An Innovative Approach for **Invasive Species Targeting and Control Using Remotely Sensed Data and Techniques Within the Chickasaw Nation Treaty Territory**

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NRCS Conservation Innovation Grant (CIG)

PURPOSE: To stimulate the development and adoption of innovative conservation

approaches and technologies to further natural resource conservation.

SUBMISSION: Application in response to the

2021 CIG Notice of Funding Opportunity (NFO)

PRIORITY CLASS: Water Resources and Increased

Resilience (Climate-Smart Strategies)

FEDERAL FUNDING RANGE:

\$300,000 - \$2,000,000

DETAILS: 77 proposals received,

19 projects funded = \$15,000,000

23 states & territories



NRCS Conservation Innovation Grants

Chickasaw Nation Treaty Territory



Project Description

FUNDING AMOUNT: \$476,572 FUNDING PERIOD: 02/19/2022 - 02/19/2024 PROJECT LOCATION: Chickasaw Nation Treaty Territory

PROJECT GOALS:

- 1. Develop an innovative approach using a suite of remotely sensed data and techniques to optimize efforts to identify and clear eastern red cedar (ERC) (*Juniperus virginiana*).
- 2. Develop a cedar encroachment vulnerability ranking for parcel-level cedar eradication prioritization.
- 3. Develop an interactive dashboard that stakeholders can use to enhance best management practices.
- 4. Provide outreach and relationship building opportunities.

Project Partners & Tasks

Several partners are part of the project with a large portion of the work tasked to AquaStrategies. Tasks include:

- 1. Build a model to improve the understanding of ERC proliferation dynamics (AS).
- 2. Quantification of the economics of prescribed fire (AS, OSU)
- 3. Relationship building and community outreach (ALL)
- 4. Stakeholder meeting (NRCS, OWRB, OCC, ODEQ, etc.) (ALL)
- 5. Technical oversite and Rangeland Analysis Platform (RAP) enhancement (CN, AS, NRCS)

All facets of the project (2-5) builds on the model (1) used to understand the extent and vulnerability of ERC. Office of Natural Resources

AquaStrategies Water Planning, Science & Engineering







What is the Rangeland Analysis Platform (RAP)?

16-day biomass

2020

2010



The Rangeland Analysis Platform is an online tool that quickly visualizes and analyzes vegetation data for the United States.



RAP Tool Derivatives

Derivatives from the RAP tool can be developed with the help of the NRCS staff to

provide site-specific products such as woody encroachment vulnerability maps.



Rangeland and Prairie Conservation



Initial interest from landowners associated with the Lake of the Arbuckles Watershed Association (LAWA) and the Blue River Foundation (BRFO).

What is the current cedar removal process?





Improving the process?







Finding the Cedars

- Literature on cedar identification
- Built on research from OU (Sent2 imagery, NDVI)
- Identification process should be:
 - 1. Replicable
 - 2. Scalable
 - 3. Affordable
 - 4. Actionable
- Google Earth Engine (GEE) selected for analysis:
 - 1. Large datasets
 - 2. Web-based
 - 3. Analysis done on GEE servers
 - 4. Easy to insert/redo intermediate steps





INPUT DATASETS



Sentinel-2 and NAIP images can be directly called in GEE Canopy Height Model:

- Use LiDAR return data to extract canopy height
- Stitch together multiple LiDAR flights across study area
- Adjust canopy height using field-measurements



Classification

Explored several methods to classify cedar within GEE:

Supervised classification (Random Forest & ML)

- Showed good results for land cover classification
- Ultimately over-predicted cedar in some areas, under-predicted in others

• Lack of spectral information in available imagery data

Cedar Extraction



MODELING EASTERN RED CEDAR EXTENT & VULNERABILITY



Remote Sensing and GIS Methods OUTPUT DATASETS



<u>1. Cedar Extent</u>

- 1-m resolution
- All scales; parcel is unit of analysis





WATERSHED

PARCEL



Remote Sensing and GIS Methods OUTPUT DATASETS



2. Cedar Index

 Based on NRCS Woody Encroachment classes: <u>Woodland Transition:</u> Cedar extent

Encroachment:

Start of the transition from prairie to woodland (50m buffer)

Dispersal & Recruitment:

Seed spread zone; generally trees < 6-ft (200 m buffer)

Intact:

Prairie/open grassland

Describes overall cedar presence/threat





Remote Sensing and GIS Methods OUTPUT DATASETS



Parcel Ranking



• Webmap Application (at parcel, watershed, or county scale)

Parcel Data		
Other Data		
Mean Cedar Height (ft):	7.1	
Mean Slope (%):	1.5	THE PARTY OF
Cedar Index & Rank		50002933 50002933
Cedar Index (1-5 scale):	4	
BMP Recommendation:	Mechanical Removal & Prescribed Fire	500000070 500000070

Economics of Cedar Removal

Cedar Growth Projections

under 4% growth scenario

2 mi

2020 (Existing) 2030

2050 2070

- 1. Locate areas where cedar removal could be most cost-effective:
 - Use bulls-eye approach to rank parcels
- 2. Estimate **cost of no action** (i.e. project growth out 10-30+ years)
- 3. Show benefits of doing something (prescribed fire):
 - Financial
 - Land values
 - Water quality and quantity
 - Habitat
 - Others

Applications & Products

OUTREACH MATERIALS



FIELD DAYS & OUTREACH EVENTS











RAP TOOL

TEAM



QUESTIONS



CHICKASAW NATION Office of Natural Resources

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