Ecological Insights

November 01, 2024

Mr. Reice Haase, Deputy Executive Director
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840

Dear Mr. Haase,

This transmittal letter requests consideration by the Oil and Gas Research Council (OGRC) of a proposal by the North Dakota nonprofit corporation Ecological Insights, based in Hazelton, North Dakota. The title "Two Years of Grassland Carbon Capture" represents the importance of continuing the last leg of a 2-year research plan proposed in partnership with the North Dakota Natural Resources Trust and approved by the OGRC in 2022. Since the initial field work began in May 2023, the second year of data collection will not be completed until May 2025, which is critical to completing the annual carbon capture budget.

We respectfully request serious consideration of this proposal, given the level of success the project has enjoyed to date. In addition to quantifying the positive effects of regenerative grazing on the annual carbon budget, we have organized and reached out to nine different groups over the last two years. These groups represent diverse audiences, from ranchers and funding partners to community organizations such as Visions West and Farm Aid. The response has been overwhelmingly positive. Ecological Insights and the Heaton Ranch were recently invited to present this project to the National Grazing Lands Coalition Conference in Tucson, AZ.

The level of dedication to this project by Ecological Insights is demonstrated by the offer to provide matching funds in the form of salary donations and donations by the Board of Directors. We anticipate additional matching funds will become available in 2025.

Thank you for your consideration.

Sincerely,

rebecca phillips

Rebecca Phillips, PhD

195 69TH ST SE, HAZELTON, ND 58544STREET ADDRESS, CITY, ST ZIP CODE
T 1 (701) 425-1433 WWW.ECOLOGICALINSIGHTS.ORG/REBECCAPHILLIPS

Application

Title: Two Years of Grassland Carbon Capture

Applicant: Ecological Insights

Principal Investigator: Dr. Rebecca Phillips

Date of Application: 10-31-2024

Amount of Request: $65,000

Total Amount of Proposed Project: $130,000

Duration of Project: 1 year

Point of Contact (POC): Dr. Rebecca Phillips

POC Telephone: 701-425-1433

POC E-Mail Address:

Grazinglands@protonmail.com

POC Address: 195 69th St SE, Hazelton, 58544

Oil and Gas Research Program

North Dakota

Industrial Commission

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ABSTRACT

The Oil and Gas Research Council (OGRC) approved funding the Agricultural Carbon Capture project proposed by the North Dakota Natural Resources Trust from 2022 to 2024, in cooperation with Dr. Rebecca Phillips and her team at Ecological Insights. This research tracks carbon dioxide capture and the net annual ecosystem carbon budget for grasslands under regenerative grazing management on a working ranch. We have completed the annual carbon budget for the first year under the original agreement and have partially completed the second year. Ecological Insights is requesting support to complete the second year of data collection, so results based on a full two years of data can be reported to the OGRC by the end of 2025.

The annual carbon balance requires year-round data collection and specialized instrumentation deployed at suitable locations for micrometeorological measurements. Thanks to support for the project initiated in 2023, we have procured and deployed the instruments necessary to quantify effects of regenerative grazing on the annual ecosystem carbon balance on a working ranch—possibly for the first time in this country. This research requires year-round, continuous measurements of carbon dioxide because some of the carbon stored in summer is released in winter. The first year of data represents May 2023 to May 2024. The second year of data will be complete in May 2025. Without these last few months of data, results for the second year cannot be calculated. Ecological Insights requests support necessary for completion of a full two years of data collection, analysis, and reporting.

Positive effects of regenerative grazing on carbon capture were clear the first year of the project, and the final analysis for the first year of data will be provided in the final report by the North Dakota Natural Resources Trust. The Heaton Ranch, the North Dakota Natural Resources Trust, and Ecological Insights have collaboratively presented results to audiences at nine events over the last two years—from Bismarck to Buelah to Cheyenne. These outreach events stimulated interest and animated discussions among stakeholders. The question of whether positive effects observed in one year would persist another year was asked at each of these events.

The annual carbon balance for the second year can be determined by continuing carbon dioxide data collection at the Heaton Ranch from January 1 through June 1, 2025. Subsequently, Ecological Insights will perform the technical analyses necessary to determine evaluate effects of regenerative grazing for an additional year and write the full report on two years of data. Given the initial investment required to get this project up and running and to finalize results for one year, there would be a significant return on the support requested here to complete an additional year.

Objective:

Continue carbon dioxide and weather data collection and instrument maintenance and calibration in the winter and spring of 2025. Complete the net annual ecosystem carbon budget for two complete years. Perform data analyses, literature review, and writing necessary to create technical and public outreach reports.

Expected Results:

1. A technical report and outreach materials, based on two full years of data, showing how regenerative grazing management can influence the grassland carbon capture.

Duration: One year

Total Project Cost: 130,000

Participants:

Ecological Insights, a North Dakota nonprofit organization

PROJECT DESCRIPTION

Objectives:

1. Continued flux data collection, instrument maintenance and calibration, and quality checks.
2. Filter, process, and analyze data collected by instruments.
3. Construct the annual carbon budget for 2024-2025.
4. Develop outreach materials for stakeholders and write a technical manuscript suitable for peer review summarizing two full years of data.

Methodology:

With support from the ORGC, we were able to procure and deploy two state-of-the-art instrument arrays designed to measure ecosystem carbon dioxide capture on a working ranch in May 2023. These have continuously measured fluxes of carbon dioxide, water vapor, and energy, in addition to weather variables (soil temperature and moisture, humidity, wind speed and direction, precipitation, radiation, etc.). One array is near the center of a 50-acre pasture that is rotationally grazed. The other array was deployed 0.5 miles away at a similar, but ungrazed pasture. Figure 1 illustrates this design at the Heaton Home Ranch.

We apply these and field data to determine the net amount of carbon stored for each pasture, including the amount of carbon exported and imported by cattle. Between May 2023 and May 2024, more carbon was stored in the grazed pasture, even when considering the amount of carbon in forage removed by grazers. Data for the first full year show regenerative grazing management improves carbon capture, potentially applicable to the vast northern prairie region.

Eddy flux technology, which has been deployed since May 2023, will continue to be applied according to published standards. All protocols developed in Year 1 will be applied in Year 2, so years will be comparable. Photos of the eddy covariance instruments collecting data is summer and winter are provided in Figure 2.

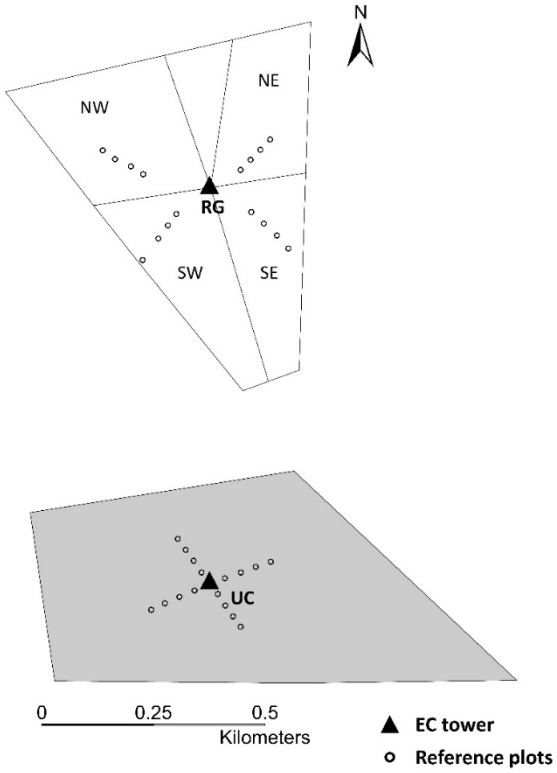

Figure 1. Pastures set up for regenerative grazing management (RG) and ungrazed control (UC). Each were set up with one of identical eddy covariance (EC) towers. The RG pasture was divided into five paddocks, labeled southeast (SE), southwest (SW), northwest (NW), and northeast (NE), and an unnamed fifth paddock that is not included in the experiment. The UC pasture is located 0.5 miles from the RG pasture within the same 640-acre allotment. EC refers to each eddy-covariance instrument array. Open circles are field plots for monitoring biomass, leaf area, and species.

Figure 2. Instrument array in winter and during a grazing event in autumn with herdsman Allen Will.

Anticipated Results:

We anticipate the annual carbon budget under regenerative grazing will be greater than idle pasture control in the second year, as we found for the first year. Analyzing the annual carbon budget for two years under varying conditions will help managers understand how forage utilization interacts with weather to alter grassland carbon capture. Results will show how grazers can be used as tools to enhance carbon storage for economic and environmental benefits.

Facilities, Resources, Techniques to Be Used, Their Availability, and Capability:

Facilities, resources, and protocols established in the original Agricultural Carbon Capture project will continue to be used.

Environmental and Economic Impacts while Project is Underway:

There are no anticipated negative environmental or economic impacts during this project. Through utilization of a regenerative rotational grazing system, the participating producer will expectedly see positive environmental and economic impacts to their grasslands including but not limited to greater biodiversity, forage production, wildlife habitat, and soil quality.

Ultimate Technological and Economic Impacts:

This project represents a phenomenal opportunity for the energy industry to support state-of-the-art science that will benefit rural North Dakota. This is evident by the strong interest among farmers and ranchers, educators, and grassland enthusiasts throughout the state. Ranchers are asking for this research because they need tools for managing carbon and negotiating with companies that purchase carbon offsets. Biological carbon capture can effectively complement mechanical carbon capture while enhancing agricultural environmental and economic sustainability. Furthermore, energy companies will benefit greatly from increased knowledge of carbon capture on grasslands. Much of the oil and natural gas development is located within grasslands, and the significance of understanding how grasslands offset carbon emissions will assist energy companies with lowering their carbon footprint. This could also lead to ranchers being paid for storing carbon from the companies operating in the area, increasing economic benefits to locals. Ranchers know that learning how to manage annual rates of carbon sequestration will increase their bargaining position for carbon offset dollars each year. In addition to rural community benefits, the state of North Dakota will lead the nation in regenerative research for carbon sequestration optimization, with clear ESG potential.

Why the Project is Needed:

This proposed project is an ideal framework for coupling energy and agriculture with interest from multiple sectors of the economy. The project is needed because mechanical capture of carbon dioxide emissions at stacks alone will not solve the problem and bring the state to a carbon-neutral economy. Experts agree that multiple avenues for sequestering atmospheric carbon dioxide are needed. The specific avenue proposed is conservation and agricultural-production friendly and practical across a broad range of demographic groups and a way of building agricultural and energy alliances.

STANDARDS OF SUCCESS

This proposal addresses the Program goal of reducing the carbon footprint associated with oil and gas exploration and expanding economic opportunities by quantifying effects of regenerative ranching on agricultural carbon capture for the benefit of North Dakota agriculture and energy sectors. Success will be measured by data collection and technical report quality, public education and outreach, and stakeholder engagement. Progress reports will be prepared biannually (due 30 days from the end of the second and fourth quarters) and will serve as a means of evaluating the project with respect to budget, schedule, and technical achievement.

BACKGROUND/QUALIFICATIONS

Dr. Rebecca Phillips is the principal investigator (PI) on the project and a performance-based research leader. Dr. Phillips will continue to apply 20 years of eddy covariance skills and experience to quantify carbon capture and storage using micrometeorological techniques. Six of the of the 50 peer-reviewed scientific articles Phillips has penned were specific to her carbon flux research.

A full list of qualifications, experience, and publications can be found here: https://ecologicalinsights.org/rebeccaphillips

MANAGEMENT

Dr. Rebecca Phillips will continue managing the project and will adhere to the current activity schedule necessary for project maintenance, as performed for the last 1.5 years. Evaluation points are:

1. DAILY: Confirm data are downloaded, battery is in good condition, and sensor signals. Resolve issues immediately or during the next field site visit.
2. WEEKLY: Curate and filter flux data for conditions of low turbulence. Review literature and prepare written materials.
3. BIMONTHLY: Check calibration of flux signals bi-monthly. If calibration issues cannot be resolved, return to the factory.
4. BIANNUALLY: Confirm all data are properly collated and analyzed. Prepare graphs and tables and technical report. Request internal peer review.

TIMETABLE

January 1—June 1: Complete Year 2 data collection and semi-annual report.

June 1—December 31: Submit technical report and outreach materials.

BUDGET

Project Associated Expense	NDIC's Share	Applicant's Share (Cash)	Applicant's Share (In-Kind)	Other Project Sponsor's Share
Salaries	49,000	25,000	40,000	
Supplies & Maintenance	8,000			
Travel	8,000			

We are actively writing proposals to support this work. Currently, we can provide a partial salary match by Dr. Rebecca Phillips and cash donations offered by the Ecological Insights Board of Directors.

CONFIDENTIAL INFORMATION

No confidential information is expected to be created during this work.

PATENTS/RIGHTS TO TECHNICAL DATA

No patentable technologies are expected to be created during this work.

STATUS OF ONGOING PROJECTS (IF ANY)

The original project was awarded to the North Dakota Natural Resources Trust, in cooperation with Ecological Insights. Objectives have been achieved in the original project, except for the final report, which will be completed by Dec 31, 2024. We request continuation of this project through Ecological Insights to complete two years of data collection and reporting.

APPLICATION CHECKLIST

Use this checklist as a tool to ensure that you have all of the components of the application package. Please note, this checklist is for your use only and does not need to be included in the package.

☐	Application
☐	Transmittal Letter
☐	$100 Application Contribution
☐	Tax Liability Statement
☐	Letters of Support (If Applicable)
☐	Other Appendices (If Applicable)

When the package is completed, send an electronic version to Mr. Reice Haase at rhaase@nd.gov, and 2 hard copies by mail to:

Reice Haase, Deputy Executive Director
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840

For more information on the application process please visit:
http://www.nd.gov/ndic/ogrp/info/ogrcsubgrant-app.pdf

Questions can be addressed to Mr. Haase at 701-328-3726 or Brent Brannan at 701-425-1237.

Industrial Commission

Tax Liability Statement

Applicant: Ecological Insights

Application Title: Two Years of Grassland Carbon Capture

Certification:
I hereby certify that the applicant listed above does not have any outstanding tax liability owed to the State of North Dakota or any of its political subdivisions.

rebecca phillips
_____
Signature

Executive Director
_____
Title

October 31, 2024
_____
Date