Mechanisms of Vegetation Response to Climate Change in the Pacific Northwest Simulated by DGVM's: Are They Reliable?

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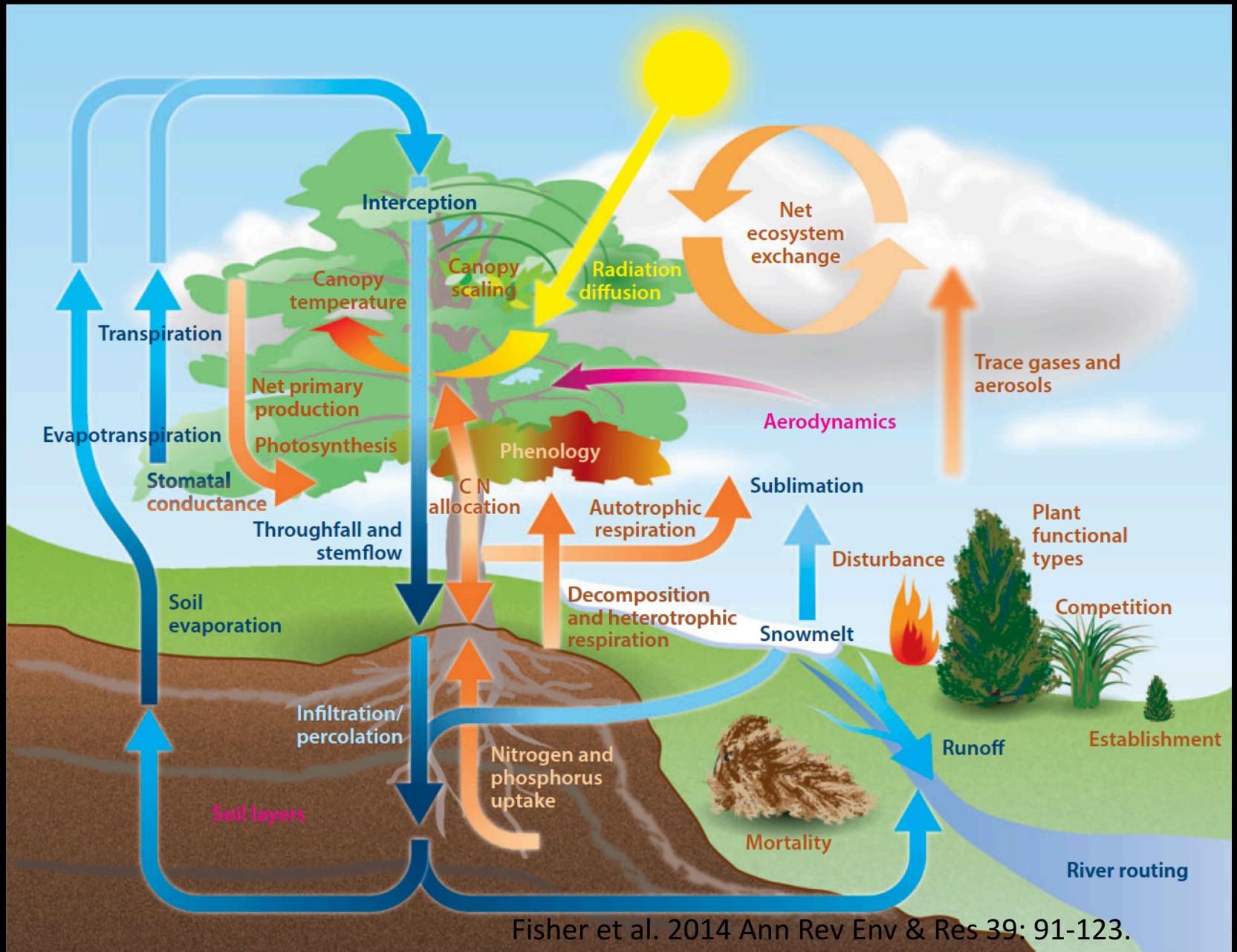
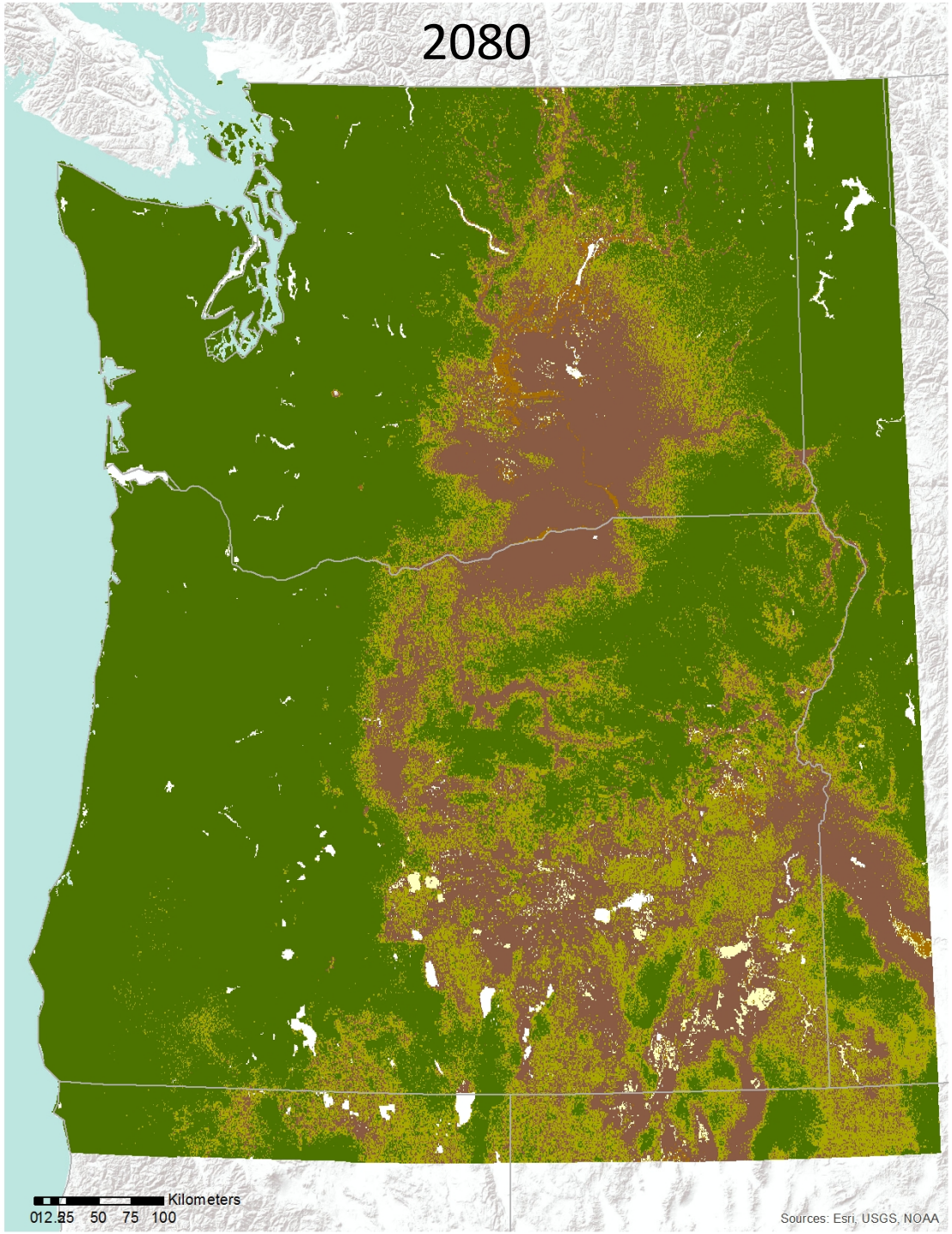
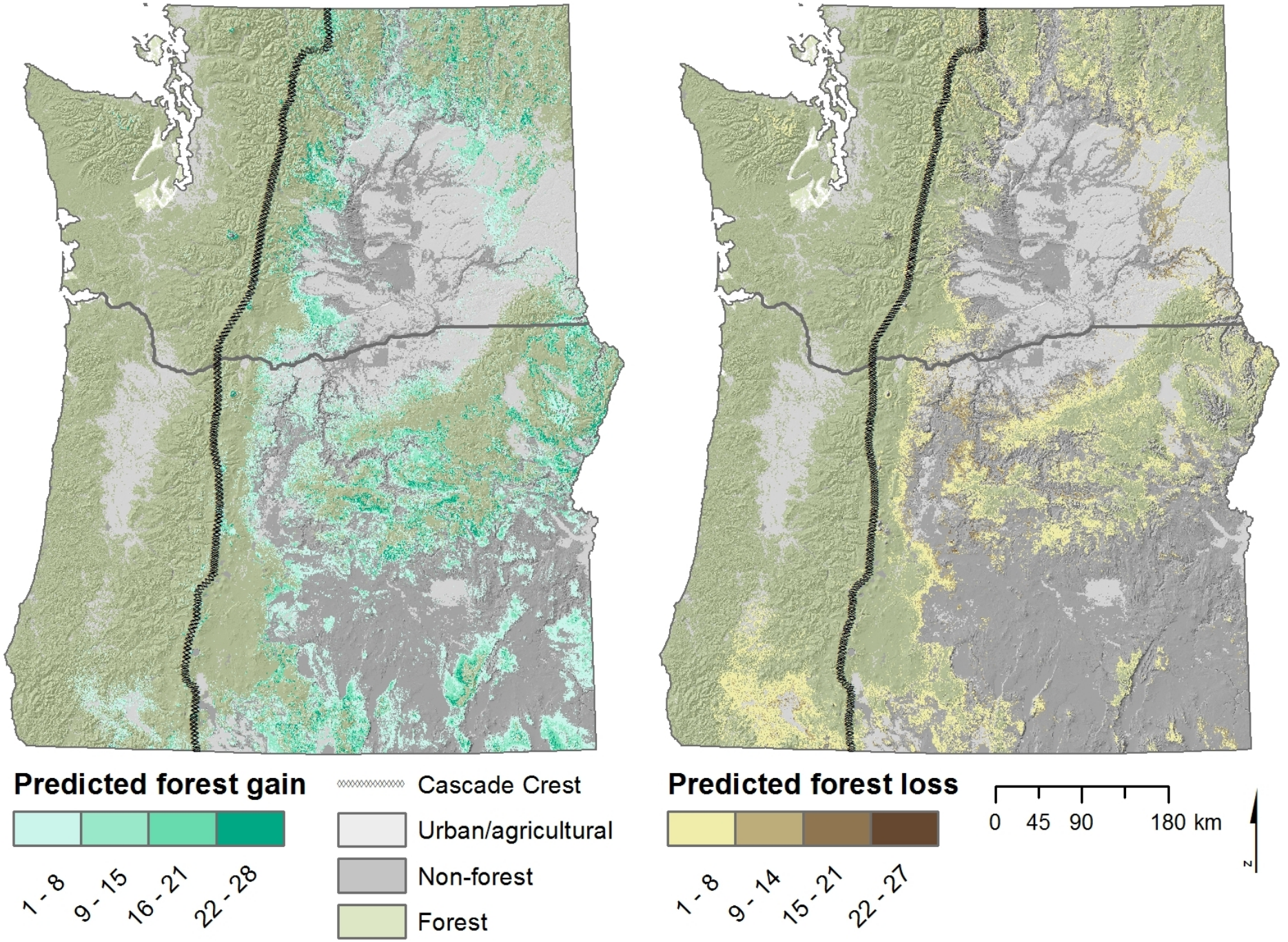
Dynamic Global Vegetation Models (DGVMs)



Fisher et al. 2014 Ann Rev Env & Res 39: 91-123.

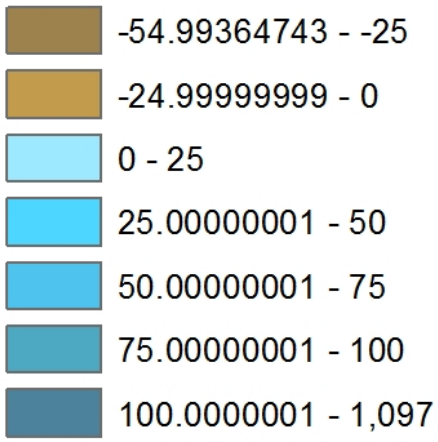
MAPSS-Century 2 (MC2) "Biomes"

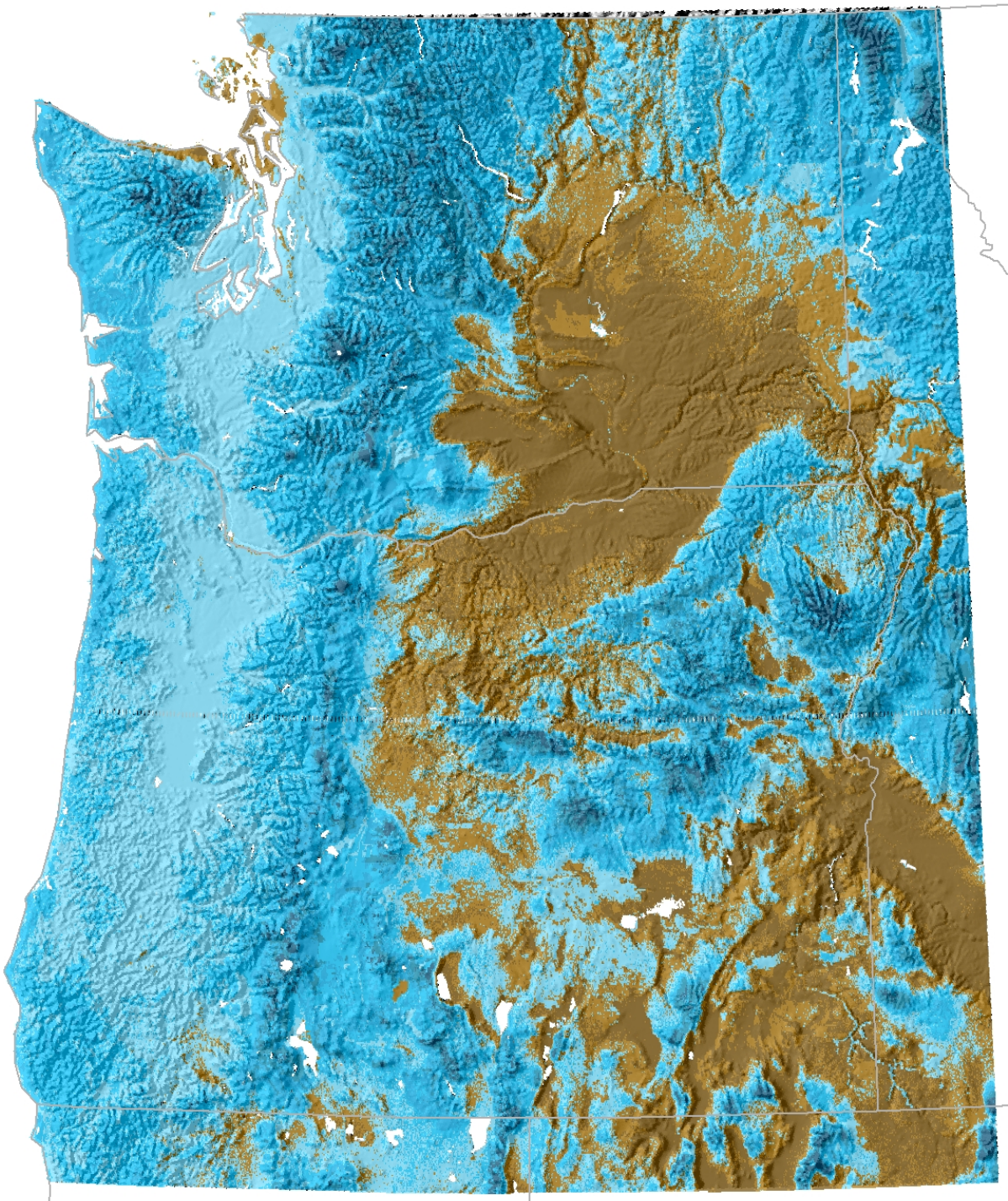



Predicted forest gain
1 - 8
9 - 15
16 - 21
22 - 28
Cascade Crest
Urban/agricultural
Non-forest
Forest
Predicted forest loss
1 - 8
9 - 14
15 - 21
22 - 27
0 45 90 180 km
N

MAPSS-Century 2 (MC2)

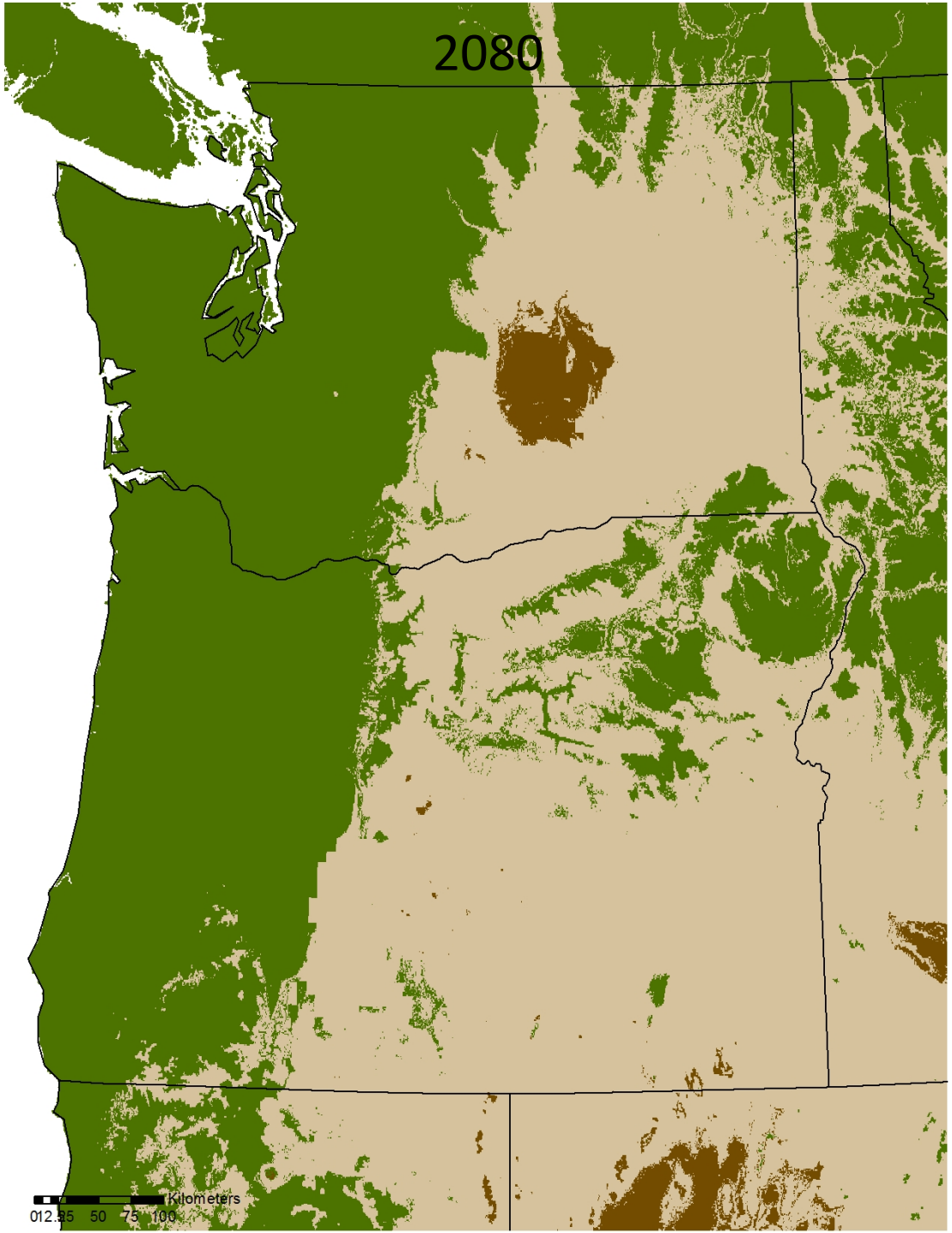
Percent Change in NPP from Historical (1970-1999) to 2080





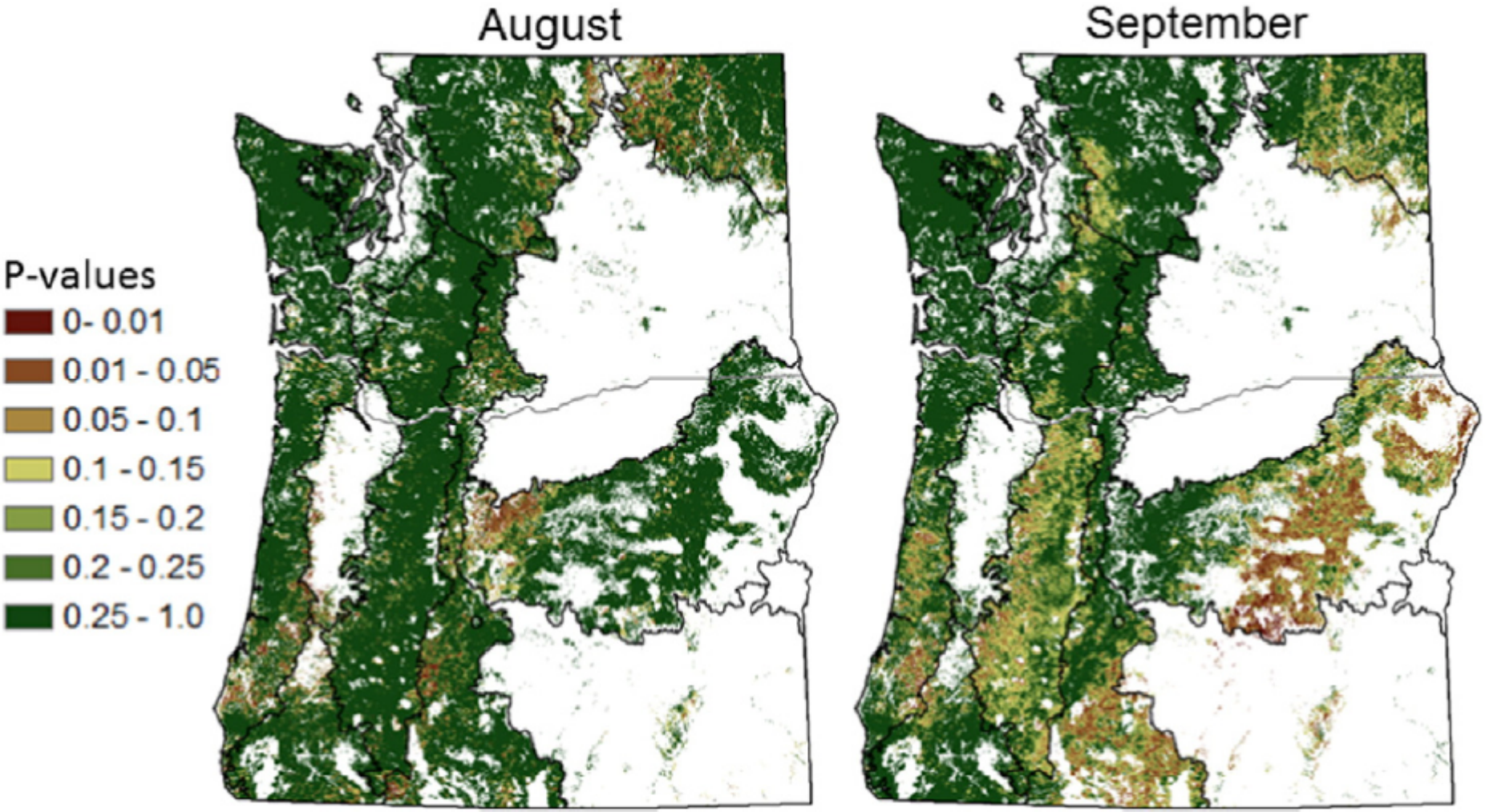
LPJ “Biomes”

Cold grass/shrub
Cold forest
Cool forest
Coastal cool forest
Cold open forest/woodland
Cool open forest/woodland
Cool open mixed forest/woodland
Savanna/grassland/steppe
Shrub-steppe
Dry shrub
Barren


2080
Kilometers
0 12.5 25 50 75 100

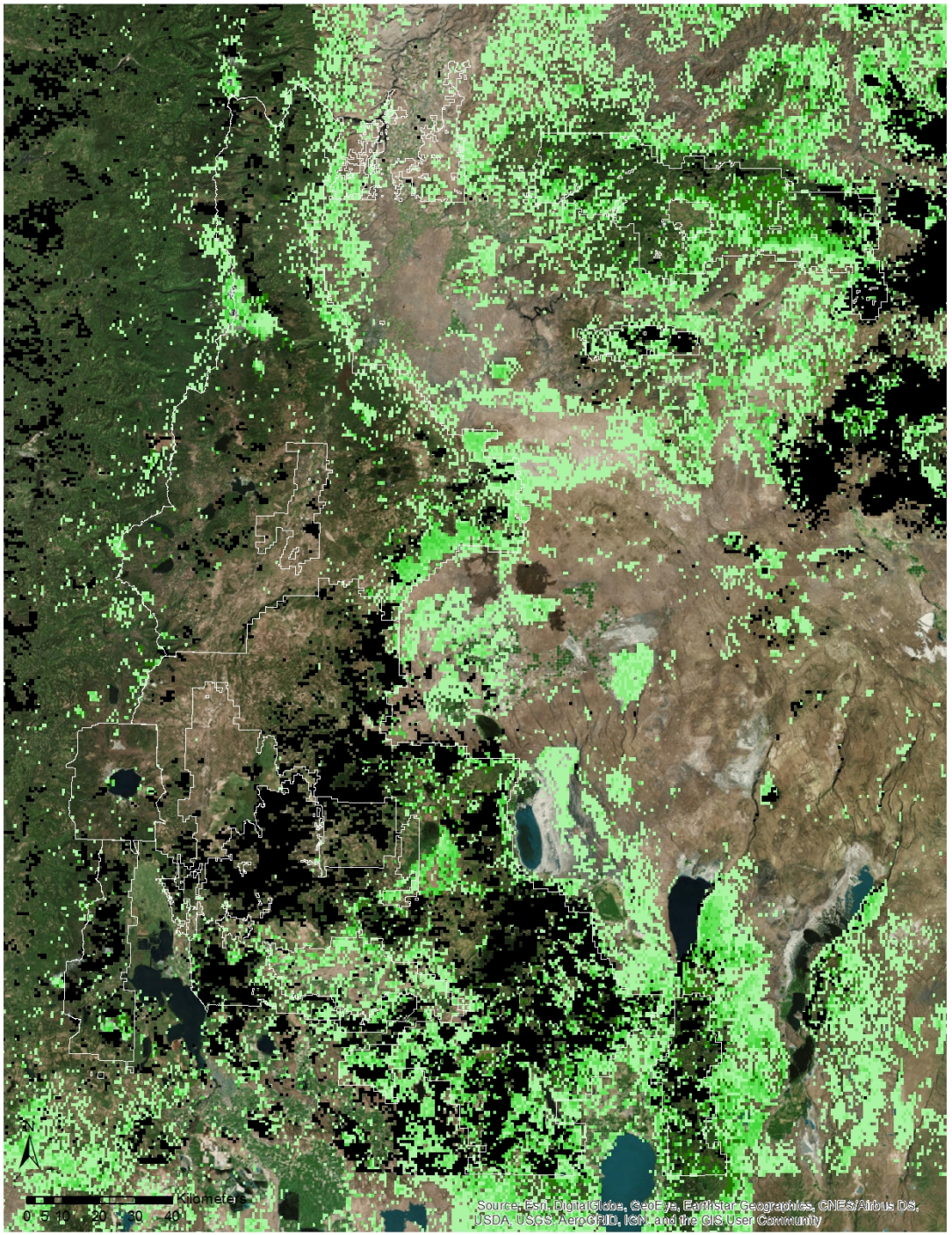
What do other models say?

D. Mildrexler et al. / Remote Sensing of Environment 173 (2016) 314–325



Forest Change – case study in southern Oregon

Green = MC2 forest expansion
Black = Forest Vulnerability Index



Historical data (paleo evidence)

Warm/dry climates

- Dry forests replaced cool/wet species, woodlands shrink (Blinnikov et al. 2002)

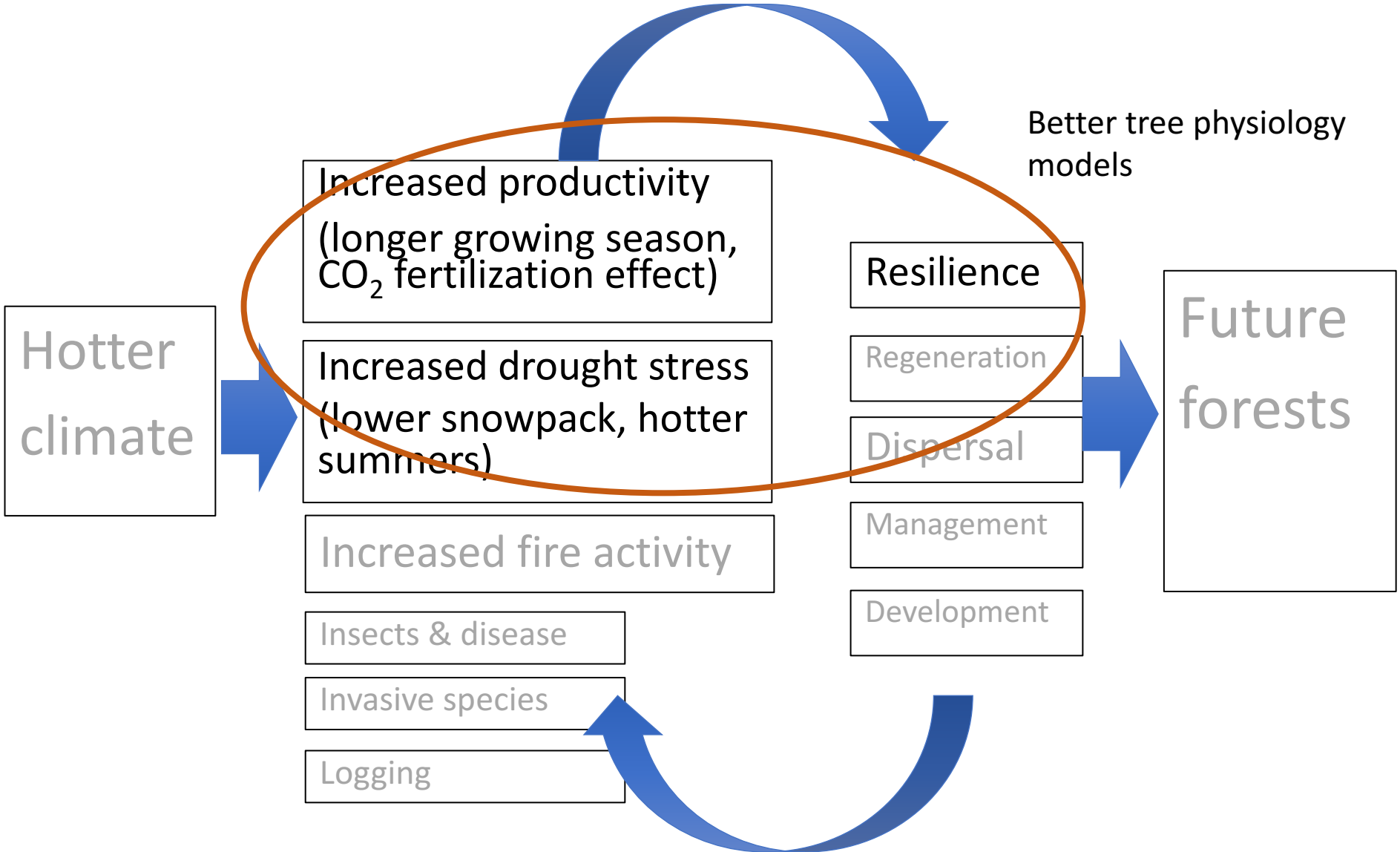
Warm/wet climates

- Wet species replaced dry forests, woodlands expand (Whitlock and Bartlein 1997)

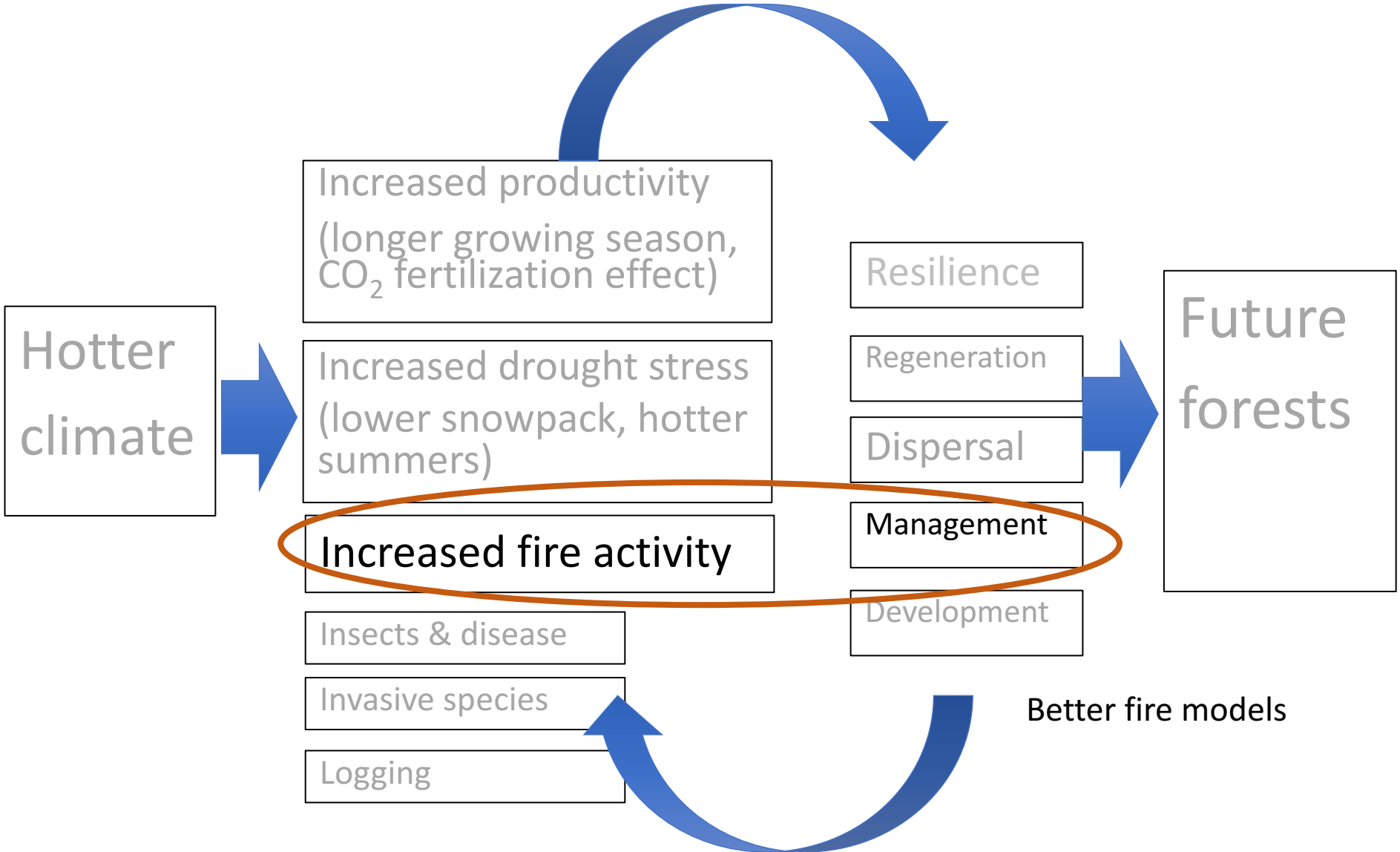
➢ Disturbances will have a major effect in determining which species will persist

➢ Dry forests may be more resilient than other forest types (Halofsky et al. 2014)

Need to model major driver #1



Need to model major driver #2



Where (and why) some models get it wrong

- What do other lines of evidence indicate?
- What are the implications for interpreting model projections?
- What about tree physiology and drought response?
- What do we know about regeneration & succession dynamics?
- What methods exist to evaluate and synthesize those lines of evidence?

Questions
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