

LANDFIRE data and ecological departure: an analysis of ecosystem loss and structural change



THE TNC LANDFIRE TEAM
RANDY, SARAH, KORI, JIM AND JEANNIE

Goals

1. Introduce co-authors and The Nature Conservancy
2. Set the stage for THE QUESTION
3. Present data, analysis and results



Boys as primary foragers

The authors...



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Introduction to



The mission of The Nature Conservancy is to conserve the lands and waters on which all life depends.



TNC=Totally Non-Confrontational



Introduction to



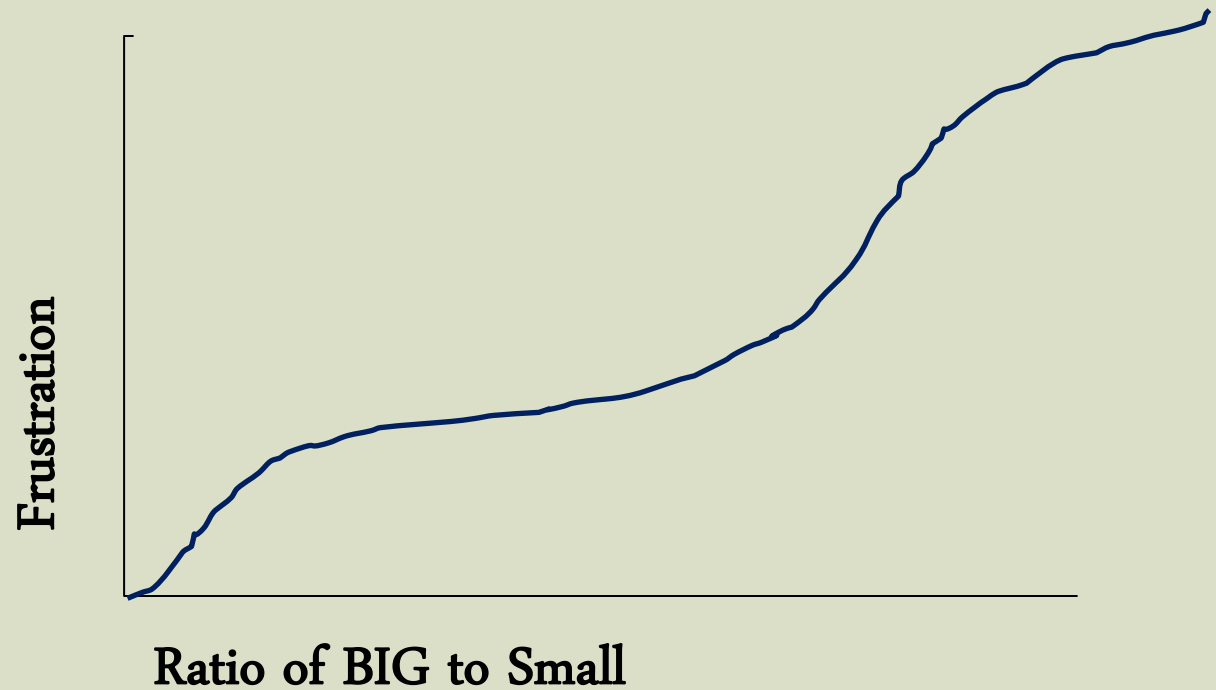
What does thinking big mean?

- Development by Design: being proactive
- Conservation Partnership Center: robust relationships
- “Working” easements: eliminating threats, preserving ways of life



To do this work we need science—we need to understand the condition of the ecosystems we care about

Beer Discussion Moment #1

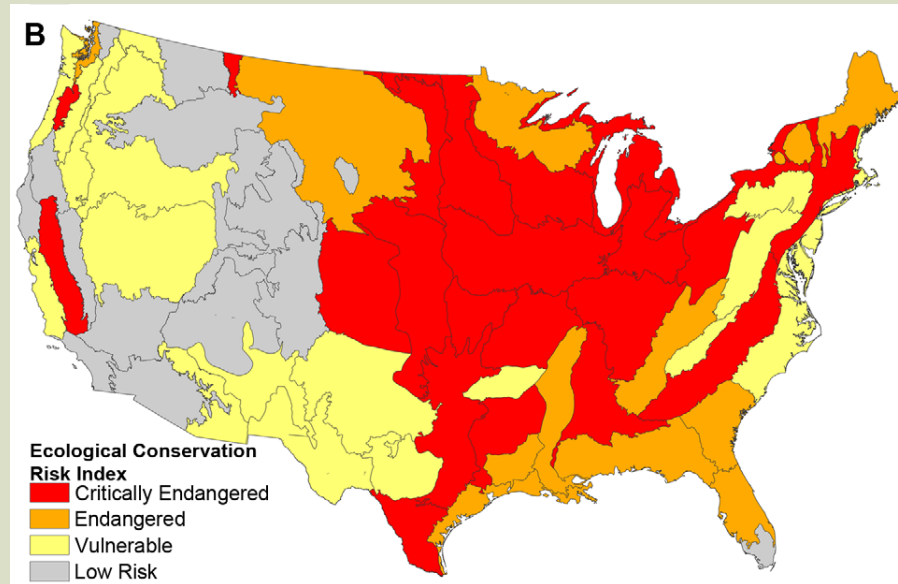


Hagen-Swamy statistic = 0.96, $p < 0.05$



Previous knowledge-recent paper in PLoS1

- Roughly 24% of the country is AG, 5% UR
- 23% of the US remaining ecosystems are highly altered



$$\text{ECRI} = (\% \text{ Converted} + \% \text{ Highly Altered}) / \% \text{ Protected}$$

What's the question???

Which ecosystems of the central US are most degraded and/or converted to Ag and Urban?



Reference



Current

In the past we have been limited to coarse-level assessments of loss and/or local assessments of conditions



Introduction to



LANDFIRE is...

an innovative project designed to create and periodically update comprehensive vegetation, fire and fuel characteristics data using a consistent process for the entire United States.

KEYWORDS: nationwide, consistent, ecological models, GIS data, tools, fire/non-fire





Introduction to



Objective-*for TNC's LANDFIRE Team:*

Then: To describe how the Ecological Systems of the US looked and worked prior to European settlement

AND

Now: To assist potential users in appropriate application of LANDFIRE products for conservation results **at landscape scales**

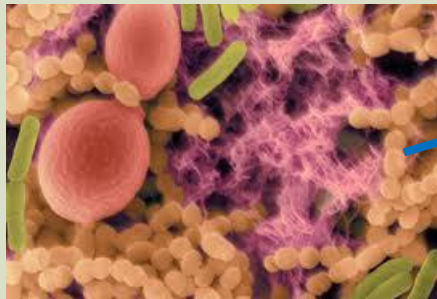
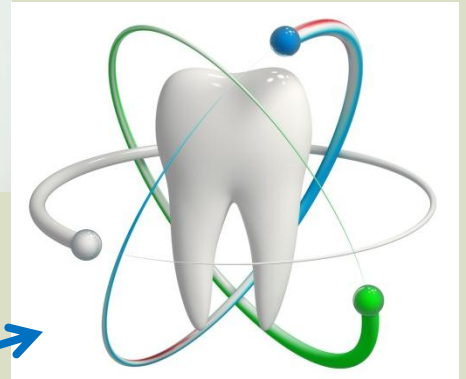


LANDFIRE reference conditions

- Described how 1300+ ecosystems looked and worked pre-European settlement
- Broke each ecosystem into 5 or fewer succession classes
 - Defined by species, % cover and height
 - Used Vegetation Dynamics Development Tool (VDDT) to model % of each



Modeling your mouth-it's all the same



Model Development

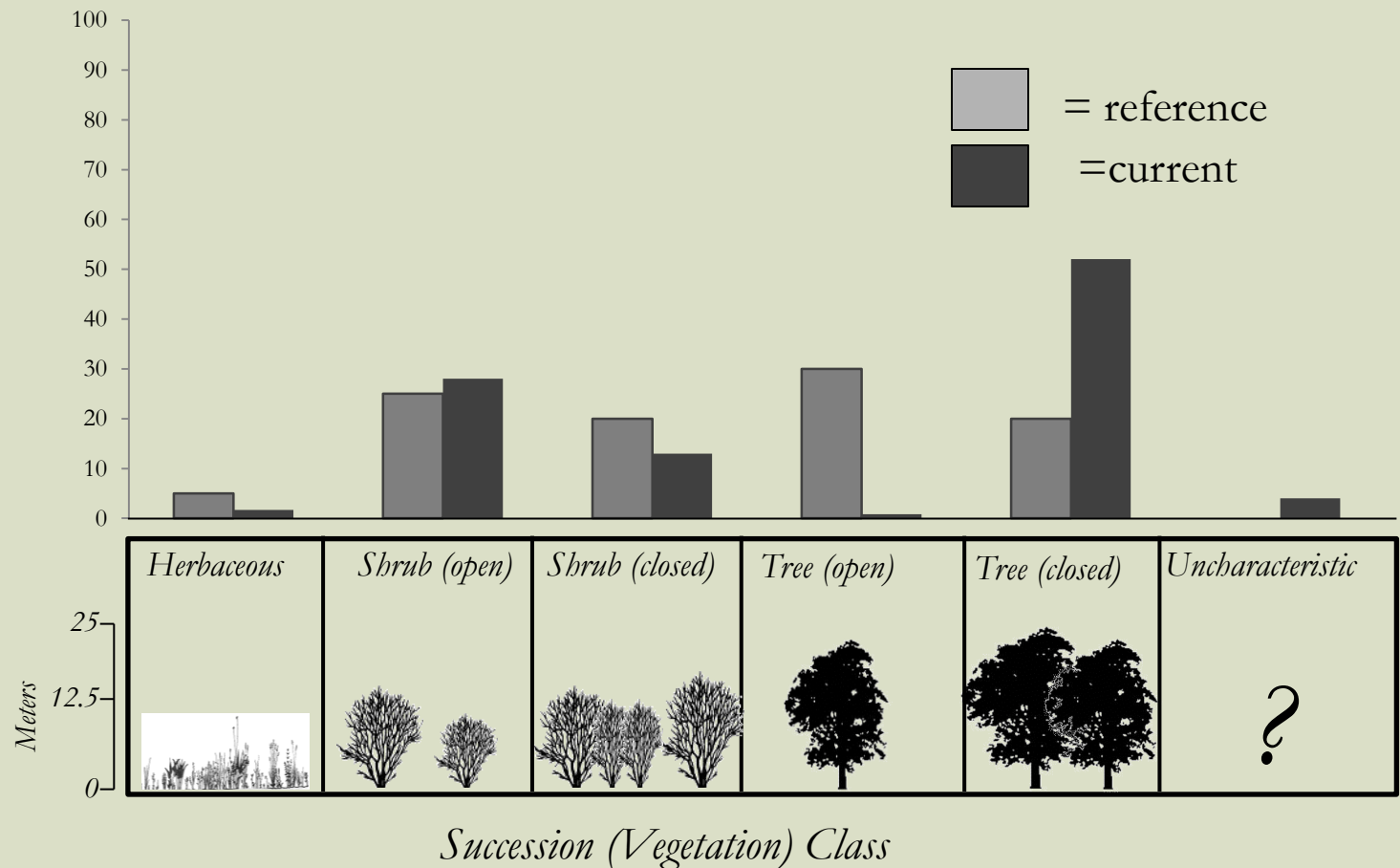
Prairie
0-5 years
open





LANDFIRE Vegetation Departure

Ozark Oak woodlands example





Vegetation Departure/Alteration Math

Succession Class	Reference %	Current %	Similarity
A--Early	15	0	0
B--Mid-Closed	5	35	5
C--Mid-Open	35	5	5
D--Late-Open	30	5	5
E--Late-Closed	15	45	15
Uncharacteristic	0	10	0
Sum of Similarity	100	100	30
Departure (100-Similarity Sum)			70

Departure values over 66 were considered “High”



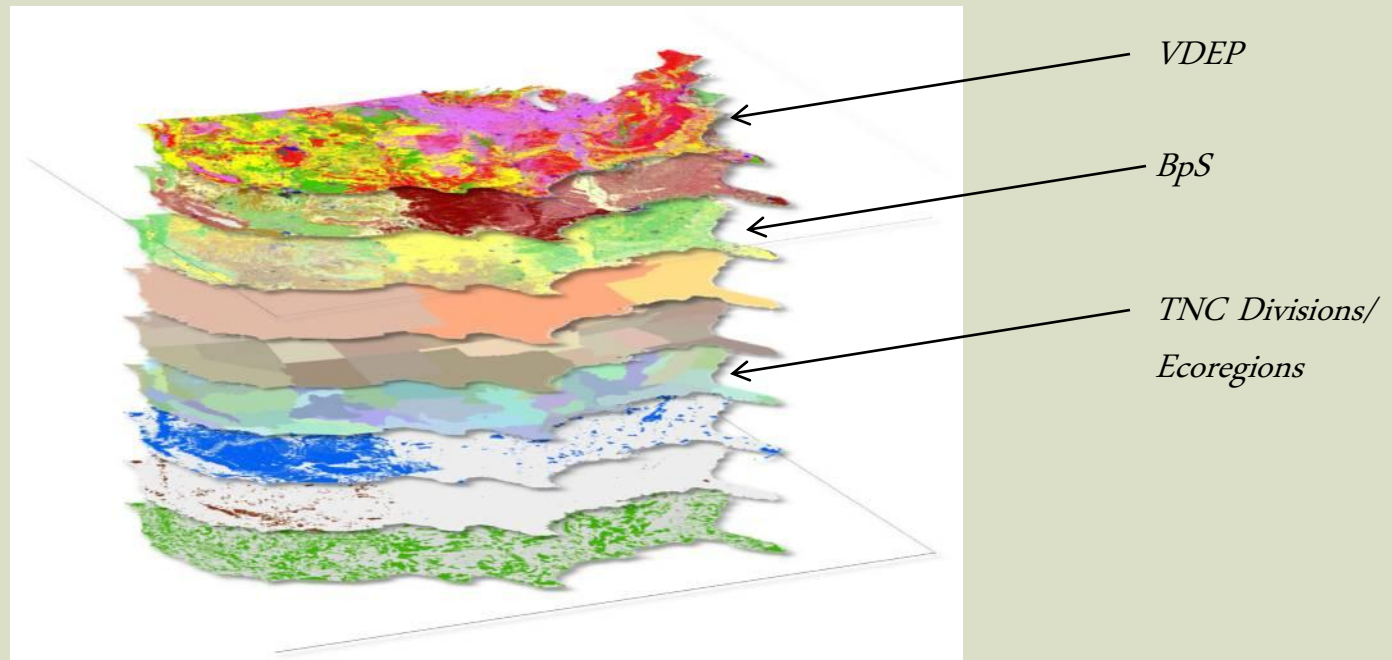
Beer Discussion Moment #2

Reference conditions-how valuable are they in the face of climate change, resource extraction, invasives, deer, etc.



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LANDFIRE data is seamless and works together



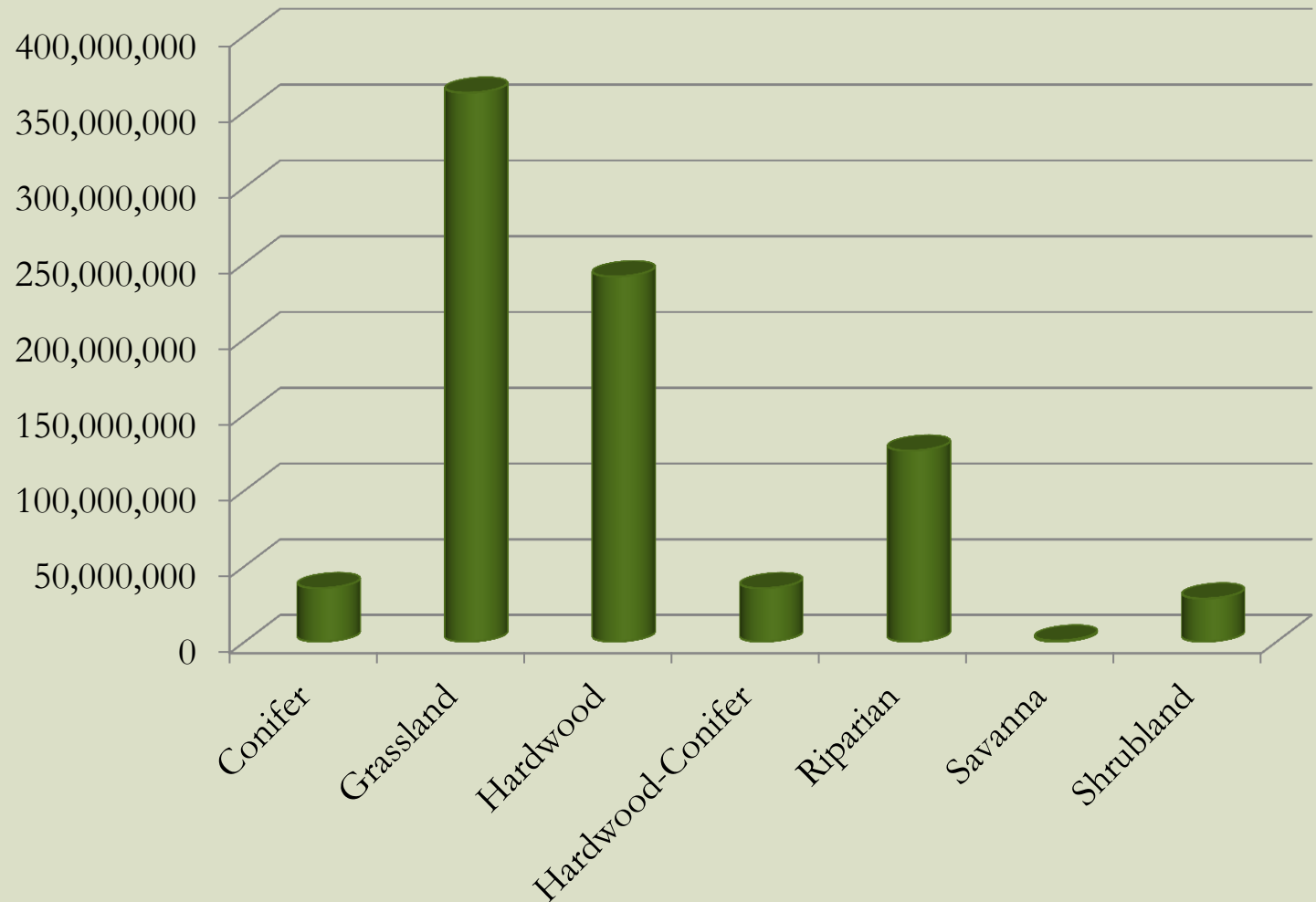
Our Study Area – Central US



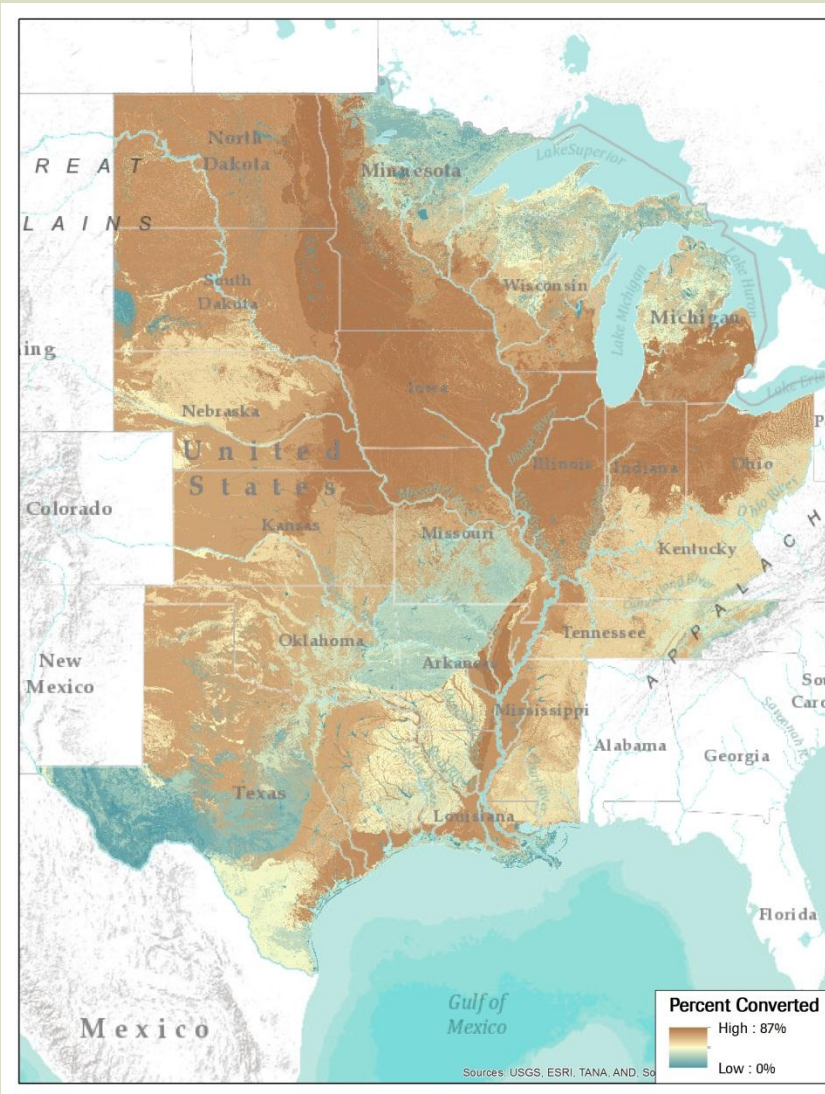
Major Pre-Settlement Vegetation Types



Total Acres in Each Pre-Settlement Major Vegetation Type

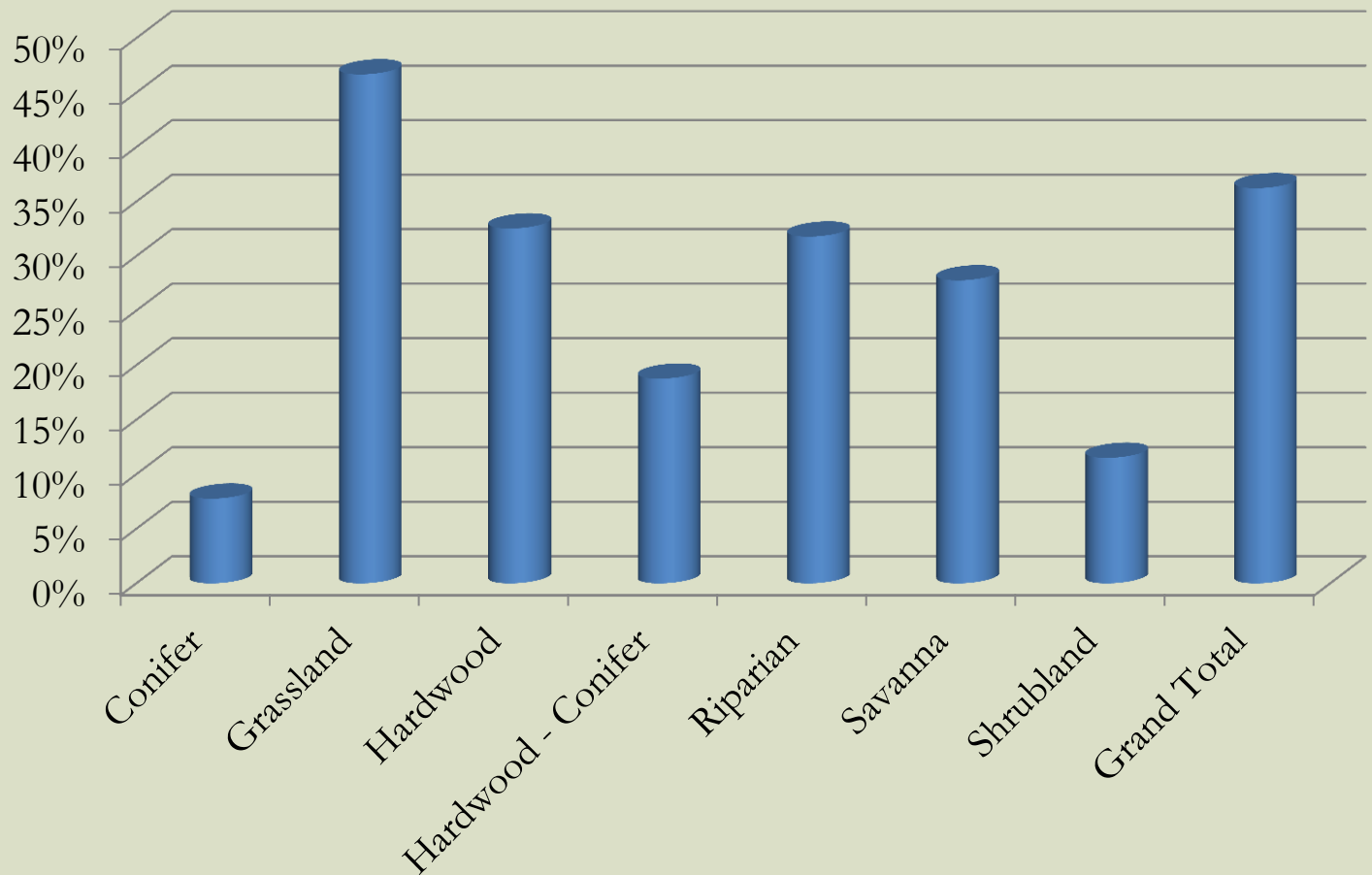


Percent Conversion (Ag or Urban)



Percent Conversion (Agriculture or Urban) in Each Vegetation Type

Percent Converted



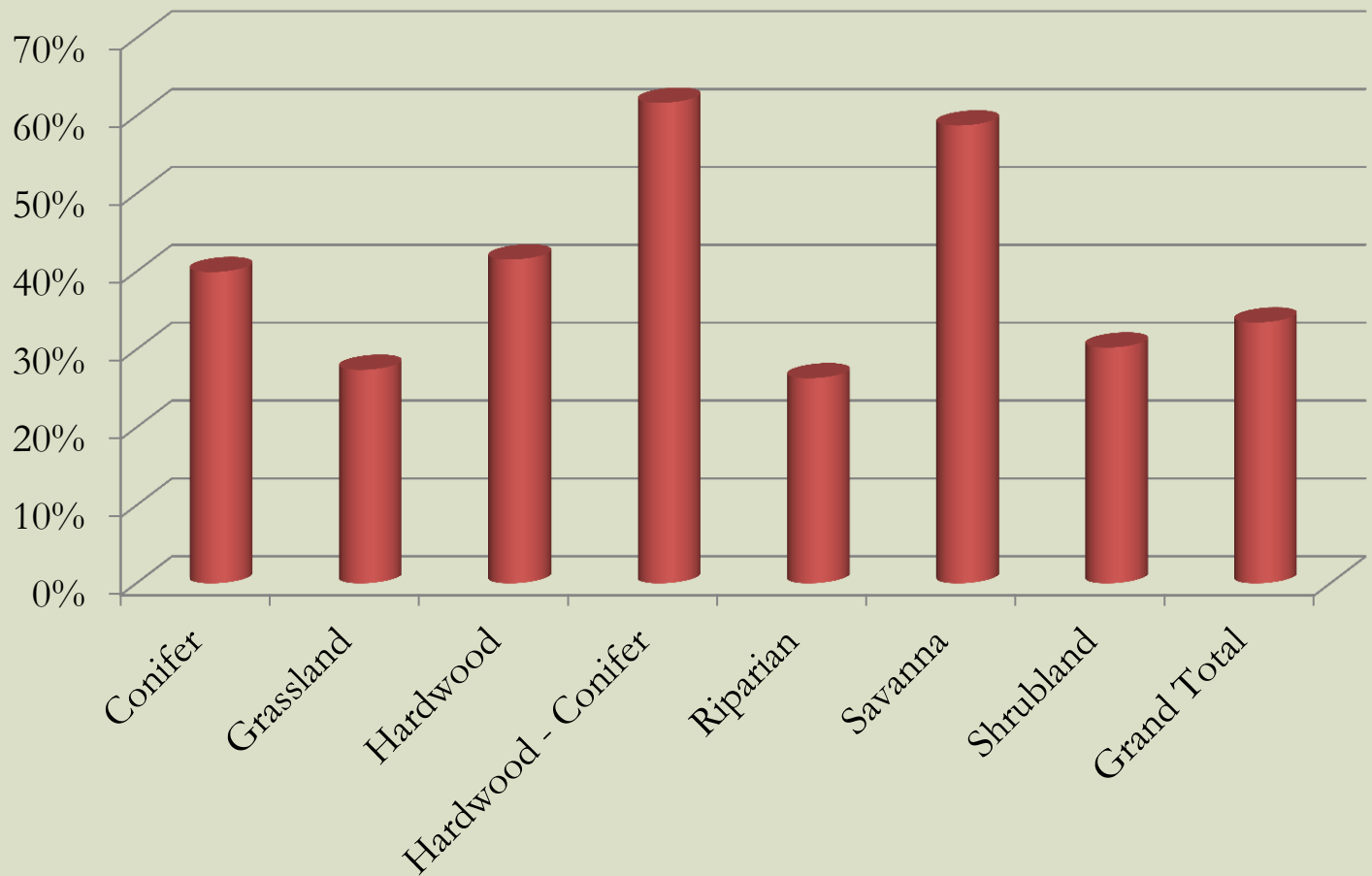
Percent Highly Departed



Percent High Departure in Each Vegetation Type



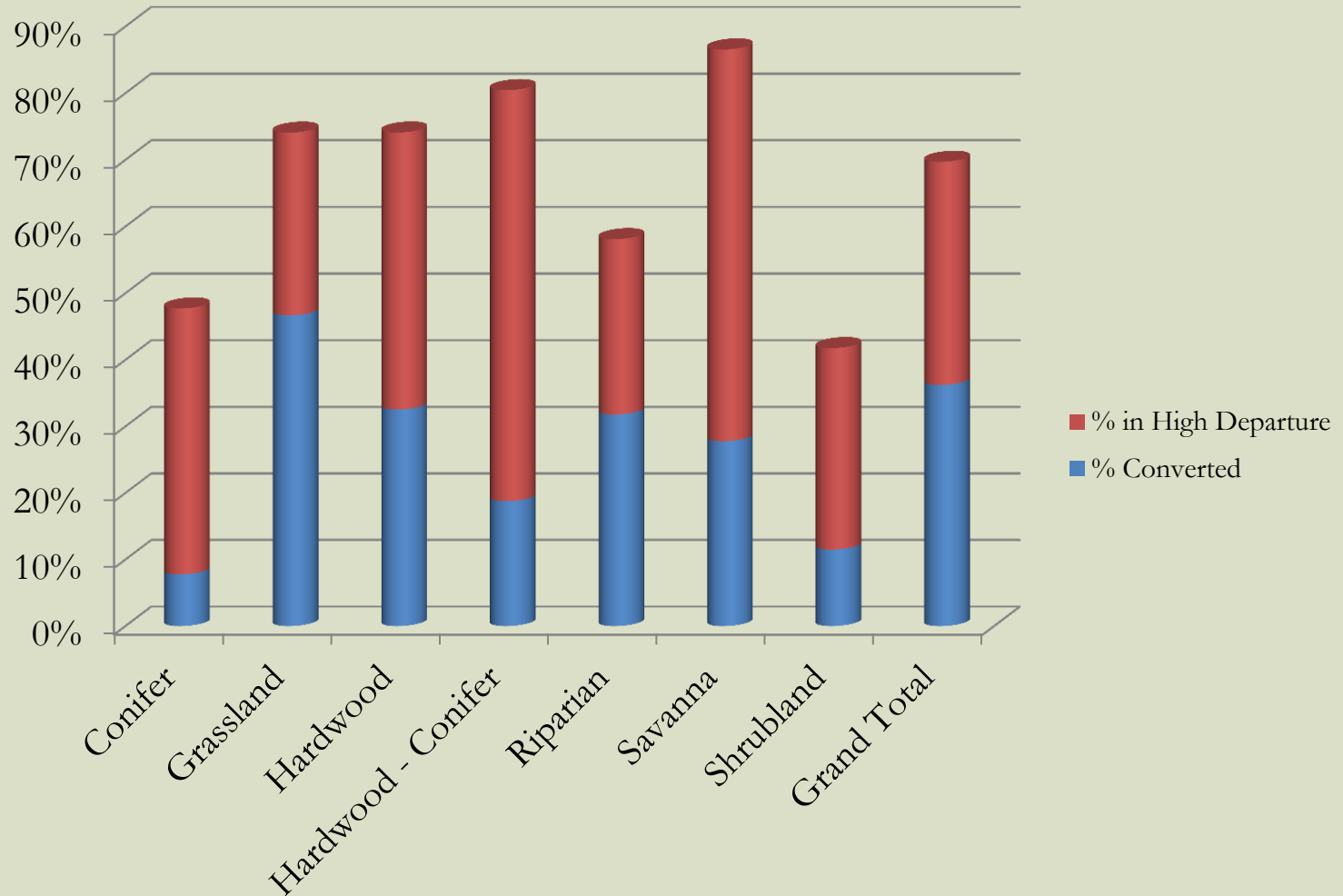
Percent in High Departure



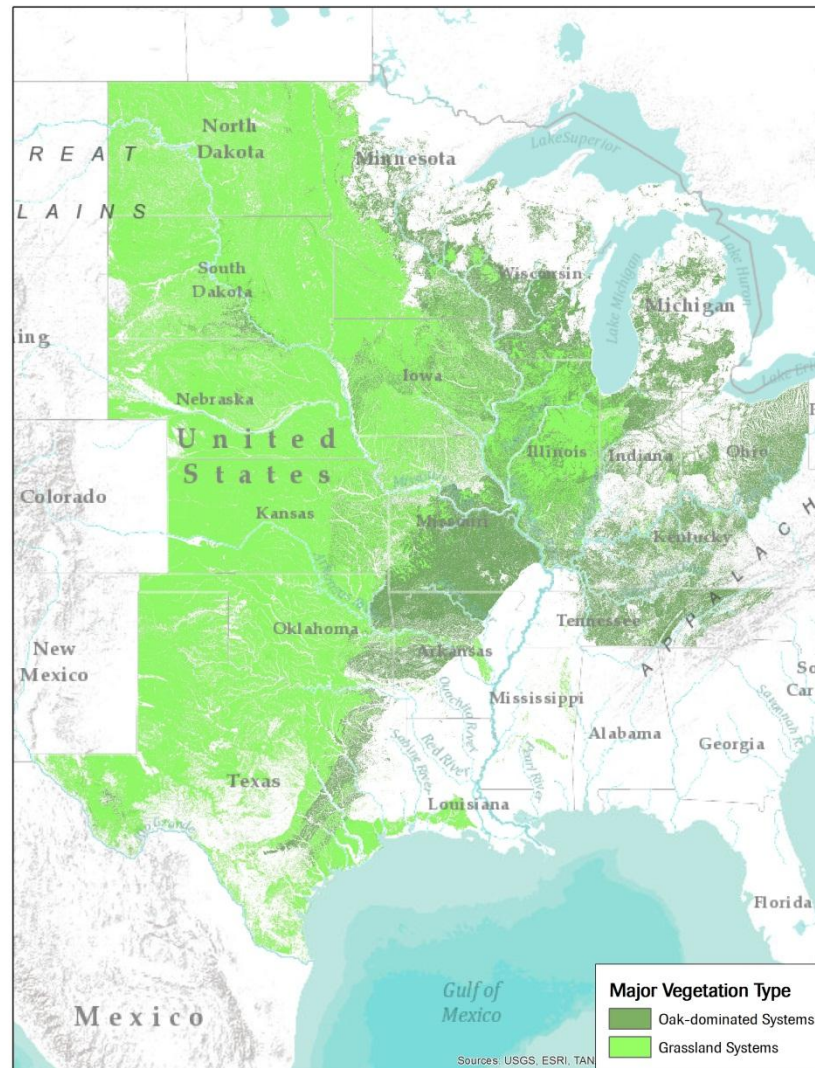
Percent Change (Conversion plus High Departure)



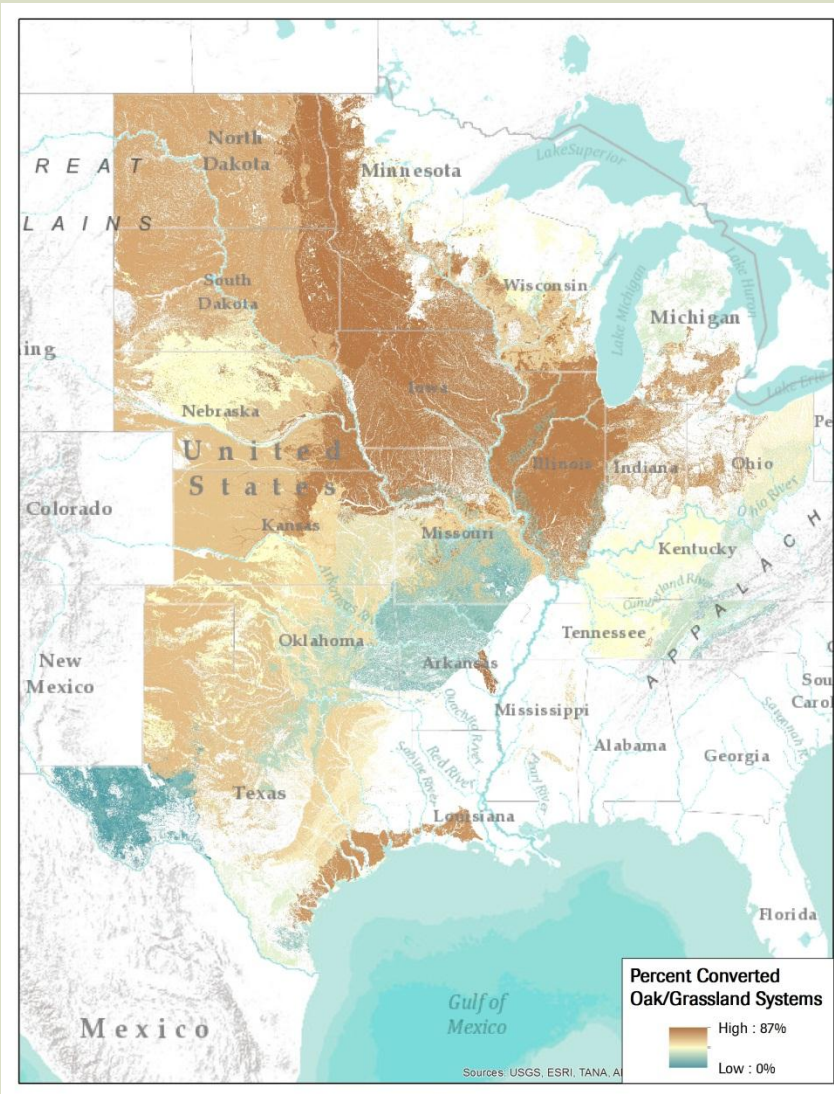
Percent Change (Conversion plus High Departure) in Each Vegetation Type



Oak and Grassland Systems



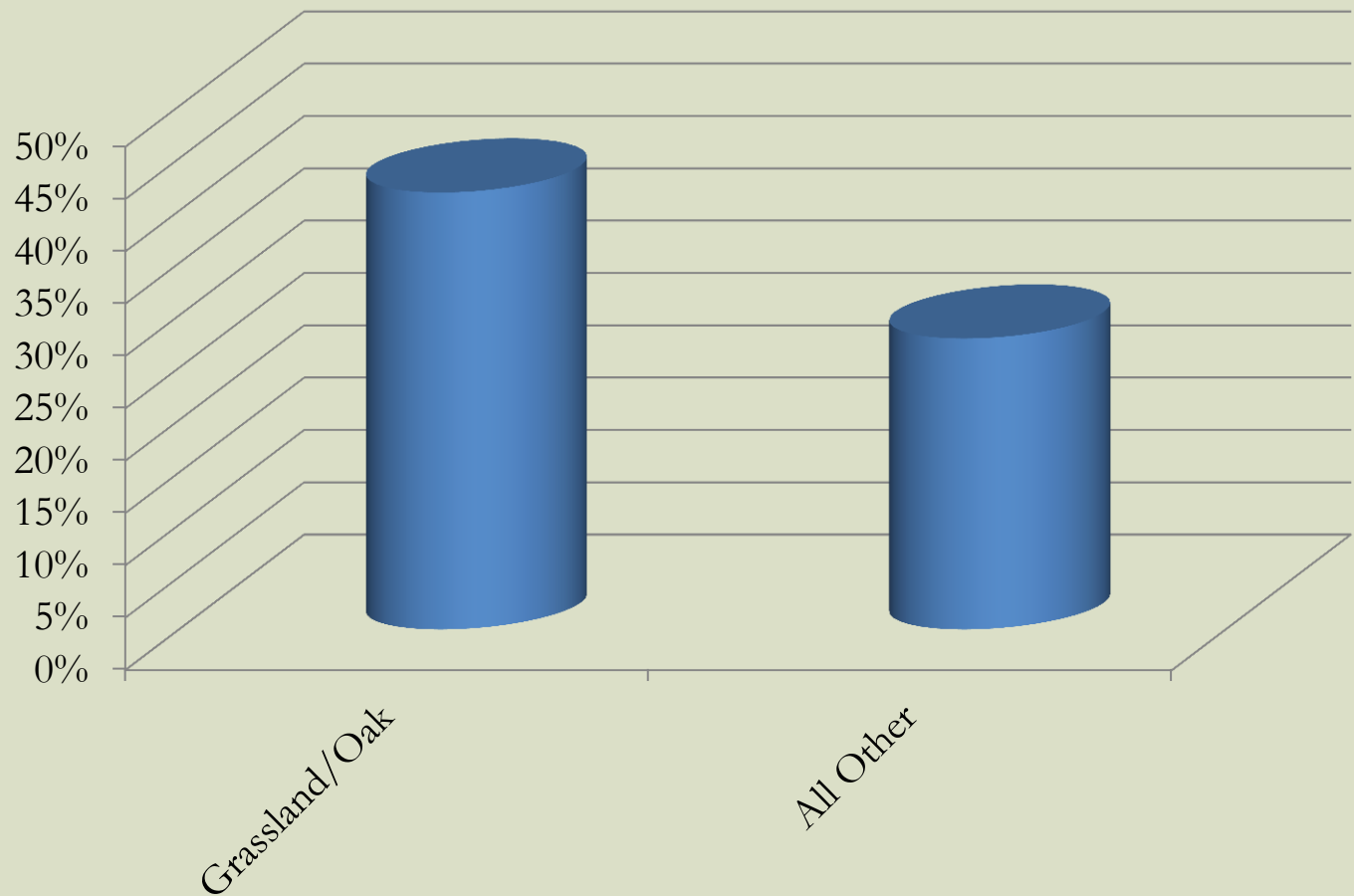
Percent Conversion (Ag or Urban) in Oak and Grassland Systems



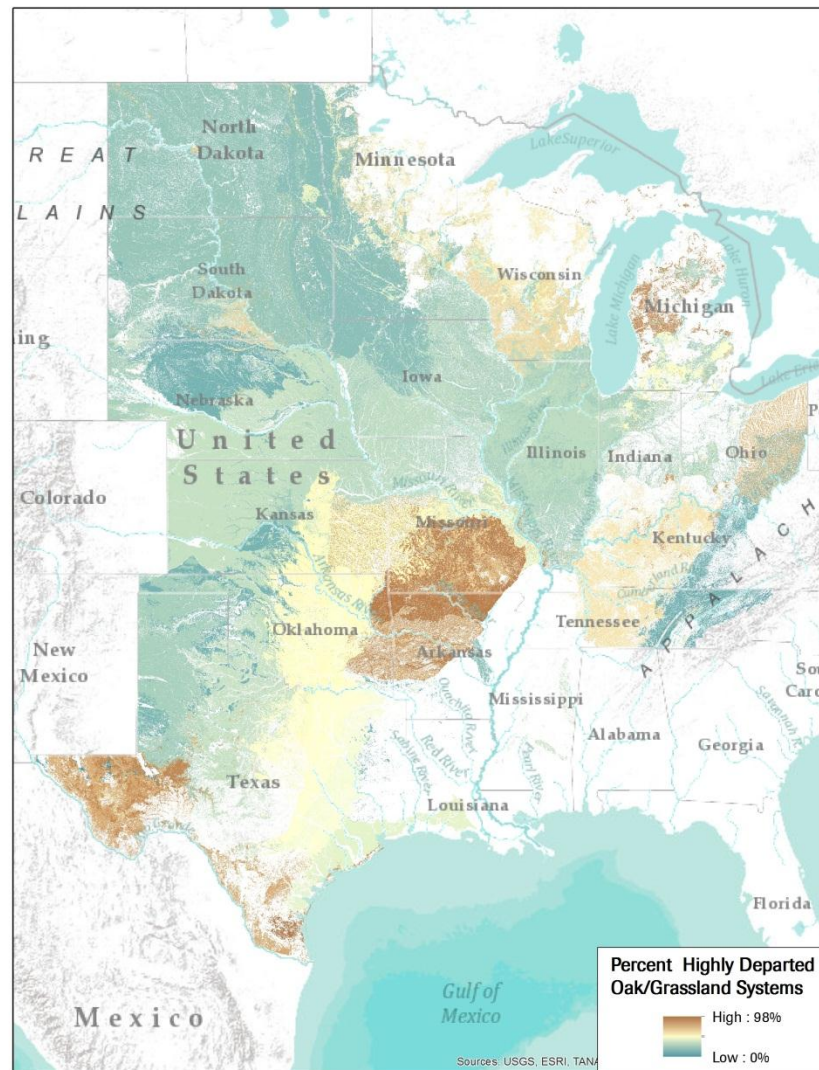
Conversion in Oak and Grassland Systems



Percent Converted



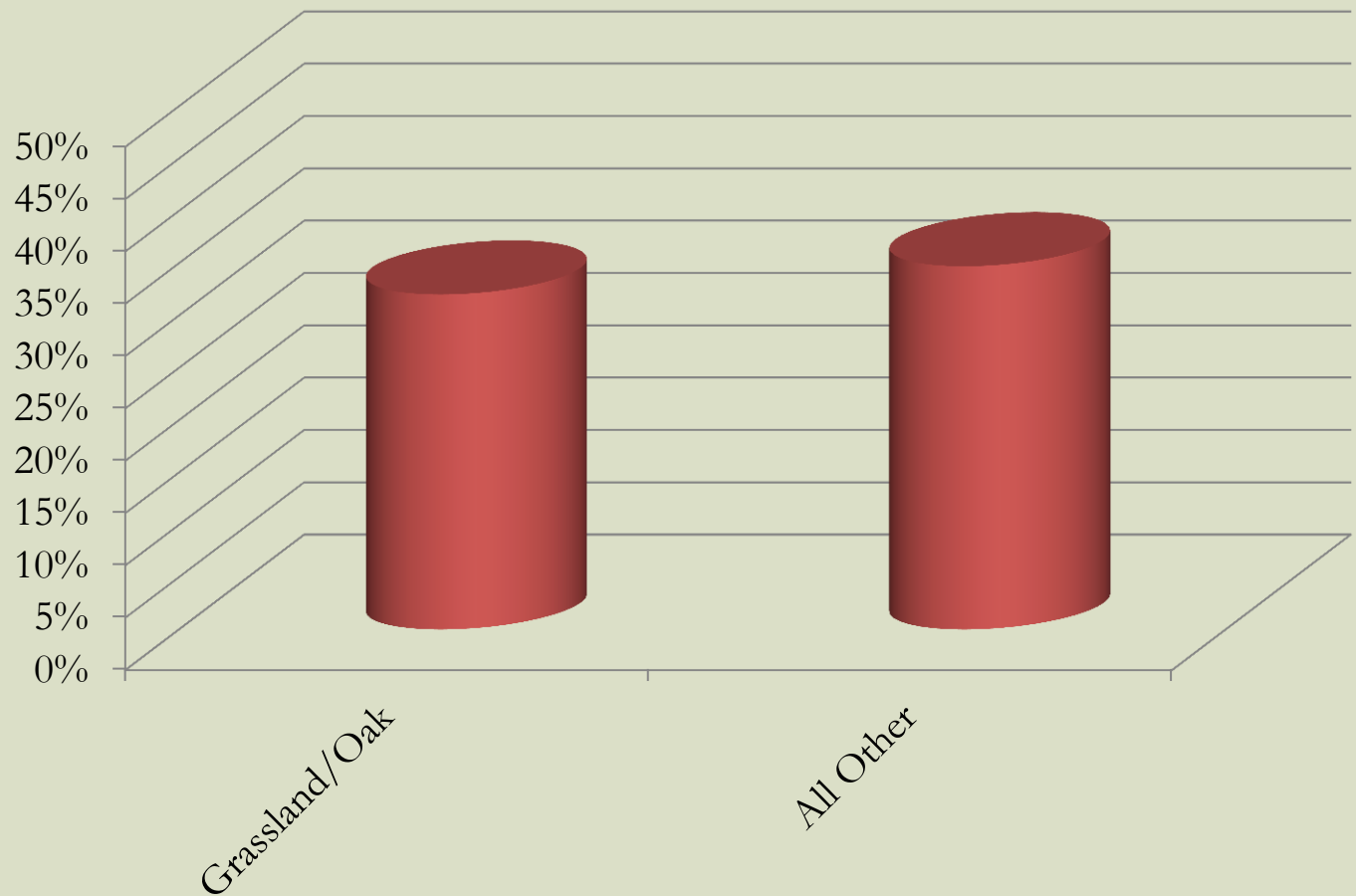
Percent High Departure in Oak and Grassland Systems



High Departure in Oak and Grassland Systems



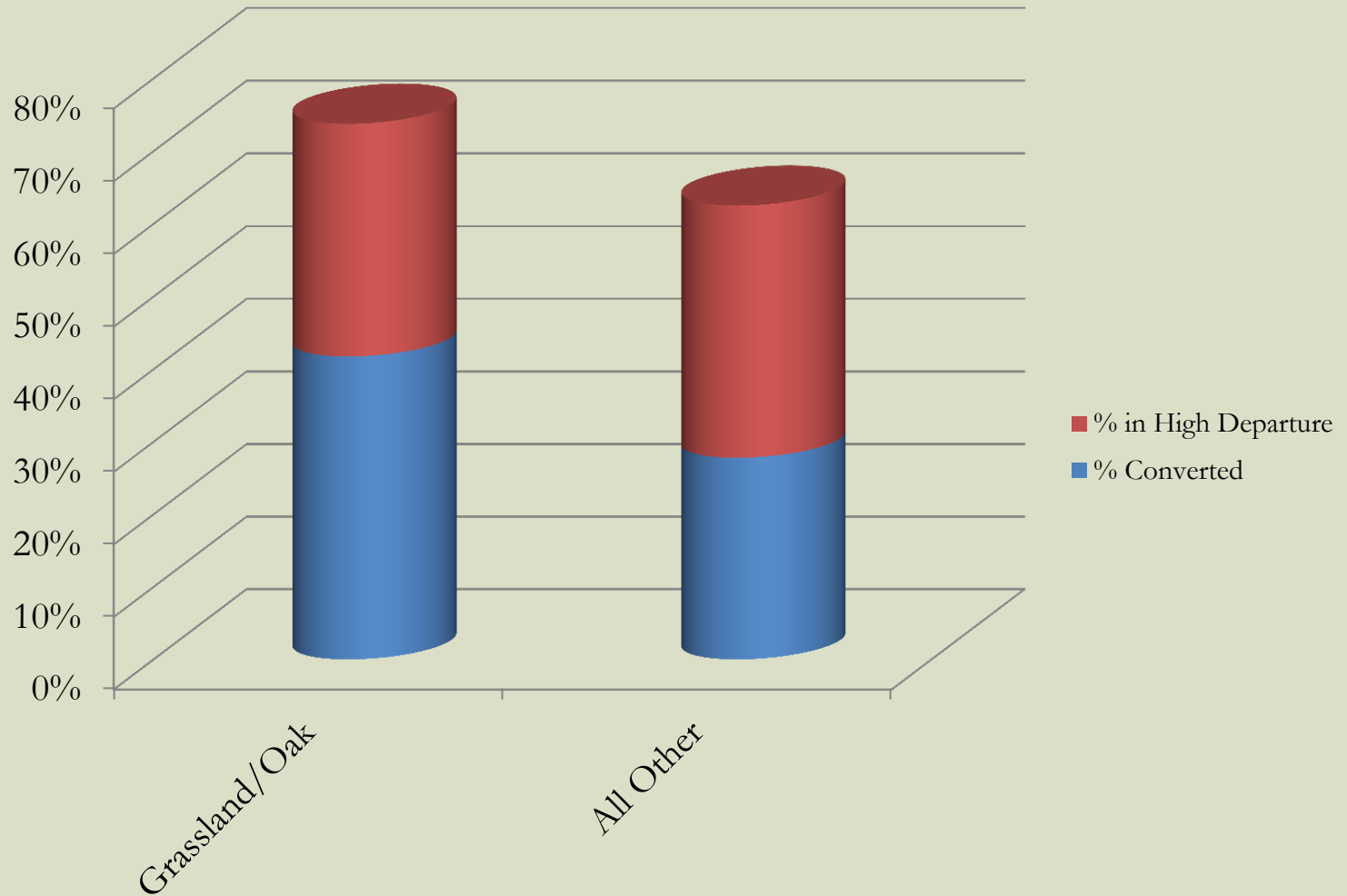
Percent in High Departure



Percent Change (Conversion and High Departure) in Oak and Grassland Systems



Change in Oak and Grassland Systems



Consequences of life-form shifts in grasslands



Shrub encroachment has profound effects

- Reduced species diversity (Wessman et al. 2004, Briggs et al. 2005, Knapp et al. 2008)
- Altered carbon and nitrogen cycling (Knapp et al. 2008)
- **Increased evapotranspiration-drought implications** (Knapp et al. 2005, also see Breshears et al. 2005)



So what

- We need to work at bigger scales, often with reducing budgets-this makes landscape scale prioritizations even more important
- These analyses tell a story-one that the public needs to hear
- Now we need to connect these changes to climate, economics and human health





So what-another Beer Moment

Does higher departure mean higher cost to restore? See Nowacki 2008 and others

Does high departure mean higher vulnerability to pests, climate change and other threats?

When and where are “Reference Conditions” important?





Where to learn more

WEB:

www.landfire.gov

<http://www.conservationgateway.org/topic/landfire>

Twitter:

@nature_LANDFIRE

@RLSwaty



Also:

Numerous peer reviewed publications. Search PLoS
most fire journals, the ESA journals and Google Scholar.

OR call me!



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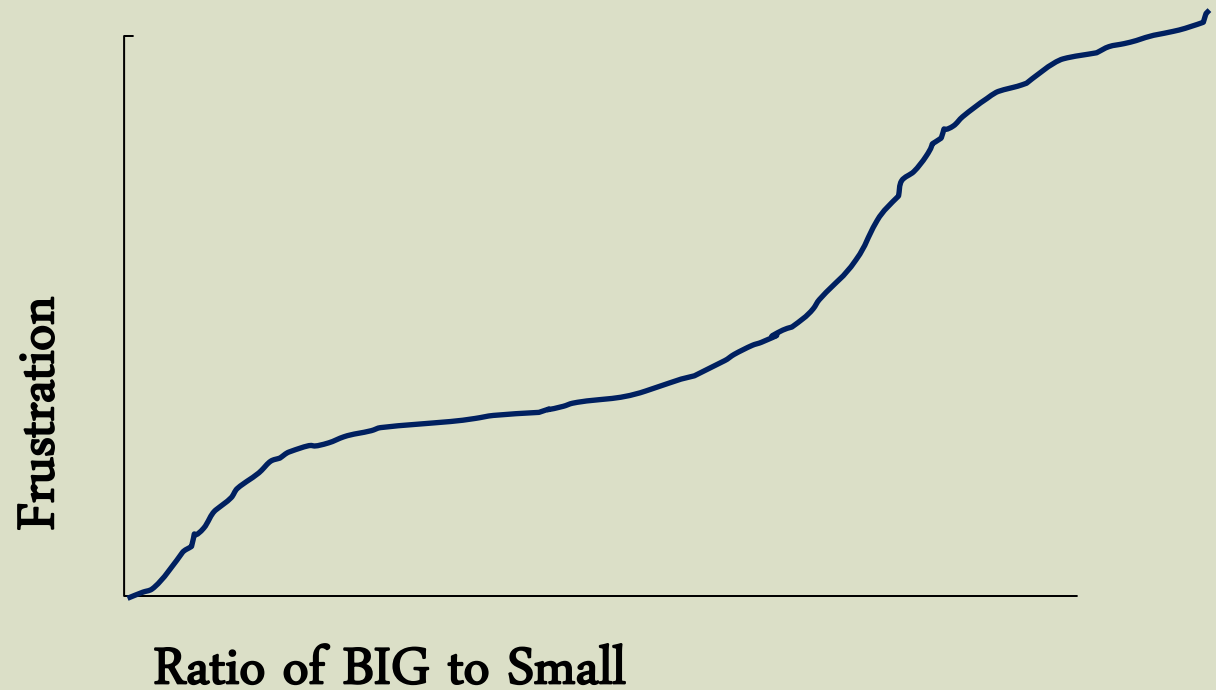
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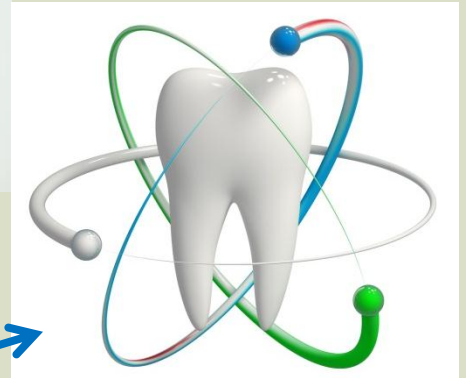
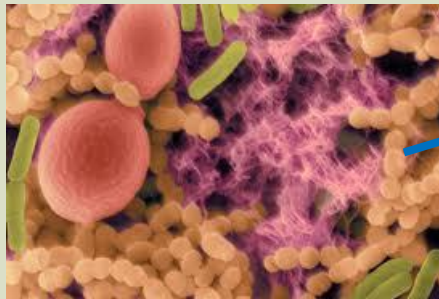


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