



# Precision Science: Informing Restoration Decisions

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# Precision Science

- One size does not fit all
- Understanding local/regional conditions to inform restoration decisions
  - Threats
  - Soils
  - Precipitation gradients
  - Right plant in the right place
- Clearly defined goals
- Greater sage-grouse and sagebrush

Cheatgrass



Biological Soil Crusts

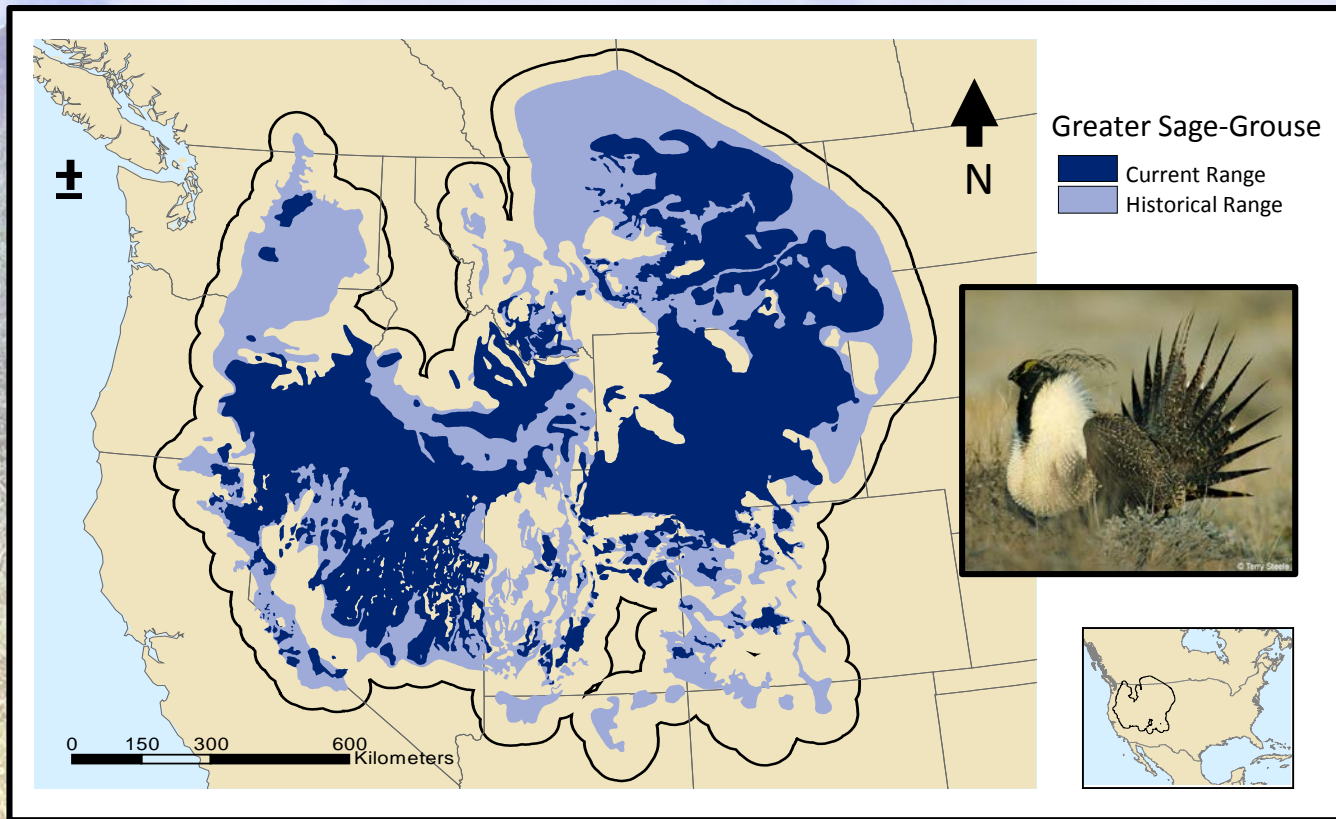


Greater Sage-grouse





# Greater Sage-Grouse



# Threats to Greater Sage-Grouse Habitat



Altered fire regimes



Conifer Encroachment



Energy Development

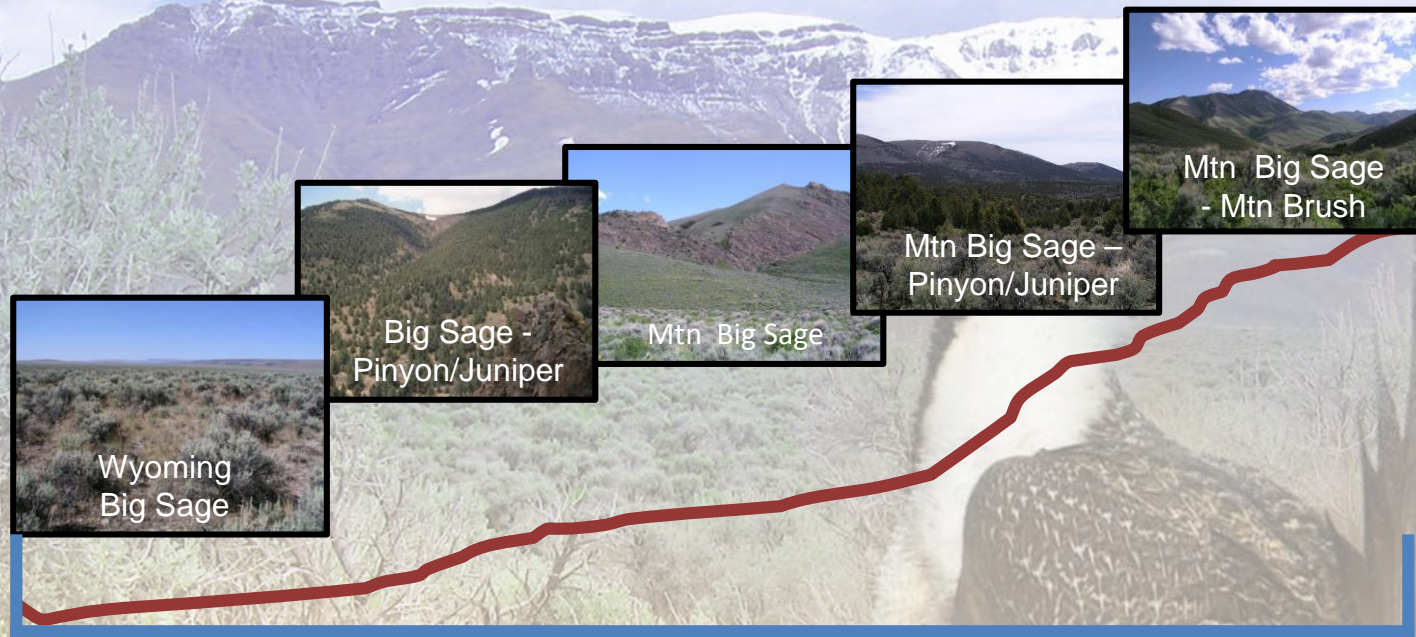


Agricultural Conversion





# Environmental Gradient Within the Sagebrush Ecosystem



Warm-Dry ←

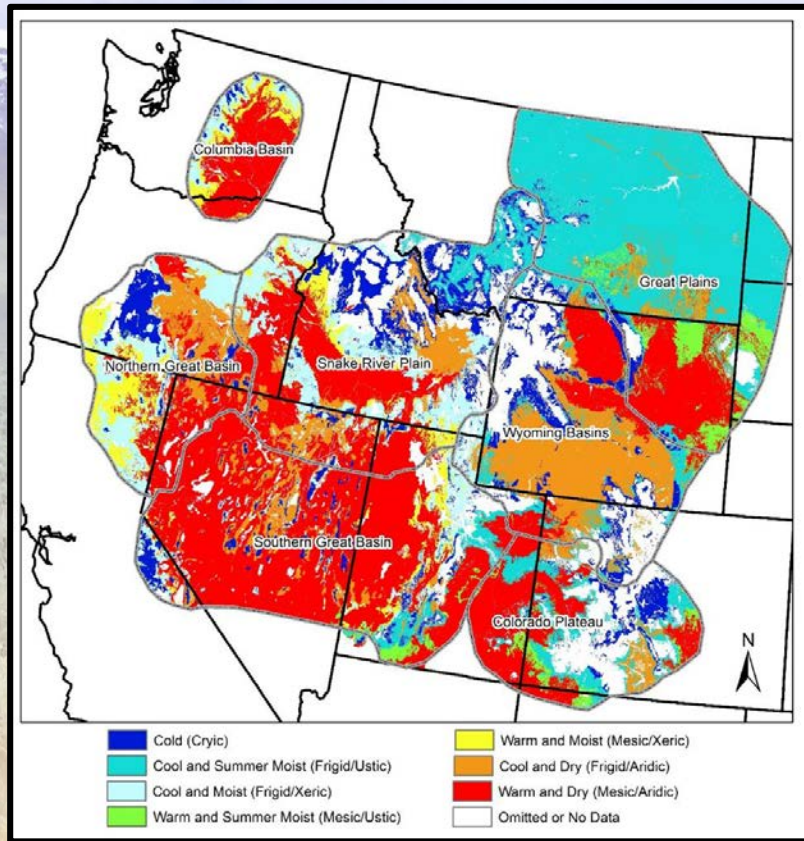
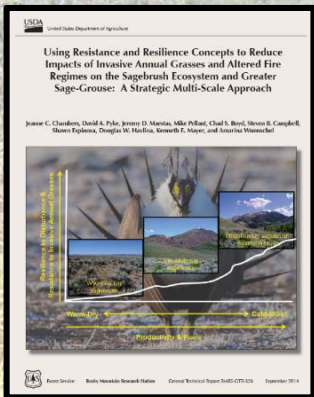
→ Cold-Moist

Elevation/Productivity →



# Depicting the Environmental Gradient

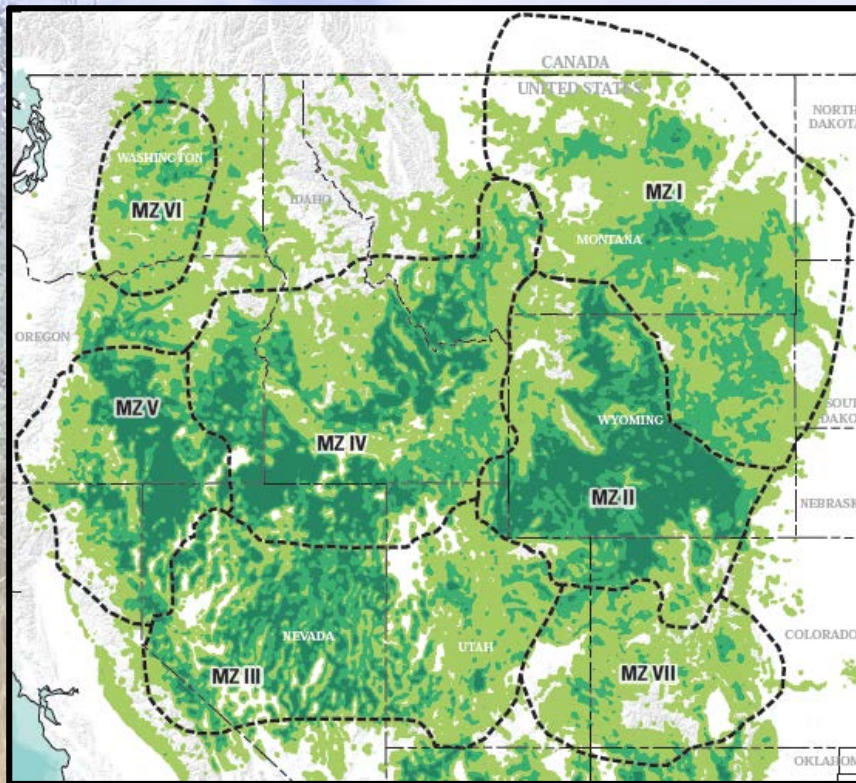
*Soil Temperature and Moisture Regimes* can be used as coarse, landscape indicators of potential resistance of sagebrush to cheatgrass invasion and resilience following disturbance



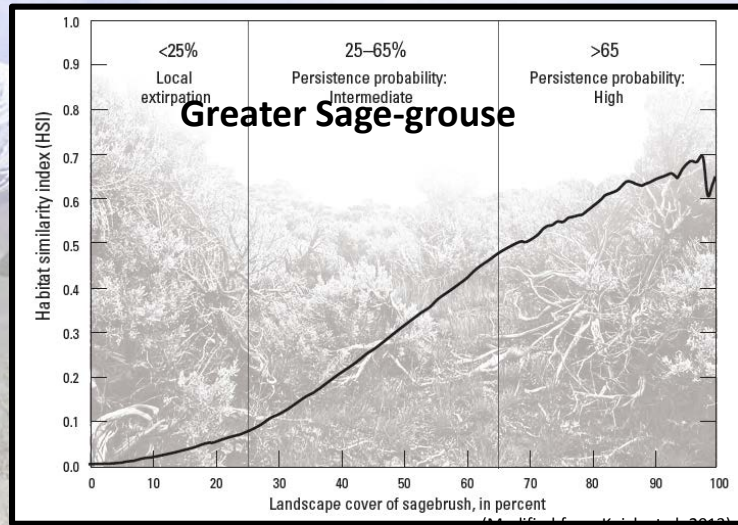
(Chambers et al. 2014, Maestas et al. 2016)



# Landscape Cover of Sagebrush

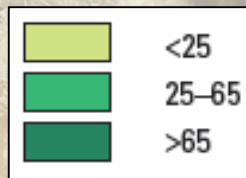


(Chambers et al. 2014)






(Modified from Knick et al. 2013)

## Sagebrush Landscape Cover (%)



# Sage-Grouse Habitat Resistance and Resilience Matrix

		Proportion of Landscape Dominated by Sagebrush		
		Low = < 25%	Medium = 25-65%	High = > 65%
Resilience & Resistance of Sagebrush Ecosystem	 <p><b>High</b></p>	<p><b>RESTORATION/RECOVERY POTENTIAL HIGH</b>  <i>Native grasses and forbs sufficient for recovery</i>  <i>Annual invasive risk low</i></p>		
	Requires longer timeframe, enhance connectivity.	Little intervention needed, enhance connectivity.	Little-to-no intervention needed.	
	 <p><b>Moderate</b></p>	<p><b>RESTORATION/RECOVERY POTENTIAL INTERMEDIATE</b>  <i>Native grasses and forbs usually adequate for recovery</i>  <i>Annual invasive risk moderate</i>  <i>Treatment success depends on site characteristics</i></p>		
Requires longer timeframe and intervention.	Enhance connectivity, minimize risk of invasives.	Little intervention needed, minimize risk of invasives.		
 <p><b>Low</b></p>	<p><b>RESTORATION/RECOVERY POTENTIAL LOW</b>  <i>Native grasses and forbs inadequate for recovery</i>  <i>Annual invasive risk is high</i>  <i>May require multiple management interventions</i></p>			
Recovery unlikely.	Long timeframe for recovery, high amount of intervention.	Moderate timeframe for recovery, moderate-high amount of intervention.		



# Strategic Decisions

**Healthy Sagebrush**



**Sagebrush–Cheatgrass Mix**



**Cheatgrass Dominated**





# Science Informing Restoration Decisions

