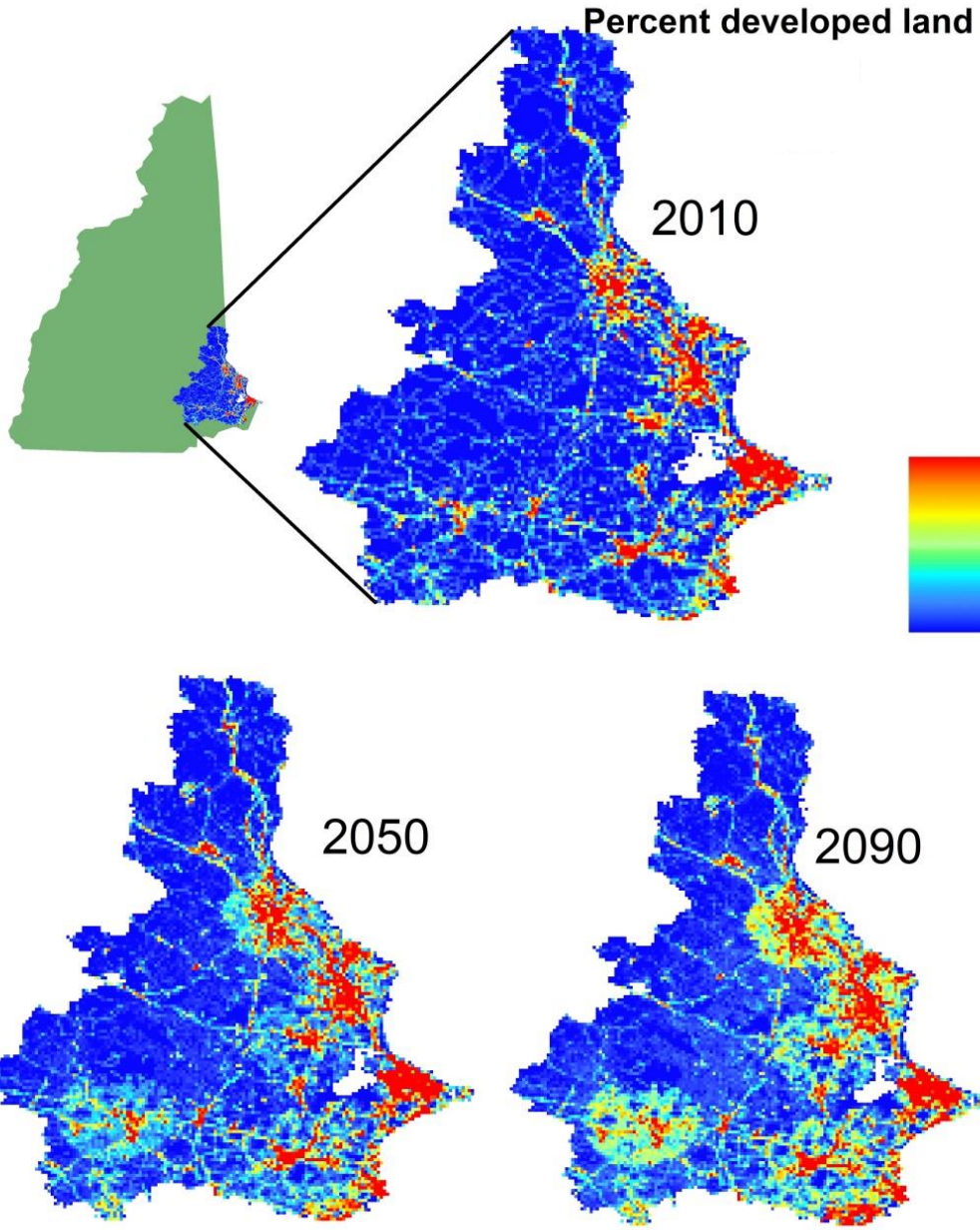


Thorn et al. Unpublished

Recent trends - Lamprey



100yearfloods.org

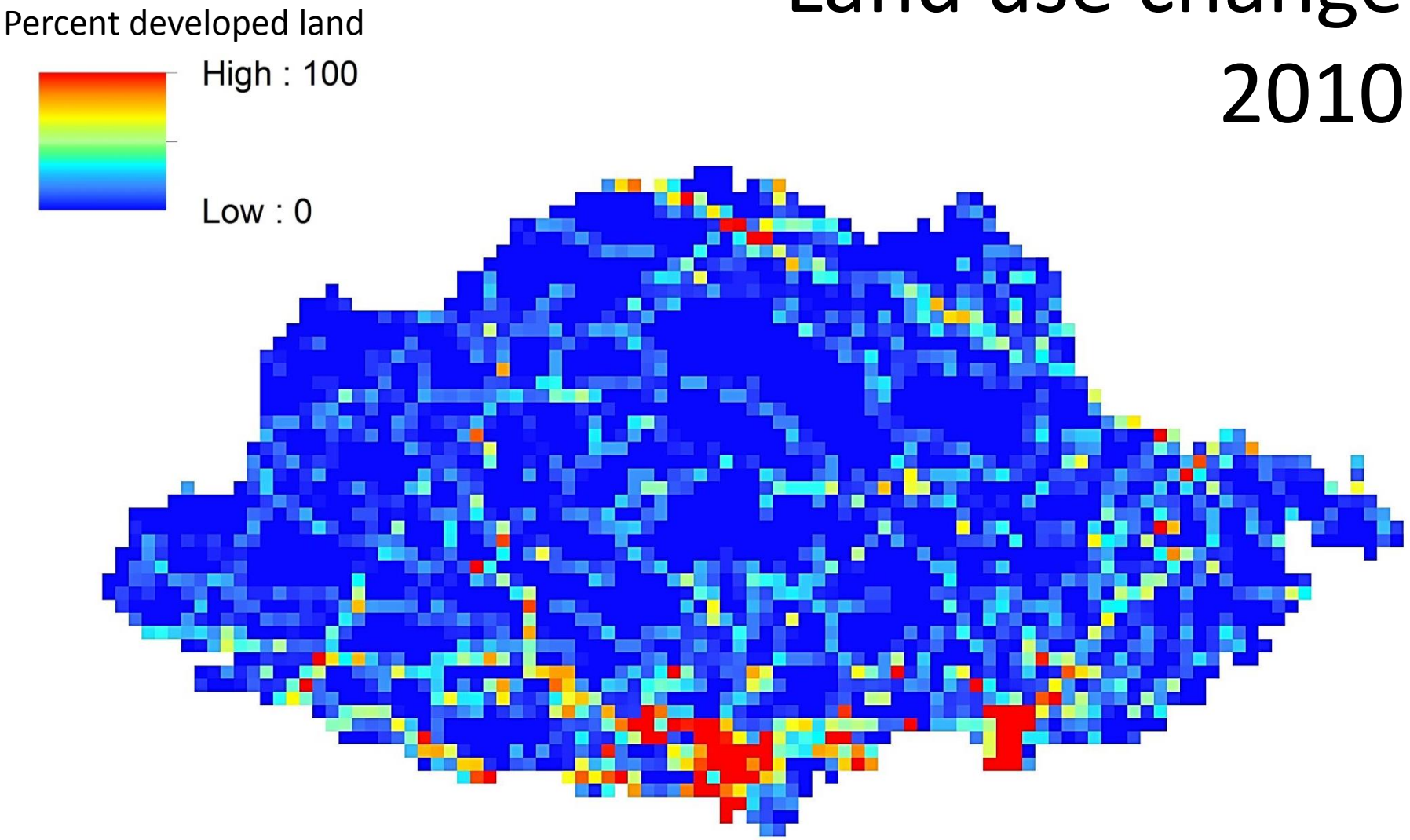


Land use change
Current trends

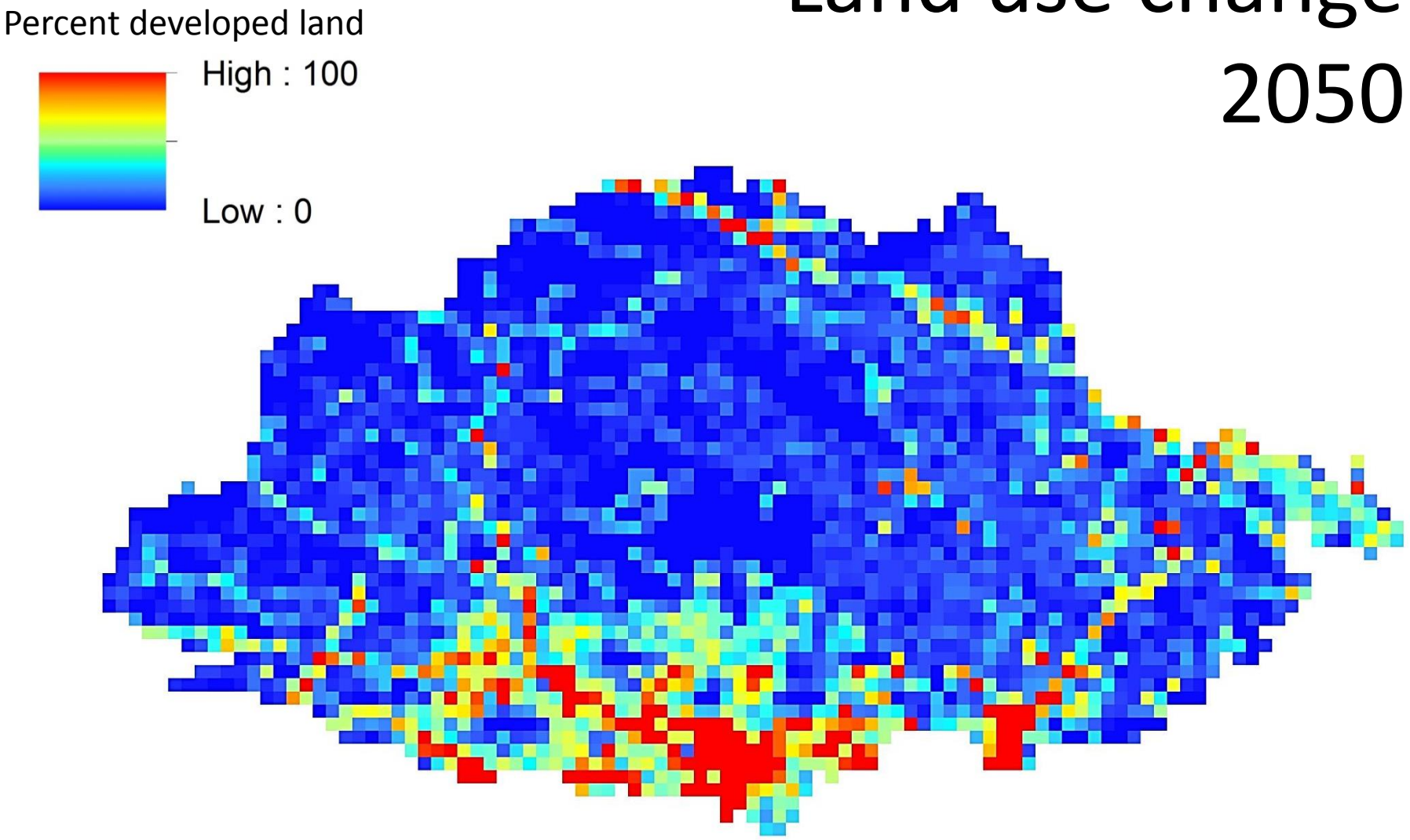
2050 ↑ 44%

2090 ↑ 88%

Land use change 2010

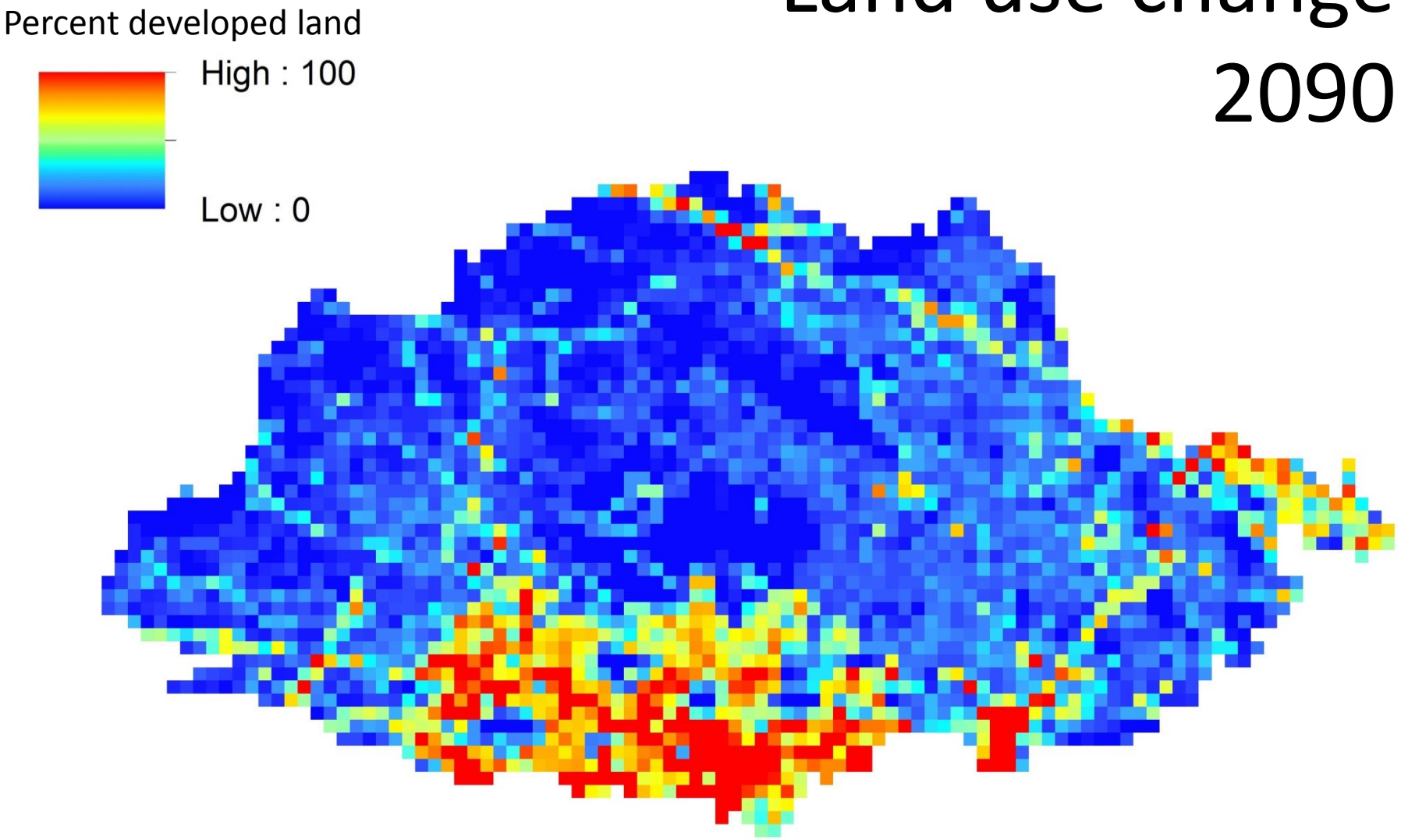


Land use change 2050



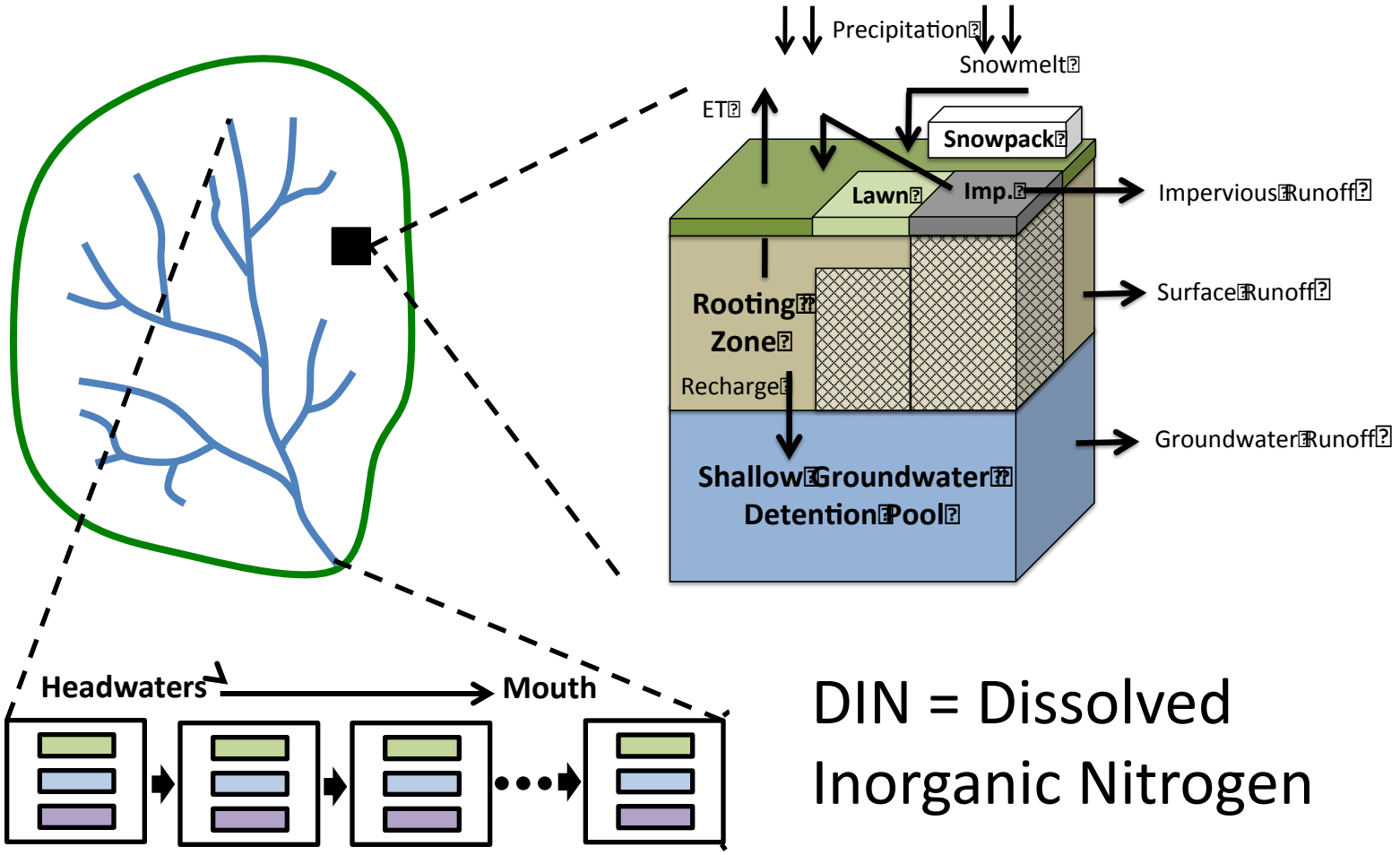
67% ↑

Land use change 2090



134% ↑

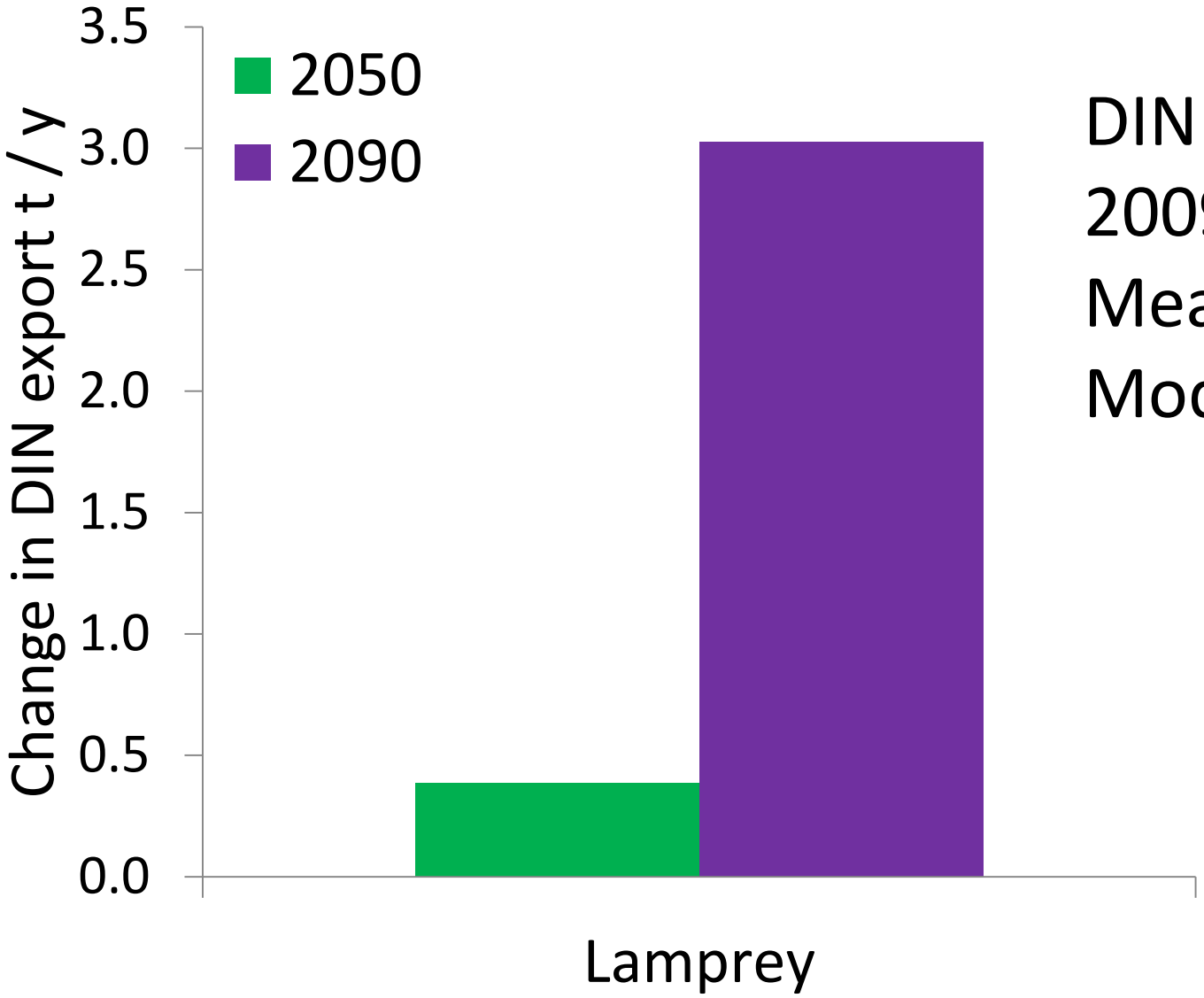
FrAMES Model



DIN = Dissolved Inorganic Nitrogen

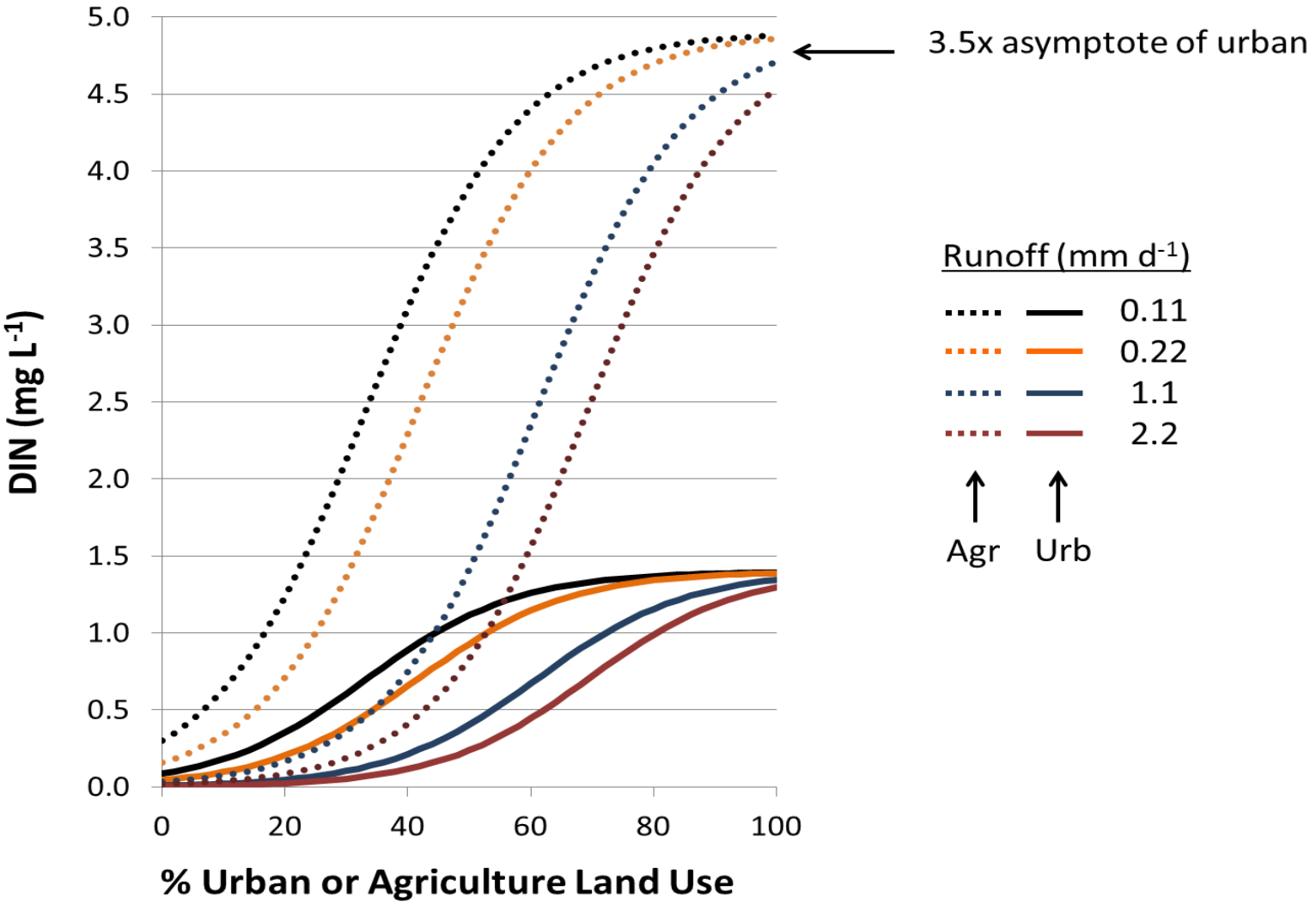
Modeled 2009 - 2011

N export response

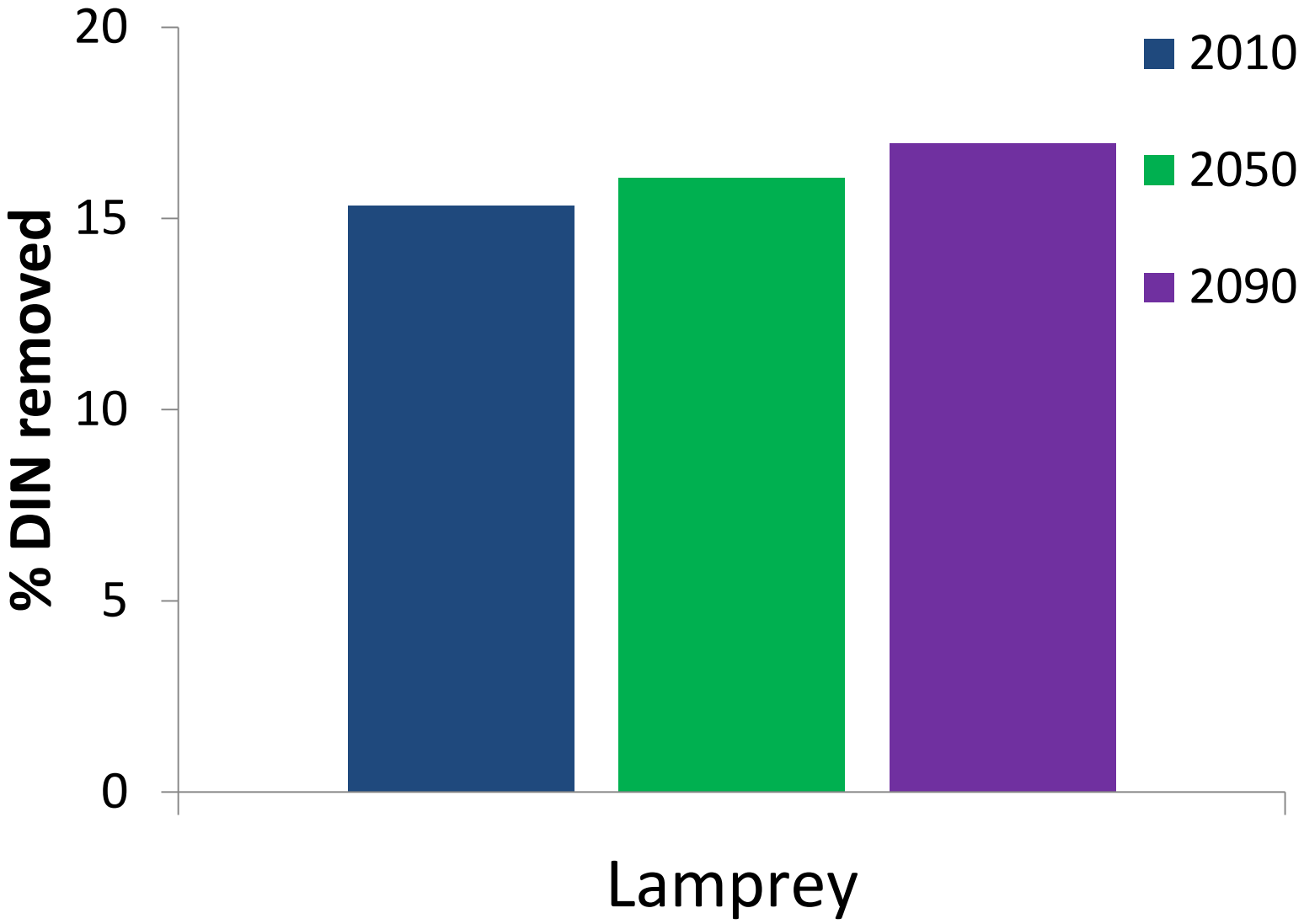


DIN export t/y
2009 – 2011
Measured: 57.5
Modeled: 58

Model DIN loading



N removal



Change in point source?

Assume change in point source output is proportional to population change

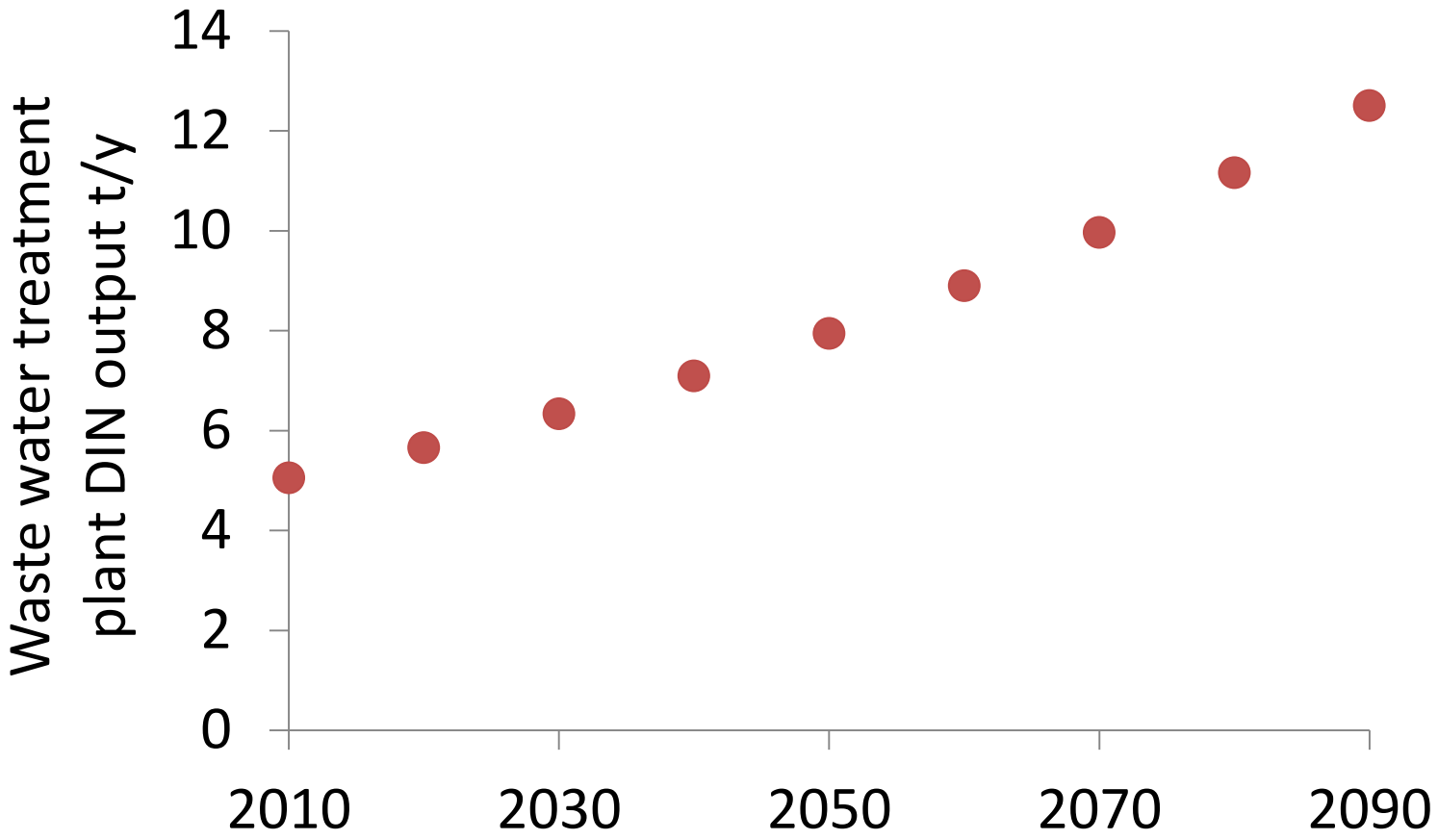
Population change

Change in population of towns that intersect Lamprey watershed 2000 – 2010

12% increase over 10y

Potential changes in point sources

If increase is proportional to population increase, we would expect:



Total change in DIN export

Annual DIN export t/y

2009 – 2011: 57.5

2090: 70.9

Increase from:

23% non-point sources

77% point sources

Next steps

- Finalize land use scenarios
- Include interactions with future climate
- Coupled terrestrial – aquatic model

Questions?

Lampreyriver.org