

Background

Cedar in Grasslands

- Eastern redcedar, *Juniperus virginiana*
- Native to Nebraska
- Grassland fires in the past limited cedar to topographically rough areas
- Fire suppression and tree planting have allowed invasion onto rangelands and grasslands

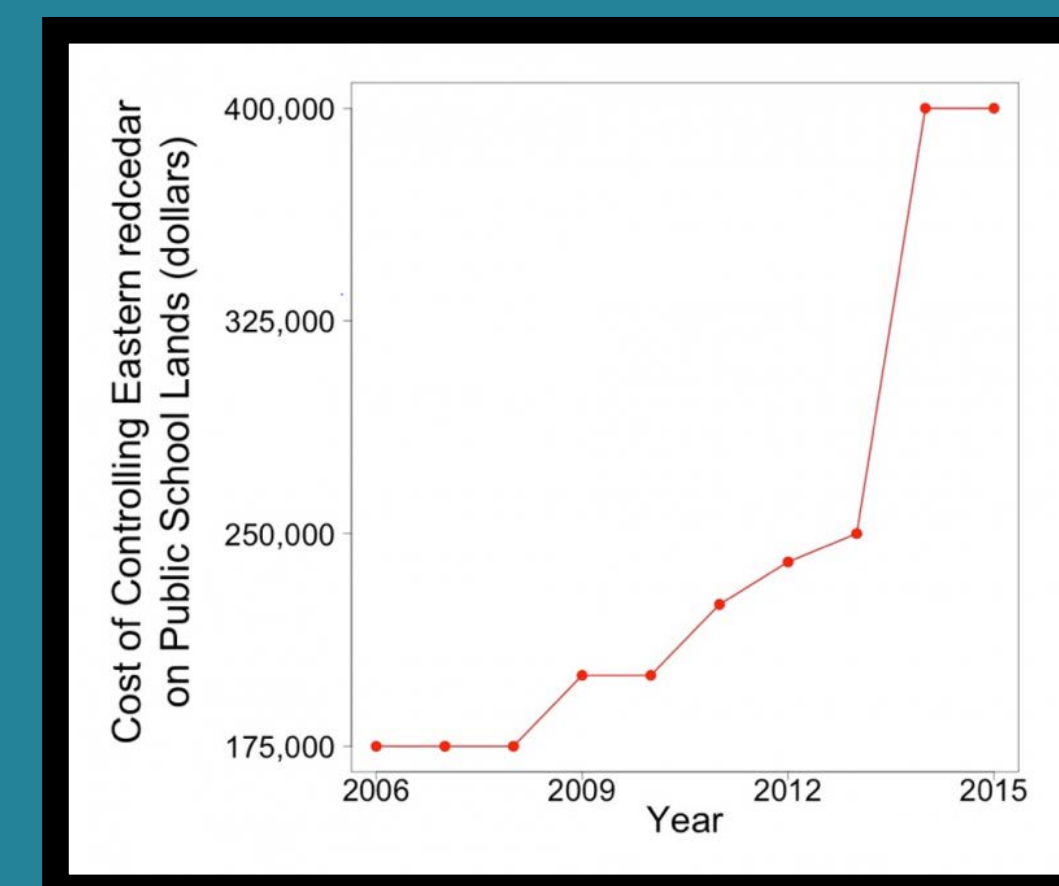
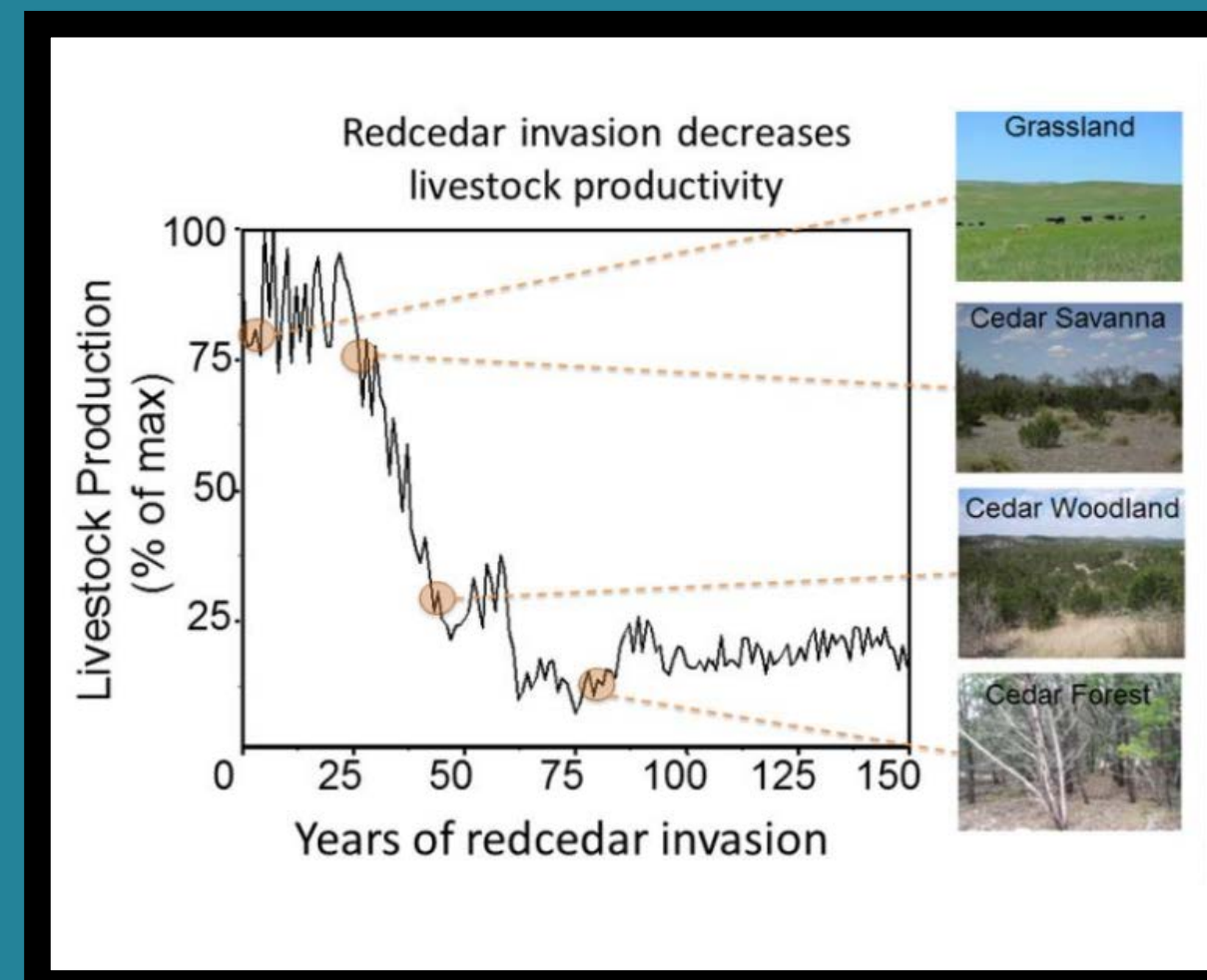


Benefits

- Windbreaks
 - Bushy, fast growing, drought-tolerant
- Aesthetics
- Woodland game/hunting

Negatives

- Ecological Impacts
 - Will shift dominant ecological system from grassland to woodland
 - Species affected
 - Birds
 - Small mammals
 - Insects
 - Native Grasses
- Economic Impacts
 - Reduced livestock production
 - 43% of NE land is used for livestock
 - Beef and veal exports totaled \$1.2 billion in 2017
 - K-12 education funding
 - Increased cost for wildfire management



Cost-Share Programs

- Encourage landowners to manage their land for a reason or in a way that they may not have considered
 - Financial and logistical support
 - Different management types are supported
 - Mechanical removal is most common
 - Nebraska Game and Parks promotes fire
- Goal is to manage cedar on a landscape scale
 - This has not been assessed
 - Most management is done on <100 acres

Types of Removal		
Mechanical	Chemical	Prescribed Fire
Expensive	Can be expensive	Cost-effective
Labor intensive	Difficult to apply	Legal restrictions
Common		Logistic restrictions
		Social restrictions

The Effects of Scale on the Management of Private Rangelands and Grasslands through Cost-Share Programs

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Objectives

- To determine how the incentive structure of cost-share programs to manage eastern redcedar affects the scale at which management happens
- Determine attributes which can be used to adapt cost-share programs to meet conservation goals of grassland-scale management

Research Questions

- What is the maximum amount of land rural Nebraska landowners are willing to manage for cedar with cost-share programs?
 - How do cost-share incentives change this maximum amount?
 - Is the maximum amount of land enough to prevent and/or reverse cedar invasion?
 - If so, is the incentive structure needed to do so feasible with current or projected cost-share funding?



Cedar Spread from a Windbreak



Scale

- Scale is temporal and spatial
- Organisms of different sizes interact with and perceive their environments in very different ways
- Humans are not exempt from the limiting perceptions scale

Contact Information

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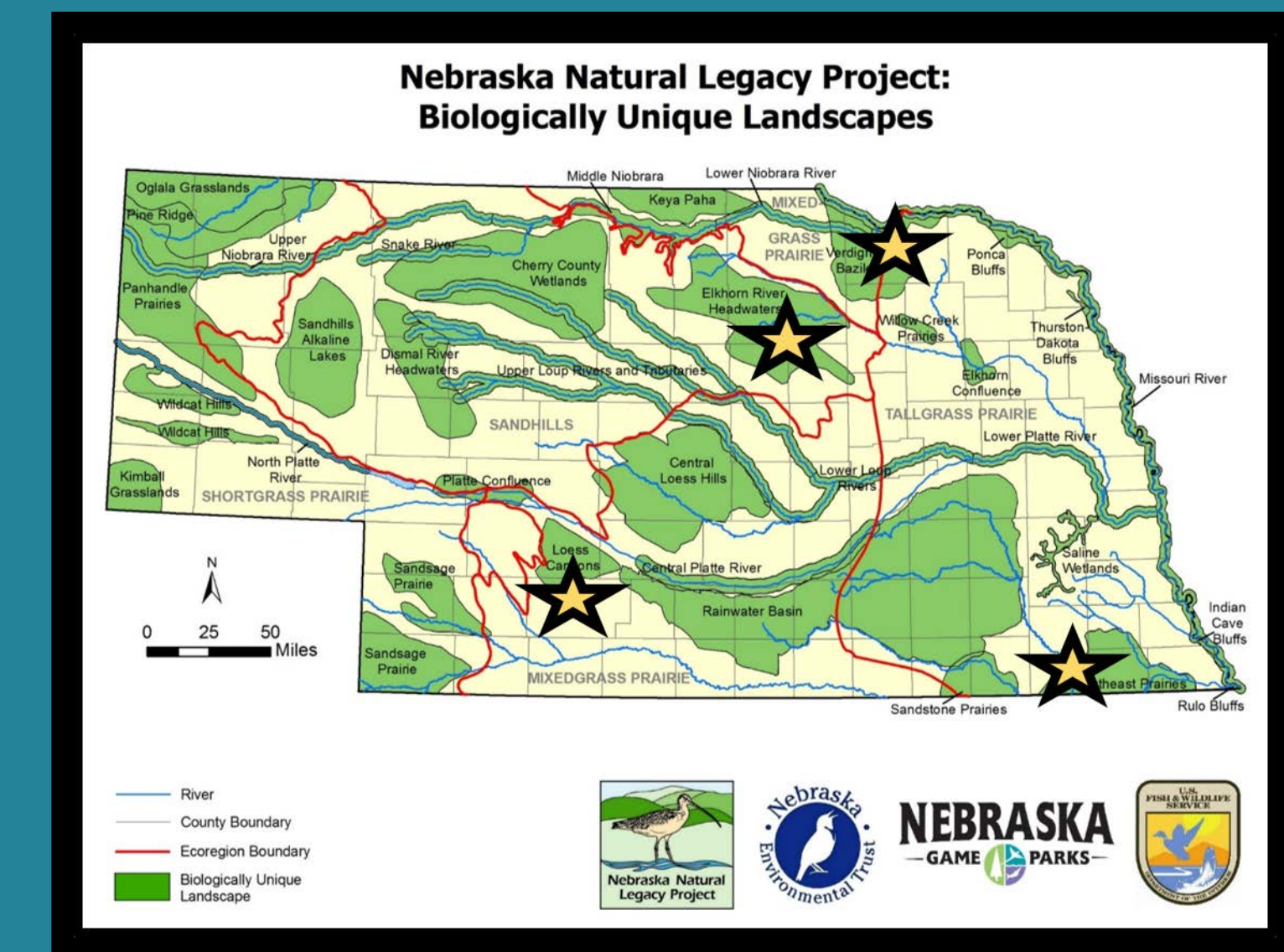
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For more information on cedar:
<https://cedarliteracy.unl.edu>

Methods

Study Sites

- Loess Canyons
- Southeast and Sandstone Prairies
- Verdigris-Bazile
- Elkhorn River Headwaters



Mail Survey

- 2262 surveys sent
- 8 pages, 36 questions
- 420 survey received back



Analysis

- Multi-model inference
- We used logistic regression models with demographic variables from survey responses to predict response variables that are directly related to scale of management
- To assess relative model support we used AIC

Preliminary Results

Summary Statistics

- 86% of respondents indicated they have cedar on their land
- Only 21% of respondents have participated in a cost-share program to remove cedar

Multi-Model Inference

Response: Willingness to Change Management Based on Neighbor's Management (N=301)			
	K	AICc	Weight
Global	9	964.83	0.64
Age	6	866.4	0.29
Cost-Share History (Any)	5	871.28	0.03
Age + Amount of Land Owned	6	871.49	0.02
Ecoregion	5	874.11	0.01
Null	4	875.5	0.00
Amount of Land Owned	5	875.83	0.00
Years Managed	5	877.40	0.00

Response: Willingness to Join a Cost-Share Program to Remove Cedar (N=321)			
	K	AICc	Weight
Global	10	886.19	0.98
Cost-Share History (Cedar)	5	894.68	0.01
Amount of Land Owned + Cost-Share History (Any)	6	900.122	0.00
Cost-Share History (Any)	5	909.85	0.00
Ecoregion + Amount of Land Owned	8	916.77	0.00
Amount of Land Owned	5	918.58	0.00
Ecoregion	7	932.45	0.00
Null	4	933.43	0.00

Response: Use of Fire for Cedar Management (N=330)			
	K	AICc	Weight
Global	7	290.23	0.94
Ecoregion + Cost-Share History (Cedar)	5	295.68	0.06
Cost-Share History (Cedar)	2	305.22	0.00
Ecoregion + Amount of Land Owned	5	334.14	0.00
Land + Cost-Share History (Any)	3	343.55	0.00
Cost-Share History (Any)	2	345.21	0.00
Ecoregion	4	350.61	0.00
Amount of Land Owned	2	356.28	0.00
Null	1	360.57	0.00

- The global model performed the best for all three response variables
- Future direction will be to determine if the predictors with meaningful coefficients in the global models affect the scale at which landowners will manage land

Acknowledgements

