Supplemental Project Notice

LEVERAGING MACHINE LEARNING TO MONITOR AND MANAGE IVM PROGRAM EFFECTIVENESS

Courtesy of A. Bennett, EPRI

PROJECT HIGHLIGHTS

- Evaluate a machine learning tool that assesses ROW vegetation and informs IVM planning at a large scale
- Machine learning metrics are focused on floor vegetation including percent compatible vegetation, woody stem density, percent flower cover, invasive species presence, plant richness
- Metrics developed using machine learning will inform IVM program effectiveness, support QA process, and facilitate internal and external reporting
- Metrics to inform future IVM decision-making based on verifiable data
- A quantitative method to evaluate IVM program progress, goals, and environmental benefits
- Standardized data collection over time demonstrates value of IVM program and commitment to environmental stewardship and conservation

Background, Objectives, and New Learnings

Excluding the federal government, energy companies represent one of the largest industries actively managing land within the United States. Rights-of-way (ROWs) are linear corridors which transect several different landscapes such as agricultural lands, forests, rangelands, prairies, and urban communities. Vegetation existing within the ROW corridor is generally managed using integrated vegetation management (IVM). IVM is an approach to managing vegetation that uses a combination of treatment methods in an effort to create desirable low growing vegetation. ROWs managed with IVM have the potential to create habitat that can both complement as well as contribute to biodiversity conservation. ROWs managed with IVM offer an opportunity for energy companies to both document and communicate the benefit of their IVM program internally as well as externally to the communities in which they operate and serve.

The ability to track changes in ROW vegetation in response to IVM treatments is essential to demonstrating program value both internally and externally. However, many vegetation managers lack the data needed to document the value of their vegetation management program. Vegetation managers need new tools that can assist in collecting quantitative data that informs IVM effectiveness, annual progress in completing goals, biodiversity benefits, and costs over time. Tools that quantify ROW habitat composition and track environmental inputs can also contribute to sustainability reporting and develop narratives which enhance community and stakeholder relations. A new tool developed to measure ROW management leverages ground collected photos and machine learning to quantify changes in ROW floor vegetation. The overall goal of this study is to evaluate the ability of this tool to document changes in ROW vegetation being managed using IVM.

Specific project objectives include:

1. Evaluate and document the process to develop metrics that assess ROW vegetation using machine learning
2. Validate vegetation metrics calculated using machine learning with field collected data
3. Compare automated and field methods for quantifying IVM effectiveness on ROWs

Benefits

Public Benefits:

- Enhanced service reliability and safety through improved analytics and decision-making.
- Improved ROW vegetation which supports a variety of wildlife, pollinators, and plant species.

Funder Benefits:

- Data on ROW vegetation, including cost-benefits of different monitoring methods, to aid work planning, decision-making, and reporting.
- Consistent quantitative metrics to assess IVM program effectiveness and progress over time.
- Opportunity to improve stakeholder relations by documenting and sharing IVM program data.

Project Approach and Summary

1. If hosting research, a ROW scheduled for IVM in 2025 is required.
2. The project team will use three data collection methods to evaluate vegetation: 1) imagery for the entire enrolled ROW, 2) photos and associated information on vegetation for field assessment plots, and 3) traditional ground vegetation surveys.
3. Data are collected prior to and approximately one year after IVM is performed.
4. Field assessment plot images and vegetation information are used to train a machine learning model to identify plant species and calculate metrics. Metrics are then calculated for the enrolled ROW.
5. Independently executed vegetation surveys are performed and used to validate vegetation metrics calculated by machine learning and photographs.
6. As a research participant, utilities will provide data for analysis. Machine learning analyses develop metrics but resulting metrics are not field validated.

Deliverables

- A report for each enrolled ROW. Reports will include and compare metrics calculated from photographs and vegetation surveys, pre and post-IVM treatments.
- Field validation of machine learning metrics will be analyzed and provided as part of the final report.

Price of Project

Companies can participate by hosting research, providing data for analysis as a participant, or as an observer.

- Host price/500 acres = $50,000/year
- Participant price/1000 acres = $25,000/year
- Observer price = $15,000/year

All participants have access to deliverables and are encouraged to participate in all project activities. The benefit of hosting research includes field validated data relevant to your system and IVM program.

Project Status and Schedule

This will be a two-year study with the below schedule. One host and three observers are needed before the project can begin.

	2025	2026	2027
Q1	ID study sites	2025 Report	2026 Report
Q2-Q3	Data collection	Data collection	
Q4	Data Analysis	Data Analysis	

Who Should Join

Companies with ROW assets seeking a method to quantitatively measure, report, and communicate IVM program progress, goals, and environmental benefits.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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