Year 2 Report

Cost Data Analysis of Managing for Habitat on Energy and Transportation Lands

July 2023

Prepared for:

North Central IPM Center

Prepared by:

This work was supported by the USDA National Institute of Food and Agriculture, Crop Protection and Pest Management Program through the North Central IPM Center (2018-70006-28883).

Introduction

Pollinator populations globally have been declining at an alarming rate for decades, with far-reaching consequences for global food supplies and ecosystems. These declines are mainly attributed to intensifying land management and development, pesticide usage, and invasive species which leads to significant habitat loss. To address this pressing issue, rights-of-way (ROW) and other energy and transportation lands present a valuable opportunity to create vital pollinator habitat and establish connectivity throughout sometimes sparse landscapes. By managing ROWs for habitat conservation, these lands can not only support pollinator populations but can also be used as an opportunity to raise public awareness. Moreover, this approach facilitates landscape-based partnerships and encourages neighboring landowners to participate in on-the-ground restoration and enhancement activities.

Given the scale of conservation needed to tackle habitat loss, an unprecedented level of coordination is required across various industry sectors, geographies, public and private organizations, and government agencies. The Rights-of-Way as Habitat Working Group (Working Group) hosted by the University of Illinois Chicago represents one such collaborative effort, uniting over 400 organizations from the energy and transportation sectors, conservation community, agricultural industry, academia, and federal and state governments. Over the past eight years, the Working Group has experienced remarkable growth, becoming a leading resource for owners and managers of working landscapes, including utility corridors, highways, and railroads. The Working Group focuses on promoting pollinator-oriented habitat conservation and advocating for the adoption of sustainable integrated vegetation management (IVM) practices, ensuring a collective and impactful approach to protect pollinators and their habitats.

In recent years, Working Group participants have identified industry needs related to increasing institutional and management support for IVM and pollinator habitat conservation. Strategies to address these needs have been further refined through focused task force discussions, peer-to-peer exchanges, and an annual survey of Working Group participants. Working Group participants have consistently identified a cost-benefit calculator as one of the most beneficial tools to educate and influence decision makers at their organizations in favor of habitat conservation and IVM practices.

Summary of Study Activities

Development of the Cost-Benefit Task Force

To guide the cost-benefit feasibility study, the UIC and Burns & McDonnell convened the Cost-Benefit Task Force from participants of the Working Group. Individuals representing energy companies, transportation agencies, contractors, conservation organizations, government agencies, and academic institutions were invited to join the Cost-Benefit Task Force.

Twenty-eight participants attended the task force kick-off meeting on June 2021 and met again in August of 2021, and March and June of 2022. The focus of the Cost-Benefit Task Force was to review currently available data and provide feedback on additional inputs to assess the feasibility of a cost-benefit calculator. In the second year, the Task Force assessed methods and procedures related to data collection, sharing, and storage and provided feedback on best ways to collect and assess cost-data for vegetation management from energy and transportation organizations.

Cost-Benefit Preliminary Survey

The UIC and Burns & McDonnell designed a preliminary cost-benefit data survey with the guidance of the Cost-Benefit Task Force and sent it to the full Working Group. The purpose of the survey was to

gather information on the availability of cost-benefit data associated with pollinator-friendly and conventional vegetation management practices. The survey was designed to identify organizations that have available vegetation management cost data as well as establish other available quantitative and qualitative data. The cost-benefit survey received a total of 140 responses from Working Group participants and other interested parties. Seventy-five survey responses were received from energy and transportation organizations, with several responses representing more than one sector. Energy transmission companies and state highway agencies made up most industry sector respondents (Figure 1). The analysis of the data gathered from the survey and the first year's activities are summarized in more detail in the Year 1 Feasibility Analysis of a Cost and Benefit Calculator.

Cost-benefit data request

In year 2 of this effort, with support from Burns & McDonnell, the UIC developed a web-based cost data collection form[1] to gather cost information associated with pollinator-friendly and conventional vegetation management practices that occur within energy and transportation rights-of-way. The web-based tool went through many iterations as UIC strived to create a tool that was both intuitive and robust. The form was created and hosted on an online platform (WordPress Forms) due to the varying firewalls and limitations energy and transportation agencies had accessing commonly used tools for creating surveys.

The form allows the option to provide data associated with five different vegetation management activities: mowing, herbicide application, cutting or brush removal, grazing, and prescribed burning. For each of the vegetation management activities, organizations could indicate more specifically what activities are included in their cost if applicable (i.e. for herbicide; aerial spraying, ground broadcast spraying, hydraulic spraying or individual plant spraying).UIC conducted a series of surveys and interviews to determine which of the specific vegetation management activities had a significant enough change in cost to warrant a distinction as a separate vegetation management activity as well as determine an accurate description for each IVM activity. The vegetation management activities and their descriptions included in the cost-benefit collection form can be found below (Table 1).

Feedback from the Cost-Benefit Task Force and the preliminary survey indicated that partners had a wide variety of data and therefor it would be difficult and time consuming to convert the data into a format dictated by UIC, potentially preventing partners from sharing their data. UIC thus designed the survey to accept different formats of data including cost data that was provided as an average annual cost or provided as cost per year. The organization could also indicate whether the costs took into account a number of factors such as planning, on-site work, and travel, and if they were completed either by in-house staff, contractors, or both. Most notably, the form also requests the organization indicate if the cost is for pollinator-friendly or conventional vegetation management practices.

In late spring of 2023, UIC sent out the cost data collection form to the 75 organizations representing energy and transportation agencies who completed the cost benefit preliminary survey indicating they had cost data that could be shared. Only 10 industry partners completed the cost-benefit data solicitation form in the three-week timeframe that was requested. Participants who provided cost data consisted of four electric utilities, four transportation organizations, and two pipeline entities. Nine of the ten participants provided information associated with either mowing or herbicide vegetation management activities. One participant provided information for grazing, six participants provided information for cutting, and there were no participants that provided information associated with prescribed fire. Overall, data was highly variable among all organizations that submitted cost data. For example, some participants provided cost data associated with a single year (between years one and seven), on an annual basis, or a lump sum

[1] https://cost-template.netlify.app/Home

amount without further cost frequency context. Few participants were able to provide breakdown costs for both pollinator-friendly and conventional vegetation management practices.

Methods for data review consisted of the organization of raw data output, summarization of findings, consideration for trend-level analysis feasibility, identification of data limitations, and recommendations for future data collection efforts. Due to the small sample size and variability in data received, it was not feasible to identify outliers or conduct a meaningful cost trend analysis between land use/easement types or overall trends. In one instance, reported conventional mowing costs ranged from $656.47 per mile to $23,244,100.00 per mile of right-of-way between different organizations. Provided that only three respondents provided data in this category it is difficult to determine which (if any) is an outlier in the dataset and how these values could be interpreted for future planning.

The UIC requested qualitative data as well, including the identification and rank of factor impacts on cost of vegetation management activities as well as benefits received from implementation. Participants were asked to qualitatively identify and rank (low, medium, high) benefits from pollinator-friendly vegetation management and factors contributing to cost. Relative rank was determined for both benefits and factors (Table 2, Table 3).

Seven respondents ranked factor impacts on the cost of implementing pollinator-friendly vegetation management. All respondents ranked 'Topography Terrain of the Site' and 'Type of Regrowth/Seed Bank' as the highest factors affecting cost. One respondent selected the 'Other (fill in)' option, ranking as a high impact on cost; however, no additional context was provided and therefore was excluded from the review (Table 2).

Six respondents ranked benefits received from implementation of pollinator-friendly vegetation management. Only half of the respondents selected the "Stormwater Management and Improved Erosion Control Value" benefit, but all ranked this benefit as high. Not all respondents provided responses for all perceived benefits which may have resulted in lower or higher ranks of some criteria due to the low sample size. Two respondents provided ranks for 'Improved Air Quality,' but both ranked this benefit as low resulting in this being the lowest ranked benefit; however, if either of these respondents had ranked this as medium it would move from lowest rank to fifth lowest rank (Table 3).

Annual Buy-in Survey

For the past four years, UIC and Burns & McDonnell have conducted annual surveys[2] of the Working Group to gauge the level of internal management buy-in for IVM and pollinator habitat-related vegetation management on energy and transportation lands. The fourth annual survey was sent to the full Working Group in November 2022. As in past years, the majority of survey respondents represented utility and transportation organizations, with some representation from non-profits, government agencies, and others. Survey results from 2022 showed that many organizations have relatively strong institutional buy-in for pollinator habitat conservation on ROWs and other lands, with support increasing or remaining the same as past years.

Despite generally positive internal management support, many respondents indicated they have experienced barriers to managing ROW for pollinator habitat. Most often, respondents indicated their organizations found habitat to be a lower priority compared to other operational needs and/or there was a perceived higher cost associated with managing for habitat and not achieving a return on investment. Respondents have consistently noted that a cost-benefit calculator and/ or articulating how habitat

[2] https://rightofway.erc.uic.edu/cost-benefit-calculator-feasibility-study/

management makes good business sense would be most influential to build support. An overview of the past three years of surveys can be found in the Appendix.

Recommendations

The findings of the cost-benefit preliminary survey and the annual buy-in survey indicate that there is still strong interest in developing a cost-benefit calculator for IVM and pollinator-friendly vegetation management on energy and transportation lands. There was however low participation in submitting cost data from industry organizations. The UIC and Burns & McDonell recommend conveying the need for more data and support to the Working Group in order to move forward with the effort to develop a cost-benefit calculator. Additionally, although this effort resulted in limited data and trend analysis was determined to be infeasible, several lessons learned were identified, resulting in recommendations to be considered for future data solicitation efforts.

- Modifications to the data collection form should be explored to improve data integrity and harness comprehensive data sets. The following adjustments are suggested:
    - Apply strategic data field settings that require participants to insert data prior to moving to the next section. For example, in some instances participants selected the 'Other (fill in)' field without inserting additional context.
    - Modify or incorporate additional instruction in sections where respondent data was not provided, or data requests were not properly interpreted by participants.
- Consider supplemental meetings with targeted respondents to deduce discrepancies and variabilities throughout provided data.
- Re-engage with the Cost-Benefit Taskforce to re-evaluate the components of the form, and solicit commitments to sharing requested data.
- Consider an outreach campaign or recruitment strategy to engage a larger number of participants to increase the sample size of received data sets.

Finally, continuing to gauge internal buy-in for IVM and pollinator-friendly vegetation management is key to creating effective tools that energy and transportation organizations will use. The annual buy-in survey sheds light into the barriers to IVM and habitat-related vegetation management and confirms that they are often due to concerns over costs. The UIC and Burns & McDonnell will continue the annual buy-in survey as a means of tracking perceptions, barriers, and opportunities within the energy and transportation sectors over time.

Sharing cross-industry cost-benefit information provides an opportunity for decision makers to compare costs, learn from each other, and highlight documented benefits of implementing IVM and pollinator habitat practices on ROWs and other energy and transportation lands. Through continued efforts to collect data and assess vegetation management costs, the UIC and Burns & McDonnell hope to provide valuable insights that will inform future vegetation management decisions on energy and transportation lands.

Appendix

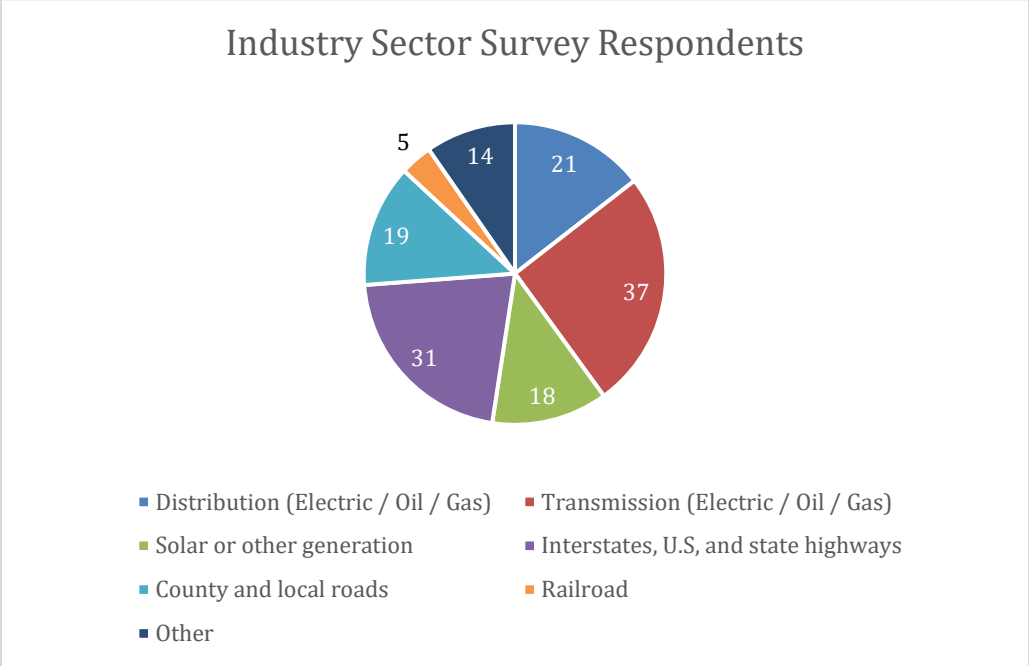


Figure 1: Industry Sector Respondents to Preliminary Survey

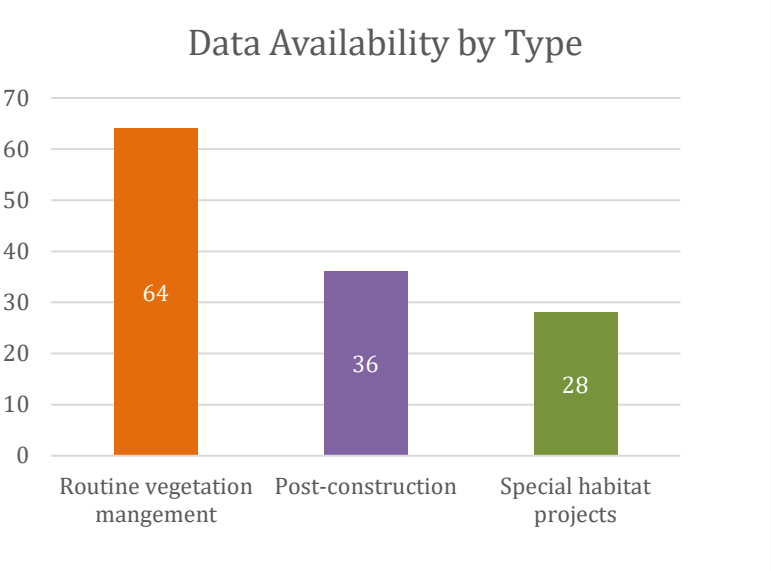


Figure 2: Vegetation Management Cost Data Availability by Type

Table 1: Vegetation management activities and descriptions

Mowing*	*Note: brush mowing, i.e., mechanical removal of primarily woody vegetation, should be reported under "brush cutting or removal."
Mowing	Periodic mowing of primarily grasses and herbaceous plants to postpone conversion of the plant community to woody brush. Mowing timing may be adjusted based on desired management outcomes and/or pollinator conservation goals.
Herbicides	
Aerial spraying:	Herbicide applications performed with aerial equipment such as fixed wing aircraft, helicopters, or drones. Depending on the equipment used applications can be either broadcast or applied as a direct, spot treatment.
Ground broadcast spraying	herbicide applications performed using ground equipment such as a truck, tractor, UTV, or ATV, or on foot from backpacks. Applications could be applied as a foliar or cut stubble treatment and are broadcast across the entire treatment area. Selectivity is determined by the herbicide chemistry.
Hydraulic spraying	herbicide applications performed using a spray gun/wand attached to a vehicle-mounted spray rig. Applications can be performed as either broadcast or selective spot treatments.
Individual plant treatment	selective herbicide applications to individual plants, typically using backpack or hand spray equipment. Could include basal bark, cut-stump, hack & squirt, cut-surface, low-volume foliar, ultra-low volume foliar, chemical side trimming or dormant stem treatments.
Brush Cutting or Removal*	*Note: We are not collecting cost data for tree trimming or tree removal activities.
Manual brush cutting	use of hand-operated tools to cut down brush. Could include handsaws, axes, hatchets, or small power tools.
Mechanical brush cutting or mowing	use of mechanical equipment designed to cut down, shred, masticate, or mulch woody vegetation or brush. Could include mowers, masticators, or mulchers.
Prescribed Fire	
Prescribed fire	The use of a planned fire under desirable conditions to meet specific vegetation management objectives.
Prescribed Grazing	
Prescribed Grazing	The use of herbivorous animals to meet specific vegetation management objectives. This may include browsers such as goats or grazers such as cattle or sheep to meet short-term specific vegetation management objectives.

Table 2: Cost-Benefit Variables

Quantitative variables	Qualitative variables
Timing of mowing	Value of pollination
Costs per mile of mowing	Carbon sequestration
Miles one cycle can cover per day	Air quality
Number of mowing cycles	Resistance to infestation by invasive species
Swath Size	Aesthetics
Cost of mower	Runoff prevention
Cost per mile of herbicide	Worker safety
Type of herbicide treatment	Recreational use
Miles of herbicide covered per day	Less nuisance issues
Cost of using herbicides to non-herbicide-based vegetation maintenance	Water Quality
Cost of spray truck	Less long-term site disturbance
Native plantings per square meter	
Seed costs	
Established native stems	
Scheduling preventive vegetation maintenance	
Soil amendments	
Local weather	
Percentage of acre that need re-seeding	

Table 3. Relative ranking of benefits received from implementation pollinator-friendly vegetation management across all land use/easement types on a scale from highest (17) to lowest (1).

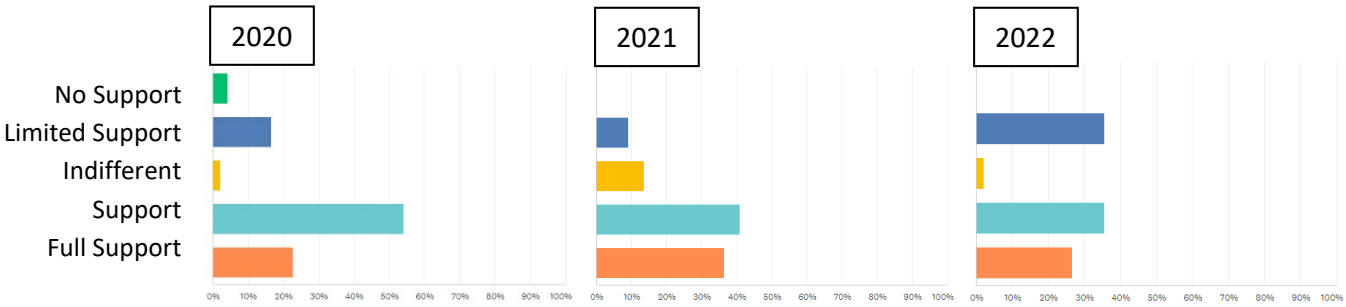
Benefit	Rank
Stormwater Management and Improved Erosion Control Value	17
Maintenance Cost Savings Value	16
Recreational Use Opportunities Value	15
Increased Biodiversity Value	13
Improved Public Relations Value	13
Value Of Pollination Services Value	11
Avoided Regulatory Costs Value	11
Reportable In Sustainability Reports Value	9
Improved Aesthetics and Tourism Opportunities Value	9
Positive Social License or Benefits Value	8
Community Partnership Opportunities Value	7
Carbon Reduction or Sequestration Value	6
Improved Working Relationship with Regulators Value	3
Reduce Snow Drift on Roadsides Value	3
Avoided Delays or Negotiation Costs Value	3
Avoided Additional Communication and Coordination Costs Value	2
Improved Air Quality Value	1

BUILDING INSTITUTIONAL BUY-IN FOR HABITAT CONSERVATION PRACTICES

ANALYSIS OF RESULTS FROM 2020-2022 SURVEYS

SUPPORT FOR HABITAT CONSERVATION

Throughout the 2020-2022 surveys, respondents were asked to rate the level of institutional buy-in and managerial support within their organization for habitat conservation on ROW's and other lands. Respondents returned high responses for "support" all three years, but significantly higher responses returned for "limited support" in 2022.



BARRIERS TO HABITAT

Respondents in the 2019-2022 were given a list of potential barriers that prevent leaders at their organization from supporting habitat conservation initiatives. The top response for potential barriers for all four years was:

1. Low priority compared to other operational needs.
2. In 2021, responses were equally returned for "Low priority compared to other operational needs," and "Perceived higher cost or belief that management will not provide an immediate return on investment."

INCREASING INSTITUTIONAL BUY-IN

Respondents from 2020-2022 were asked to select the top three options that they believed would be most effective in increasing institutional buy-in and management support at their organization. The following are the top responses from each year:

2020	Integrating habitat practices into formal organizational policies, contracts, sustainability, and biodiversity strategies, and/or public reporting (e.g., Environmental Social Governance indices)
2021	Integrating habitat practices into formal organizational policies, contracts, sustainability, and biodiversity strategies, and/or public reporting (e.g., Environmental Social Governance indices)
2022	Articulating how habitat management makes good business sense

This work is supported by the USDA National Institute of Food and Agriculture, Crop Protection and Pest Management Program through the North Central IPM Center (2018-70006-28883).