Year 1 Report

Feasibility Analysis of a Cost and Benefit Calculator to Manage for Habitat on Energy and Transportation Lands

February, 2022

Prepared for:

North Central IPM Center

Prepared by:

UIC ROW HWG BURNS McDONNELL

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 are diminishing at alarming rates, which has serious implications on food supplies and ecosystems across the world. The main drivers of these declines include habitat loss from intensifying land management and development, pesticide use, and invasive species. Given the extensive network of roads, railroads, and utility corridors spanning the country, rights-of-way (ROW) and other energy and transportation landscapes present a valuable opportunity to create pollinator habitat and connect favorable landscapes. Additionally, when managed for habitat, ROWs provide a gateway to educate the public about pollinator habitat, form landscape-based partnerships, and engage neighboring landowners in on-the-ground restoration and enhancement activities.

The scale of conservation required to address pollinator population declines demands an unprecedented level of coordination across industry sectors, geographies, public and private organizations, and government agencies. The Rights-of-Way as Habitat Working Group (Working Group) is one such effort that engages over 400 organizations across the energy and transportation sectors, conservation community, agricultural industry, academia, and federal and state governments. The Working Group has grown rapidly over the past seven years and has become a leading resource for owners and managers of working landscapes— such as utility corridors, highways, and railroads—who are interested in increasing pollinator-oriented habitat conservation and adopting sustainable integrated vegetation management (IVM) practices.

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 and overwhelmingly identified a cost-benefit calculator as the most beneficial tool to educate and influence decision makers at their organizations in favor of habitat conservation and IVM practices.

The University of Illinois Chicago (UIC) in partnership with Burns & McDonnell created a new Cost-Benefit Task Force in 2021 to evaluate existing cost data and determine the feasibility of the future development of a cost-benefit calculator for IVM and pollinator habitat conservation on energy and transportation lands. In the first year of the study, existing literature was reviewed for potential variables of costs and quantifiable benefits associated with implementing IVM and pollinator habitat practices. These variables informed the creation of a cost-benefit preliminary survey with feedback from the Cost-Benefit Task Force as well. The survey was sent to the full Working Group in September 2021 to gather data on the availability of cost data within the industry.

Summary of Study Activities

Development of the Cost-Benefit Task Force

To guide this 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 6th, 2021. The focus of this initial meeting was to inform Task Force members of the study objectives, timeline, roles, and outcomes. The Cost-Benefit Task Force reviewed currently available data and provided feedback on additional inputs to assess the feasibility of a cost-benefit calculator; methods and procedures related to data sharing and storage were also discussed. The kick-off meeting allowed for direct input and engagement with Cost-Benefit Task Force members, who further expressed support, interest, and commitment to the study as well as the need for a cost-benefit calculator. The Task Force met again at the end of August in 2021 and will continue to meet as needed for the duration of the cost-benefit feasibility study actives.

Initial literature review

To further the understanding of cost-benefit calculations and to develop a starting point, existing literature on costs and benefits of IVM and pollinator habitat conservation were considered. The literature available included five research papers on costs associated with land management practices and three high-level cost calculators. The authors of these literature sources represented departments of transportation, universities, and research centers. Quantitative and qualitative cost-benefit variables were identified from the literature (Table 1).

To assist with comparisons across the literature, the most applicable variables were categorized into four groups: (1) routine vegetation management, (2) post-construction/revegetation, (3) special habitat restoration projects, and (4) quantitative and qualitative benefits of IVM and pollinator-friendly practices. These variables, along with feedback from the Cost-Benefit Task Force, were used to develop a preliminary survey on the available cost data to send to the entire Working Group.

Cost-Benefit Preliminary Survey

The UIC and Burns & McDonnell designed a preliminary cost-benefit data survey and sent it to the full Working Group in September, 2021. The purpose of the survey was to gather information on the availability of cost-benefit data associated with pollinator-friendly[1] and conventional vegetation management practices. The survey was designed to identify organizations that have available vegetation management cost data as well as identify other available quantitative and qualitative data. Respondents were asked to identify their type of organization, geographic region, type(s) of vegetation management data available, whether the available data was focused on pollinator-friendly or conventional vegetation management practices, and how quickly the data could be collected and shared.

The cost-benefit survey received a total of 140 responses from Working Group participants and other interested parties. The 140 participants represented ROW organizations, wetland mitigation sites, rest area projects, telecom, and more. For the purpose of this study, the analysis focused on responses from energy and transportation organizations, including roadway, distribution, transmission, power generation, and railroad land managers. Seventy-five survey responses were received from energy and transportation organizations, with a number of responses representing more than one sector. Energy transmission companies and state highway agencies made up the majority of industry sector respondents (Figure 1).

---

[1] [1] "Pollinator-friendly," is generally understood to mean practices that a) consider pollinators as an objective, b) support habitat needs of pollinators, and/or c) attempt to minimize loss/damage to pollinator habitat.

Of the energy and transportation organizations with cost data, nearly 90% of respondents have cost data for routine vegetation management, about 50% have cost data for post-construction establishment or revegetation, and just over 35% have cost data for special habitat restoration projects (Figure 2). Data was predominantly available for the West and Midwest/Great Plains regions.

Respondents reported available cost data for a range of routine vegetation management activities, including mowing, herbicide treatments, cutting and brush removal, grazing, and prescribed burning. Cost data for mowing was most commonly reported (72% of respondents), followed by herbicide treatments (61%) and cutting/brush removal (53%) (Figure 3). Respondents had data for both pollinator-friendly and conventional activities, though conventional data was more common. Overall, many respondents didn't know whether their data was considered pollinator-friendly or conventional, and therefore did not respond to those specific questions.

Forty eight percent of industry respondents reported available data for post-construction and revegetation activities, such as cost of seed mixes, installation, site prep, and establishment and maintenance. Cost data on seed mix were split evenly for pollinator-friendly activities and conventional, though most respondents indicated having more data for conventional practices (Figure 4).

For the third category of vegetation management activities, more respondents reported available cost data for *pollinator-friendly* habitat projects than for *conventional* habitat projects (Figure 5). These data included cost of seed mix, installation, site prep, and establishment and maintenance. Respondents also indicated whether they could collect data by acre or mile, whether it was annualized or variable over multiple years, and if costs were tracked over the entire system or a percentage of their land.

The survey also asked respondents about the availability of other qualitative or quantitative data related to the benefits of IVM and pollinator-friendly practices,. Slightly more than half of the respondents indicated they did have additional data to share, though 22 indicated available data on increased biodiversity, and 18 indicated they had data for community partnership opportunities and improved public relations (Figure 6). Overall, respondents indicated available data for value of pollinator services, increased biodiversity, carbon sequestration, reportables in sustainability reports, improved air quality, stormwater management and improved erosion control, resistance to invasive species, recreational use opportunities, improved aesthetic and tourism opportunities, reduced snow drift on roadsides, proactively addressing future regulatory responsibilities, improved employee satisfaction, improved working relationships with regulators, improved public relations, and community partnership opportunities.

Respondents indicated varying degrees of time needed to compile and share cost-benefit data for the study. Four participants of the total 140 respondents indicated they could share their data in less than two weeks, more than 65% of respondents noted they would need two to six weeks to compile and share their data, and the remaining respondents were unsure of the process or how long it would take to collect the data. The UIC requested cost data from the four respondents who indicated they could share it quickly. Of the four, two respondents provided examples of their available cost data. One data set came from a transportation agency and another other came from the agricultural sector. The data received gave a detailed outline of several native seeding projects, including the date, type of work, materials used, equipment and man hours, and different conservation scenarios by state. These data, and others provided by vegetation managers through the literature review, provided insight into the varied costs associated

with native seeding projects and can be utilized to create more efficient and effective data collection requests.

Annual Buy-in Survey

For the past three years, UIC and Burns & McDonnell have conducted annual surveys 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 third 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 (Figure 7A). Survey results in 2021 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 (Figure 7B).

Despite generally positive internal management support, many respondents indicated they have experienced barriers to managing 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 (Figure 7C). Respondents have consistently noted that a cost-benefit calculator and/ or articulating how habitat management makes good business sense would be most influential to build support (Figure 7D).

Recommendations

The findings of the cost-benefit preliminary 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. Based on the feasibility study this past year, the UIC and Burns & McDonnell recommend proceeding with next steps to collect and analyze additional cost data to inform the potential future creation of a cost-benefit calculator.

The majority of survey respondents indicated needing at least two to six weeks to collect and share relevant cost data. The UIC will utilize the data sets gathered in the first year of the feasibility study to compare variables, evaluate how the data are aggregated, and draft a data collection template. The UIC recognizes the importance of designing a template that will be easily accessible for participants to input their data with minimal effort and also make the analysis of the aggregated data efficient and effective.

The UIC recommends starting with the collection and analysis of cost data for routine vegetation management activities. The preliminary survey suggests cost data for routine vegetation management are more readily available, which should help facilitate a more robust data collection and analysis. With a larger data set, the UIC expects to find more meaningful insights and trends related to vegetation management activities by region and type. Industry averages or ranges of cost data could help energy and transportation organizations with projections and planning for IVM and pollinator-habitat initiatives. These values could also serve as default inputs into a future cost-benefit calculator.

The UIC is currently leading a separate study funded by the U.S. Department of Energy Solar Energy Technologies Office that includes creation of a cost-benefit calculator for co-locating pollinator habitat at large-scale solar facilities. That effort is running in parallel with this feasibility study and there will be

opportunities for cross-learning and data-sharing. The UIC will ensure alignment with the data collection templates, variables, and analyses to maximize the utility for both projects. Additionally, the UIC is aware of other ongoing efforts by industry associations to collect and analyze cost data and will leverage those data and analyses where possible.

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 the continuation of this feasibility study, the UIC and Burns & McDonnell hope to provide valuable insights that will inform future vegetation management decisions on energy and transportation lands.

Appendix

Table 1: 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	

Literature reviewed:

1) Bell, Bob. "NPV Tool ProjectEasop2012C FINAL." PGE Corp.
2) Goodfellow, John. "The Cost-Efficiency of IVM." *A Comparison of Vegetation Management Strategies for Utility Rights-of Way*.
3) "Herbicide & Mowing Worksheet." Dow AgroSciences LLC, 2011.
4) Herold, Jamie, et al. "Integrated Vegetation Management (IVM) for INDOT Roadsides." *Integrated Vegetation Management (IVM) for INDOT Roadsides*, 2013, https://doi.org/10.5703/1288284315210.
5) "Mow vs Spray Calculator." Corteva.
6) Meissen, Justin, et al. "Cost-Effective Native Seed Mix Design and First-Year Management." *Farm Progress Reports*, vol. 2016, no. 1, ser. 62, 2017. *62*, https://doi.org/10.31274/farmprogressreports-180814-1632.
7) Turk, Joseph R. "Assessing the Costs and Benefits of Native Plant Species for Electric Transmission Line Right-of-Way Revegetation within the Tennessee Valley Authority Power Service Area." May 2015.
8) University of Florida, and George L Harrison. "Economic Impact of Ecosystem Services Provided by Ecologically Sustainable Roadside Right of Way Vegetation Management Practices." Mar. 2014.

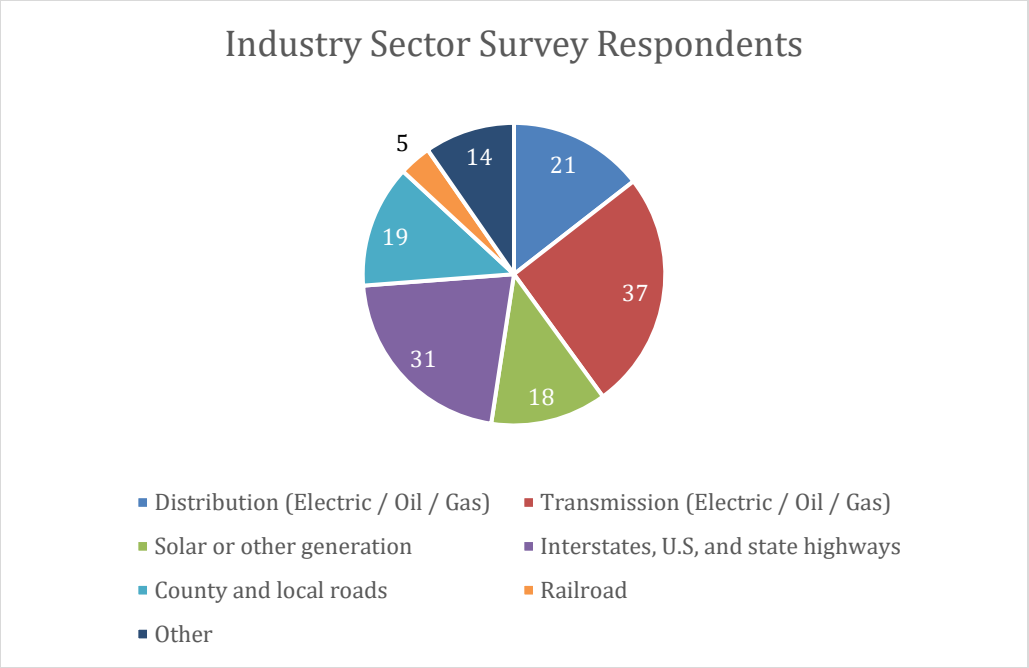


Figure 1: Industry Sector Respondents to Preliminary Survey

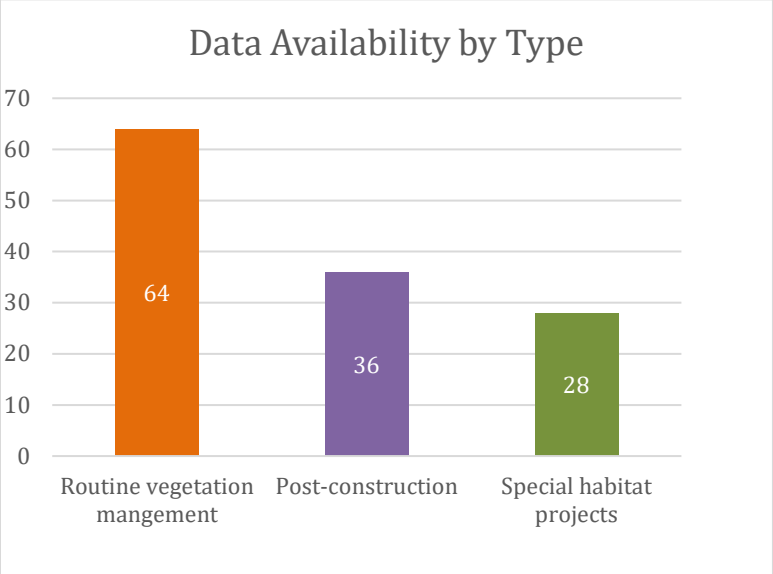


Figure 2: Vegetation Management Cost Data Availability by Type

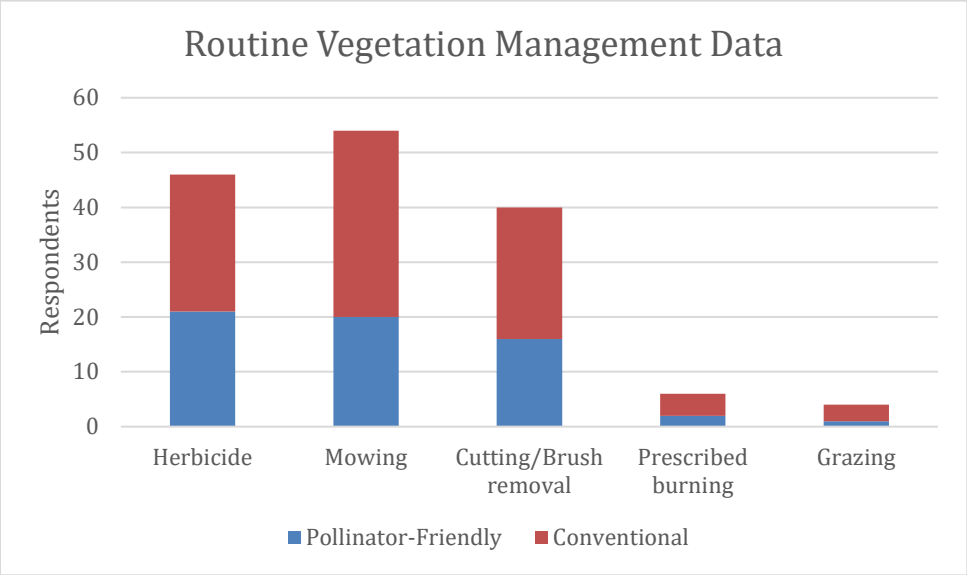


Figure 3: Availability of Routine Vegetation Management Cost Data

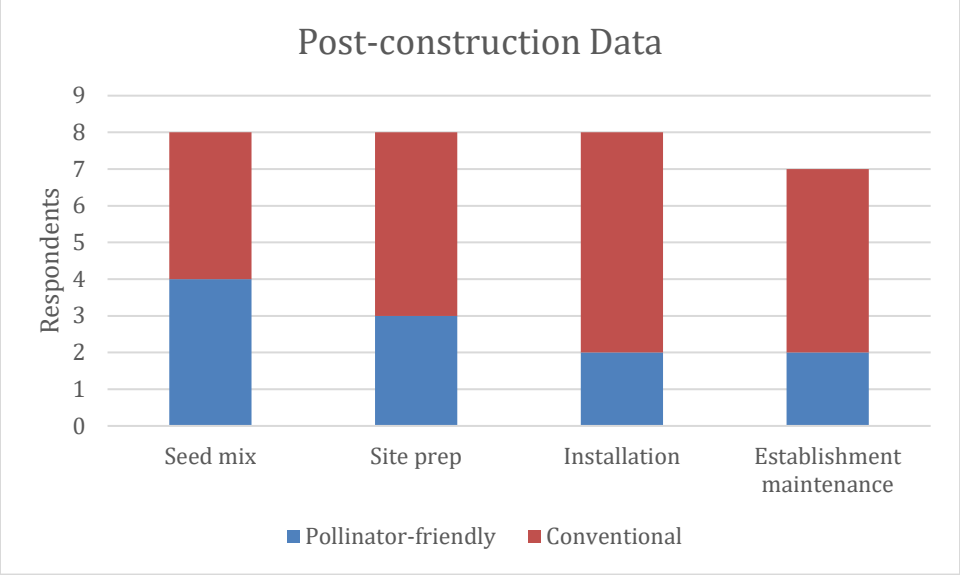


Figure 4: Availability of Post-Construction/Revegetation Management Data

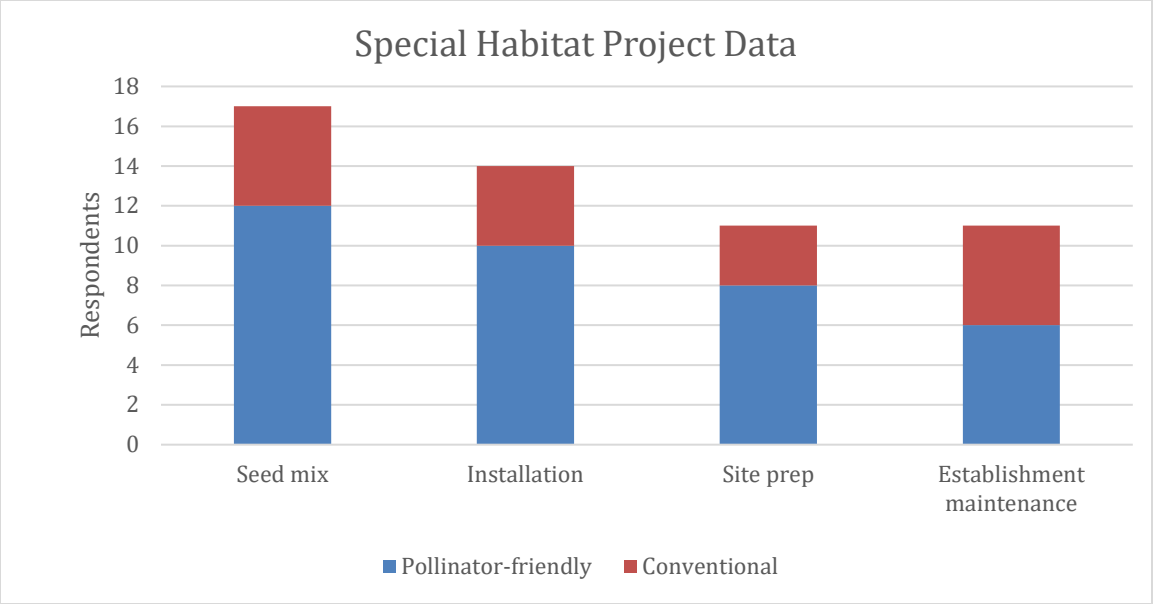


Figure 5: Availability of Special Habitat Project Cost Data

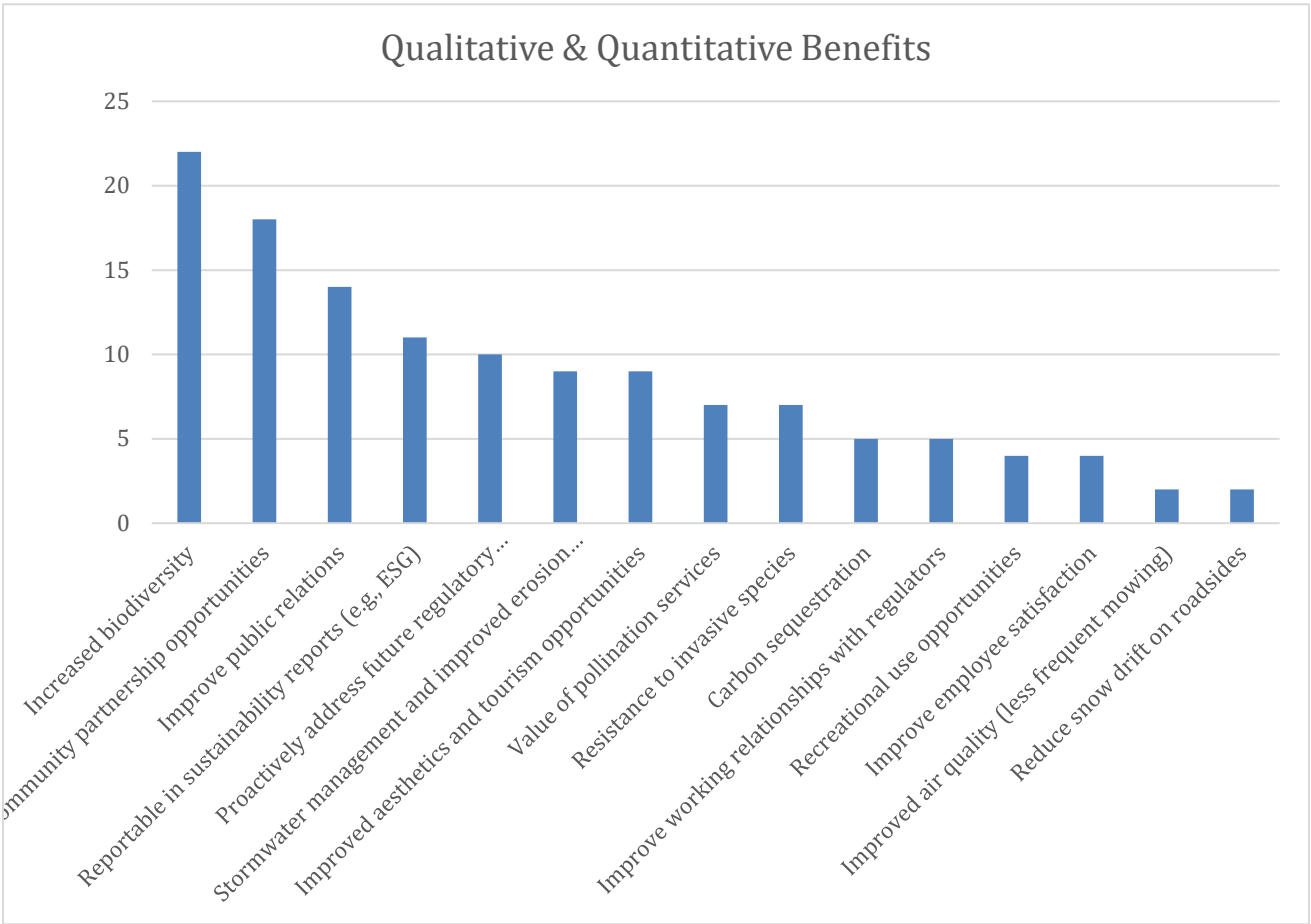


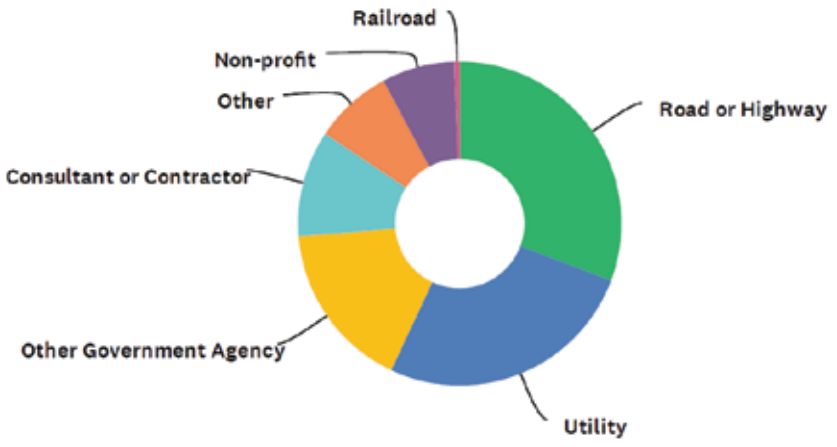
Figure 6: Availability of Data on Qualitative & Quantitative Benefits

Figure 7. Annual Buy-In Survey Results, Comparison 2019-2021

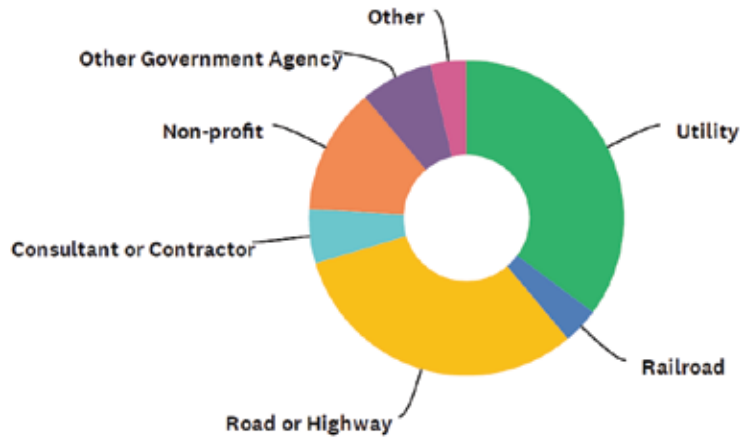
Annual Buy-In Survey Results 2019 - 2021

A. Industry

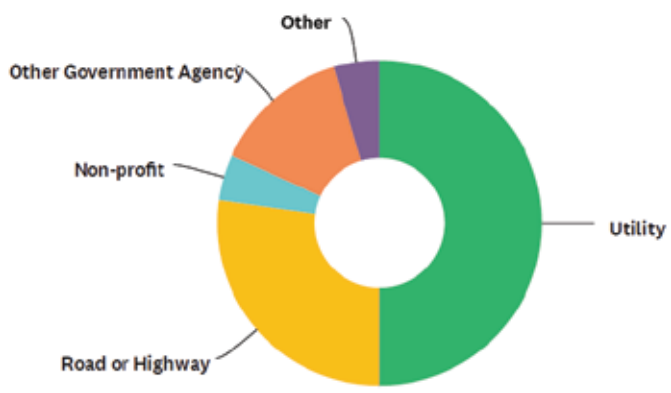
2019



2020

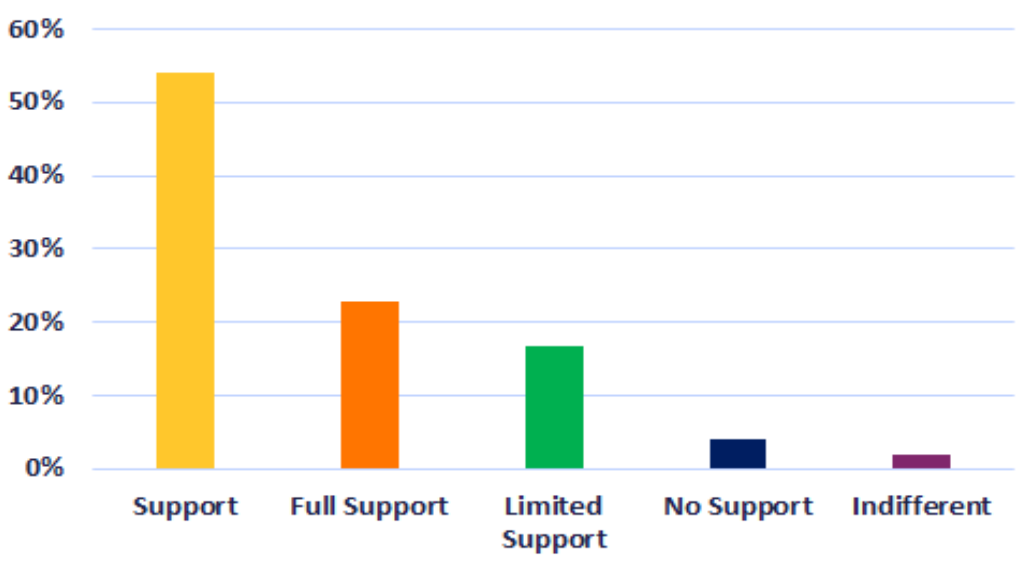


2021

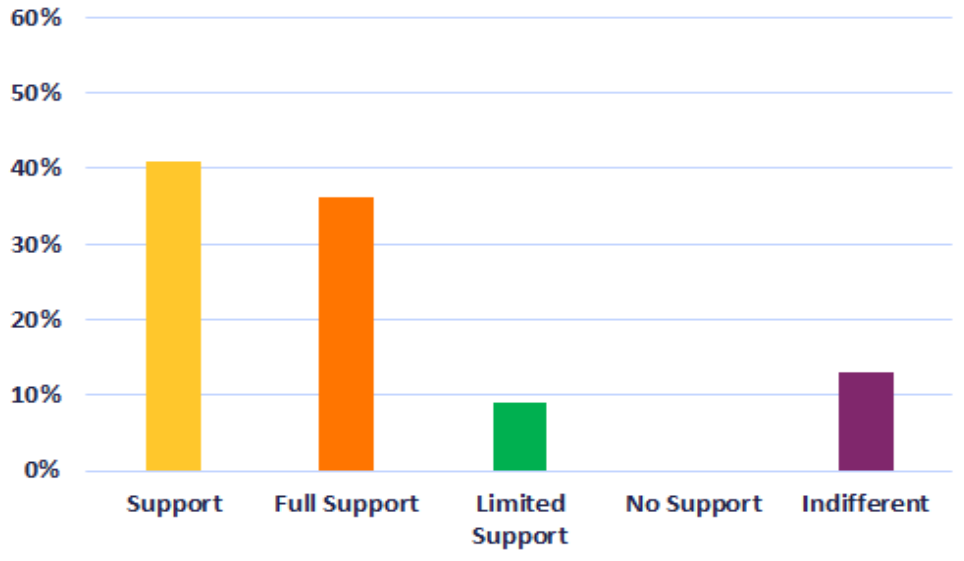


B. Level of Internal Support for Habitat Conservation

2020

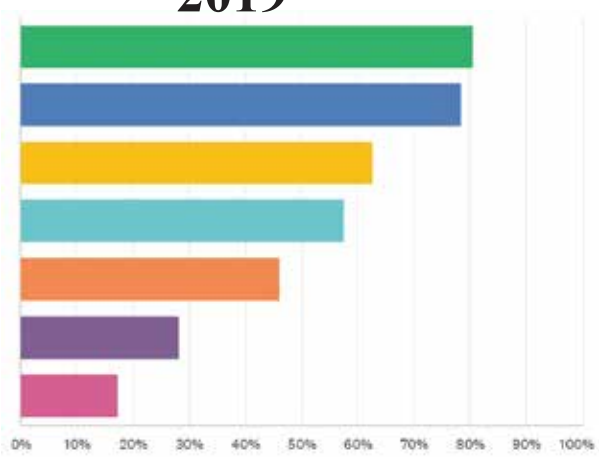


2021



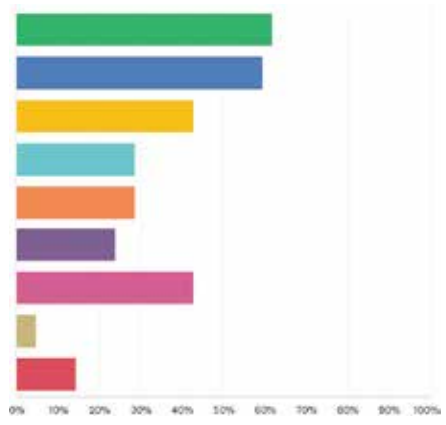
C. Barriers to Habitat

2019



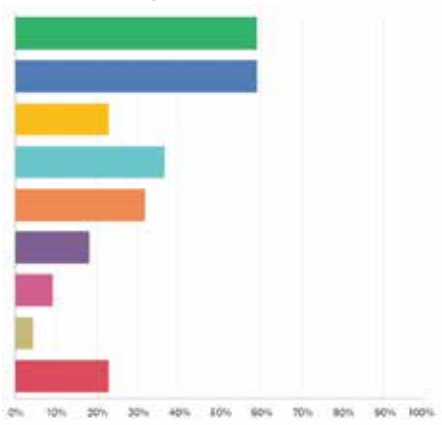
- Low priority compared to other operational needs
- Perceived higher cost/belief that habitat management will not provide a return on investment
- Business as usual/desire to manage vegetation as you always have
- Lack of Awareness
- Concern about additional regulation (e.g., Endangered Species Act)
- Concern that the initiative will not be successful
- Other (please specify)

2020



- Low priority compared to other operational needs
- Perceived higher cost/belief that habitat management will not provide an immediate return on investment
- Business as usual/desire to manage vegetation as you always have
- Lack of Awareness
- Concern about additional regulation (e.g., Endangered Species Act)
- Concern that the initiative will not be successful or well-received by the public, employees, nearby landowners, and/or stakeholders
- Reduced budget or other operational impacts due to COVID-19
- No barriers
- Other (please specify)

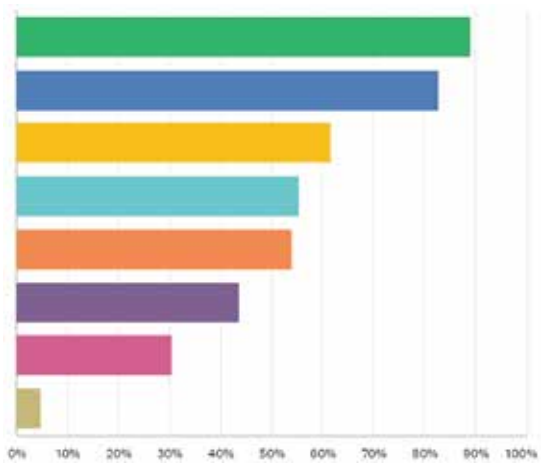
2021



- Low priority compared to other operational needs
- Perceived higher cost/belief that habitat management will not provide an immediate return on investment
- Business as usual/desire to manage vegetation as you always have
- Lack of Awareness
- Concern about additional regulation (e.g., Endangered Species Act)
- Concern that the initiative will not be successful or well-received by the public, employees, nearby landowners, and/or other stakeholders
- Reduced budget or other operational impacts due to COVID-19
- No barriers
- Other (please specify)

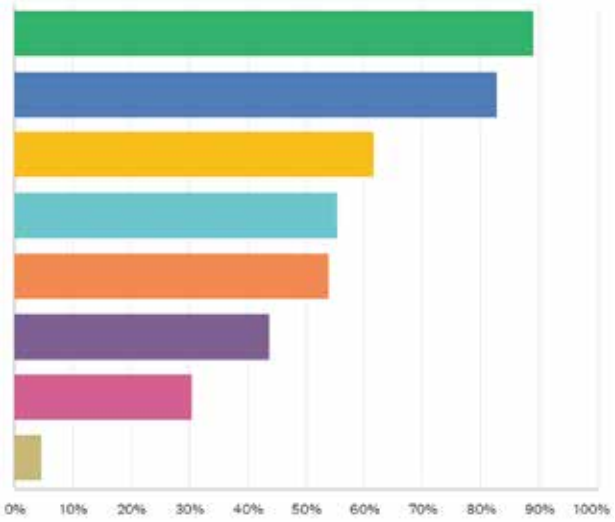
D. Opportunities for Habitat

2019



- Cost-benefit analysis tool
- Case studies from industry peers
- Recognition by government agencies and/or reputable conservation organizations
- Letters or formal requests from customers, investors, or the public
- Published white papers/fact sheets
- Videos and/or prepared presentation materials
- Social media campaigns
- Other (please specify)

2020



- Cost-benefit analysis tool
- Case studies from industry peers
- Recognition by government agencies and/or reputable conservation organizations
- Videos and/or prepared presentation materials
- Social media campaigns
- Published white papers/fact sheets
- Letters or formal requests from customers, investors, or the public
- Other (please specify)