RECYCLING OVERVIEW IN NEBRASKA

by

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RECYCLING OVERVIEW IN NEBRASKA

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Recycling is a pillar of waste management and current literature supports the need for a continued statewide review of recycling. “Nebraska has a recycling rate of 17.04%. An average of 524.7 pounds of MSW is recycled for each person in Nebraska each year, while 2554.1 pounds is disposed (UNPC, JISC, & UNLBSR, 2015). The economic impact of recycling in Nebraska is $603,400,900, $170,145,300 in wages, 2,539 jobs, and $52,859200 in federal, local, and state taxes (NRC, 2019). Improving those numbers requires documentation of current recycling accessibility and the components of the system. This study was a statewide assessment of the recycling structure in Nebraska and aimed to consolidate various forms of data into a comprehensive overview of recycling in the state which allows greater understanding. This research occurred in conjunction with the grant funded Nebraska Recycling Council Hub and Spoke Recycling Project. Municipalities were first sent an email containing a survey and those who did not respond were then called and asked to answer waste management questions over the phone. After the entire state was complete, the data was aggregated into one master spreadsheet which allowed manipulation to assess results and generation of maps and figures to conveniently display data. Findings support previous data in that recycling accessibility is an issue in Nebraska, 1/3 of residents are without a recycling option. There are multiple factors that contribute to the inconsistency. Currently, there is no outside incentive to develop a Hub and Spoke programs in Nebraska which makes it difficult for smaller rural communities to recycle. And even when a center is conveniently located, some cannot accept more material. Precarious hauling is also an issue with half the state only having one hauler option. Cost of hauling and equipment costs were mentioned 50 times and could be assisted with grant funds and systems like Hub and Spoke that share the cost of material management. The more evidence and information available, the easier it would be to expose issues and address them.

ABSTRACT

Recycling is a pillar of waste management and current literature supports the need for a continued statewide review of recycling. “Nebraska has a recycling rate of 17.04%. An average of 524.7 pounds of MSW is recycled for each person in Nebraska each year, while 2554.1 pounds is disposed (UNPC, JISC, & UNLBSR, 2015). The economic impact of recycling in Nebraska is $603,400,900, $170,145,300 in wages, 2,539 jobs, and $52,859200 in federal, local, and state taxes (NRC, 2019). Improving those numbers requires documentation of current recycling accessibility and the components of the system. This study was a statewide assessment of the recycling structure in Nebraska and aimed to consolidate various forms of data into a comprehensive overview of recycling in the state which allows improved general understanding. This research occurred in conjunction with the grant funded Nebraska Recycling Council Hub and Spoke Recycling Project.

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issue with half the state only having one hauler option. Cost of hauling and equipment costs were mentioned 50 times and could be assisted with grant funds and systems like Hub and Spoke that share the cost of material management. The more evidence and information available, the easier it would be to expose issues and address them.

ACKNOWLEDGEMENTS

This research occurred in conjunction with the Nebraska Recycling Council Hub and Spoke Recycling Project funded by the Department of Environment and Energy. The dual use of this data and developed content is both convenient and extends its use and potential audience. A special thank you to NRC Program Director, Leah Meyer, and Media & Program Coordinator, Allison Majerus who were instrumental in the completion of this project and its findings. I also thank the many city clerks that contributed to this project as well as the recycling center operators, haulers, and materials processors, and other resource stakeholders that do the difficult work of responsibly managing our resources.

My gratitude extends to Dr. Martha Shulski, A.B.D. Ben Newton, Dr. Jennifer Freund, and Dr. Dave Gosselin, all of whom played a part in my academic and personal success, and I admire greatly. I hold the University of Nebraska- Lincoln near to my heart.

Technical Terms and Jargon

Material Recovery Facility: a facility that sorts and bales material that is then shipped off to be recycled

Municipal Solid Waste: is garbage that we throw out every day that is destined for the landfill

Waste Diversion Rates: The city of Lincoln describes as, "Your waste diversion rate indicates how much of the garbage your organization (or you) generate is diverted from the landfill." They even offer a calculator so you can set a goal to increase it.

Landfill Tipping Fees or Tipping Fees: the fee paid by anyone who disposes waste in the landfill

Sustainable Development Goals: Officially, the United Nations Development Program defines them as "The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The 17 SDGs are integrated—that is, they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability."

Curbside Collection: trash or recycling that is collected from individual homes at the curb

Drop Off Collection: trash or recycling that must be transported to a collection location such as a trailer or center

Abbreviations

MRF- Material Recovery Facility

NRC- Nebraska Recycling Council

NDEE- Nebraska Department of Environment and Energy

KNB- Keep Nebraska Beautiful

UNPC- University of Nebraska Policy Center

JISC- Joslyn Institute for Sustainable Communities

UNLBSR- University of Nebraska - Lincoln, Bureau of Sociological Research.

ILSR- Institute for Local Self-Reliance

Introduction including Literature Review

This research aimed to consolidate various forms of data into a comprehensive overview of recycling in the state of Nebraska which allows better understanding of distribution and adds to the somewhat limited formal literature available on the subject. The findings exposed the variables of the recycling system across the state. This in-depth research can bring new information to light that gives way to documentation of recycling accessibility and the components of the system. Essentially, the research encapsulates what recycling looks like in the state of Nebraska and suggests reasons why it exists that way based off themes in the data.

According to TerraCycle's website, a private U.S. recycling business, "Recycling is the process of recovering material from waste and turning it into new products." This makes recycling a pillar of waste management and offers environmental benefits in the form of pollution reduction, resource conservation, reduction in the amount of waste sent to landfills, while also creating jobs and government tax revenue (EPA, 2017). In November of 2020, the Environmental Protection Agency released the newest iteration of the Recycling Economic Information (REI) Report. This report provides updated information about the number of recycling jobs, wages and tax revenues in the United States. There were 681,000 jobs, $37.8 billion in wages, and $5.5 billion in tax revenue generated in the recycling industry in 2020 (EPA, 2020). And the impacts of recycling are just as evident in Nebraska, with an economic impact of $603,400,900, 2,539 jobs, $170,145,300 in wages and $52,859200 in federal, local, and state taxes (NRC, 2019).

There is a cost to managing society's waste and an important choice to be made. We can pay to have materials landfilled and wasted forever, or we can pay to have materials reprocessed and repurposed into new products. Either way there is a cost to managing extracted resources. Fuel, supplies, labor, and capital costs exist whether materials are landfilled or recycled. Canceling recycling in favor of landfilling does not eliminate costs. Landfill tipping fees may be low in Nebraska, but they're not free. Besides, one can argue that landfill disposal fees do not accurately represent the full cost of disposal. They do not include the opportunity cost of taking agricultural land out of crop production. While disposal fees are intended to cover siting, building, closure, and post-closure costs (i.e. the cost of monitoring key environmental aspects of the facility and surrounding property for 30 years), they do not include mitigation costs if toxic materials end up in our drinking water (NRC, 2019).

The following figures and information were obtained from a 2015 study by the University of Nebraska Policy Center, Joslyn Institute for Sustainable Communities, and University of Nebraska - Lincoln, Bureau of Sociological Research and is a piece of relatively current literature with a similar goal to that of this project. However, the 2015 study had a much larger scope than was possible with the timeframe of my study. It included components on municipal solid waste, diversion rates, recycling economics, waste management legislative content, information from recyclers and county treasurers, a review of recycling in surrounding states, public forums, and extensive data on recycling rates that was used to offer recommendations in various ways, especially applicable to policy makers.

Nevertheless, the research supports the need for a continued statewide review of recycling. “Nebraska has a recycling rate of 17.04% (17.04% of Nebraska’s Municipal Solid Waste is recycled, while 82.96% is disposed). As shown in Figure 1, an average of 524.7 pounds of Municipal Solid Waste is recycled for each person in Nebraska each year, while 2554.1 pounds is disposed. (UNPC, JISC, & UNLBSR, 2015).” If these rates were to increase because of more statewide information, the $603,400,900 economic impact in NE and 2,539 jobs would also increase. Additionally, the environmental impact of recycling more material and diverting waste from the landfill would be nothing but beneficial.

Figure 1 MSW per Person per Year

Measuring recycling is multifaceted and thus, difficult to quantify. How to measure, where to measure, and what to measure are all questions that have circulated the recycling industry for years. The *UNPC, JISC, & UNLBSR, 2015* study detailed that most communities do not calculate their recycling rates and for those that do there are different methods used in the calculation. For example, some states require recycling to be measured by the hauler while others require it at the MRF, and they may only be measuring the most profitable materials like paper or cardboard. Therefore, it is extremely difficult to accurately compare recycling rates between states. The survey method used in that research is directly applicable to NRC research strategy of surveying the city or village clerk from each community. However, the experience of the Bureau of Sociological Research was that these types of surveys have the highest response rate when sent by mail, which would not be feasible in my case. They also sent the surveys to not only the clerks, but treasurers, and recyclers along with pre-survey emails, mail surveys, and postcard reminders. The response rate for City Clerks was 72%, 381 of 529, (UNPC, JISC, & UNLBSR, 2015)."

With any system, one cannot fully understand or correctly monitor what is not measured. And this project will help further establish a baseline to measure progress in the future. The term baseline here is referring to the data from the last few years that will be discussed in the next section. The research exposes incongruencies within the recycling system of Nebraska. It is of great importance to understand the recycling system so stakeholder agencies such as the Nebraska Recycling Council, Nebraska Environmental Trust, Nebraska Department of Environment and Energy, Keep Nebraska Beautiful, and others, can work efficiently and sustainably across the state regarding recycling. Additionally, the data could also be of value to

recycling centers, local governments, recycling coordinators, haulers, material recovery facilities, economic development agencies, education in school programs, and encourage general interest in recycling.

Interest in recycling is important. The book by (Weinberg, Pellow, & Schnaiberg, 2000) shows how analysis of recycling allows us to theorize more generally about sustainable development. While all communities in Nebraska may not be interested in developing sustainable development goals, the benefits that come from these goals are more broad than environmental. “Recycling also constitutes a model of sustainable development because it is one few ideas proposed by advocates that embraces all of the three Es” (Environment, Economy and Equity) and goes further in saying, “Most proposals or working models of sustainable development fall short of the three Es and focus mainly on ecological sustainability (Weinberg, Pellow and Schnaiberg, 2000).” And the Institute for Local Self-Reliance, a non-profit organization that advocates sustainable community development, promotes recycling.

> Recycling is an economic development tool as well as an environmental tool. Reuse, recycling, and waste reduction offer direct development opportunities for communities. When collected with skill and care, and upgraded with quality in mind, discarded materials are a local resource that can contribute to local revenue, job creation, business expansion, and the local economic base (ILSR, 2002).

This research offers explanations to various aspects of societal, behavioral, geographical, and governmental influence on recycling in Nebraska. The potential application is extensive because of the large scale of the project and could be useful to residents and aforementioned

organizations alike. The main limitation of this study was the absence of data from some municipalities due to the voluntary nature of the survey. Additionally, some of the data I used was collected by a different individual and there are minor inconsistencies within the data entry. In short, recycling is an important part of Nebraska's economy and community. My state-wide overview evaluates recycling in each Nebraska community and is data rich and useful in many ways. This research took place in conjunction with the Nebraska Recycling Council Hub & Spoke Project.

Nebraska Recycling Council Hub & Spoke Project

It is important to acknowledge the relationship between the project and the Nebraska Recycling Council that describes itself as, "A statewide, member-based, 501(c)(3) nonprofit organization. Our mission is to maximize the economic and environmental benefits of resource recovery in Nebraska. Our vision is a future in which all materials are reserved for their highest and best use and landfill disposal is the last resort. Our great wish is to protect Nebraska's good life for future generations."

NRC is the only recycling organization in Nebraska that serves the entire state with on the ground consultation, technical assistance, and collaboration and is where I've been employed for 2 years. In the fall of 2021, the Hub and Spoke Project was completed. This project was funded by the Nebraska Department of Environmental Quality through a Waste Reduction and Recycling Grant. On July 1, 2019, the Nebraska Department of Environmental Quality and the Nebraska Energy Office merged into the Nebraska Department of Environment and Energy and Governor Pete Ricketts shared, "the two agencies have a number of related functions and

combining them will not only make state government more efficient but also enhance the services provided to residents (Olberding, 2019).” It is important to note this to avoid any confusion with state material older than 2019 associated with the Nebraska Department of Environmental Quality. NRC received 4 separate years of funding for this project (figure 2), beginning with the North Central region in green, followed by Northeast in red, Southeast in blue and lastly, the Western region in yellow. “Waste Reduction and Recycling Incentive funds are generated by a fee on solid waste disposed of in landfills, an annual retail business sales fee, and a fee assessed on the sale of new tires. Grants are provided to local integrated waste management projects, and can include recycling systems, household hazardous waste collections, and composting. For 2020, 33 projects totaling $2,415,029 were funded under the Business Fee, Disposal Fee, and Deconstruction of Abandoned Buildings categories (NDEE).”

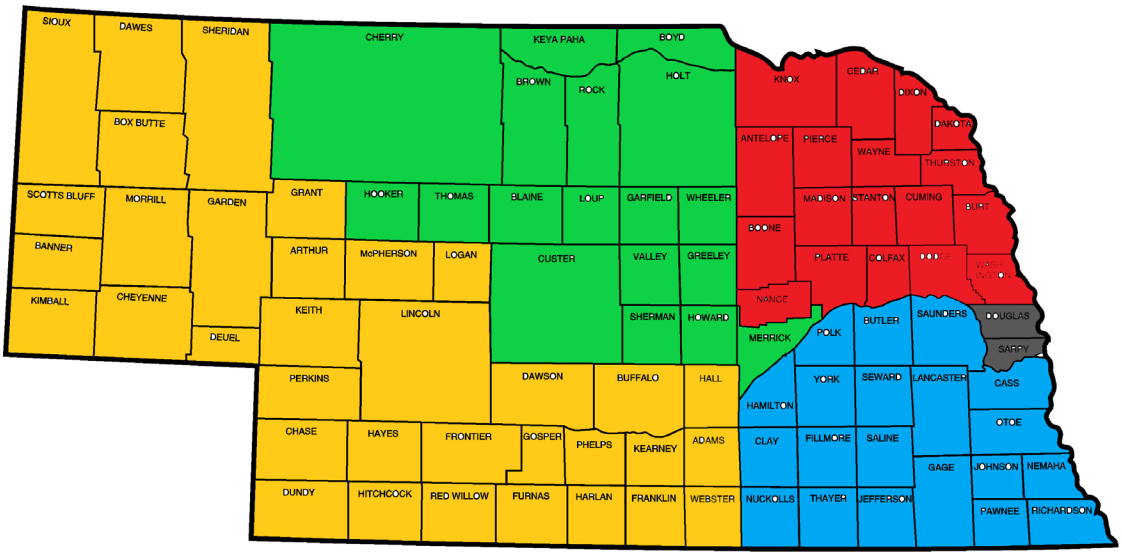

Figure 2 Hub and Spoke Regions

NRC conducted this research to encourage and support Hub & Spoke models across the state because it is an extremely efficient way to gather and process recyclables from both a capital and operational perspective.

> With small populations and low population densities, rural communities in Nebraska and across the U.S. struggle to provide cost effective recycling services because of the low volume of recyclable materials produced. Simply put, the more recyclable materials collected, the better the economics work because the costs per ton are reduced. A hub and spoke system is a proven solution to help rural communities work together on a regional level to consolidate larger volumes of recyclable materials. This creates a more durable, economical, and efficient system for managing recyclables. Hub and Spoke Recycling regional cooperation reduces costs, increases efficiency by consolidating recyclables to increase volumes, rural communities can capitalize on economies of scale and provide more efficient recycling programs. The hub and spoke model works by creating regional recycling processing centers that serve as the "hub," where material is sorted, baled, and sold to markets. Smaller, nearby communities with collection points are the "spokes" that deliver their recyclables to the hub for processing. Spokes reduce their transportation and operating costs by working with a hub, and the hub benefits by consolidating marketable volumes for higher revenues and better economies of scale. A regional partnership and formal agreement are recommended to ensure the continued success of the program (NRC).

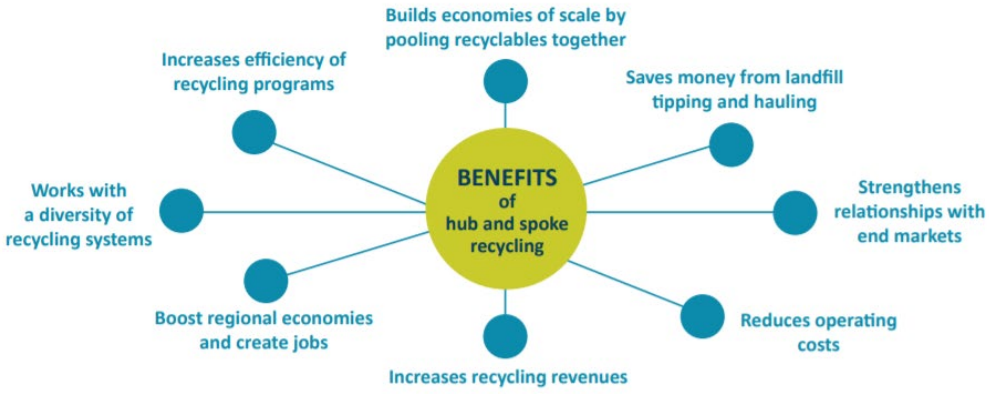

Figure 3 Benefits of Hub and Spoke Recycling obtained from the Nebraska Recycling Council

Components of my final product were used to supplement Hub and Spoke Recycling education in the form of an ArcGIS Storymap at the NRC Annual Fall Conference seen in figure 4.

Figure 4 Cover of NRC ArcGIS Storymap presented at NRC Annual Fall Conference

Methods

The research approach was similar to that of the 2015 study by the University of Nebraska Policy Center, Joslyn Institute for Sustainable Communities, and UNL Bureau of Sociological Research in that the entire state was under analysis regarding recycling with the intent to improve accessibility. However, NRC data collection solely utilized the clerks from all incorporated municipalities for information. Justifications in consulting city clerks came from their sense of waste management operations, community engagement and attitudes, historical context, and general knowledge of the community they represent. The 2015 project had a larger scope and agenda while NRC research was concerned with Hub and Spoke feasibility which is evident in the types of questions asked.

A spreadsheet for contacts had to be developed before any communication could take place. This information was found through the League of Nebraska Municipalities, google searches, and in some cases, NRC already had record of contact information. Additionally, background information was necessary and included things such as location of recycling centers and history, common MRFs that material is sent to, waste management terminology, understanding of geographic differences in population, thorough knowledge of recyclable materials and various forms of collection strategies and equipment, local government funding and grant options, etc.

Generation of questions took time and rationalized the desire for as much data as possible while respecting the clerk's time and understanding the limitations of the study. The questions related to trash service, distance to landfill, contracting, tipping fees, recycling service,

community motivation, stakeholders, accepted materials, composting, local recycling markets, construction and demolition material, and special recycling events. Surveys were administered with the majority consisting of quantitative inputs and chances for the individuals to elaborate qualitatively if they wish and completion took approximately ten minutes. The state was surveyed region by region in the order previously mentioned based on grant funding. I did not have direct involvement with the surveying of the North Central and Northeast regions, but the questions and methods were the same throughout.

Survey 123 was utilized, an ArcGIS application, that is a reliable way of surveying such a large geographical area. Provided in figure 5, is a view of page 1 of 6 that participants saw when they completed the survey. Municipalities were first sent an email containing the survey and a detailed description of the project, funding, and resources for additional information or support. Those who did not respond to the email and submit the survey themselves were then called and asked to answer the survey questions over the phone. NRC then directly transcribed the phone conversation into the survey.

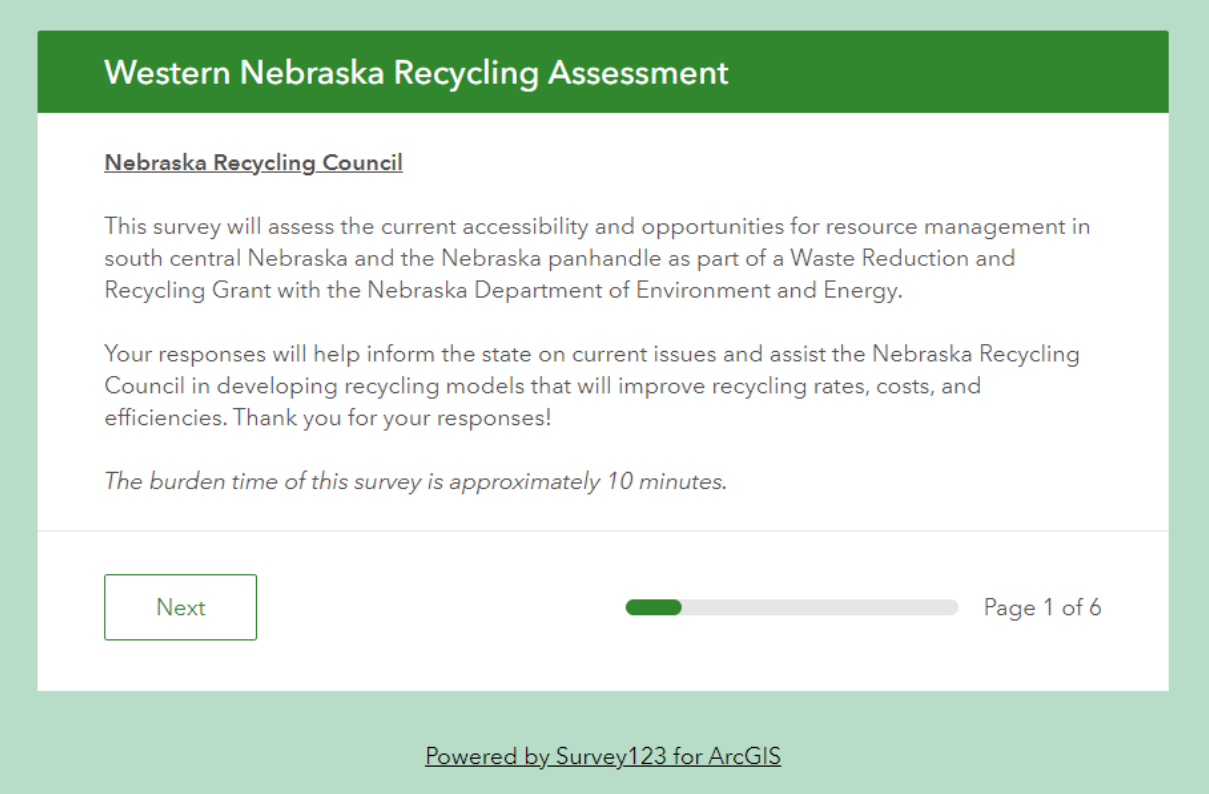

Figure 5 NRC Recycling Assessment Survey Sample

Within the survey the clerk had to enter their location which served at a geographic reference point in ArcGIS and attached all respective information to a specific location. Each region also had its own spreadsheet with the respective data downloaded from ArcGIS. After the entire state was complete, the data was aggregated into one master spreadsheet which allowed manipulation to assess results and identify themes.

Results

Fortunately, when discussing public knowledge of waste management services there is little reason for respondents to intentionally false report data and we did not run into very many issues of withholding information. The data gathered was extensive, quantitative information was manipulated into maps and figures for simplicity purposes and geographical context while qualitative data was investigated to find the key components of recycling issues mentioned by city clerks. Quantitative data was relatively easy to obtain and involved questions like whether they offer recycling and how much their recycling costs. Qualitative comments from the clerks were not always guaranteed but included reasons why recycling is or is not offered, additional feedback, requests for further assistance etc. The response rate was 71% and 67% in the Western and Southeastern regions respectively, which is very similar to the 72% rate from the 2015 study.

Recycling Availability

Of the 312 responding municipalities, 214 offer one or more recycling options. Each dot from the ArcGIS map corresponds with a responding clerk. Green indicates there is at least one option to recycle and red indicates where there is no recycling, see figure 6. Within ArcGIS you click each point and interactively learn more about the community's waste service, recycling service, composting options, budget, motivated or involved stakeholders, issues with contamination, and partnerships with regional government agencies and non-profits.

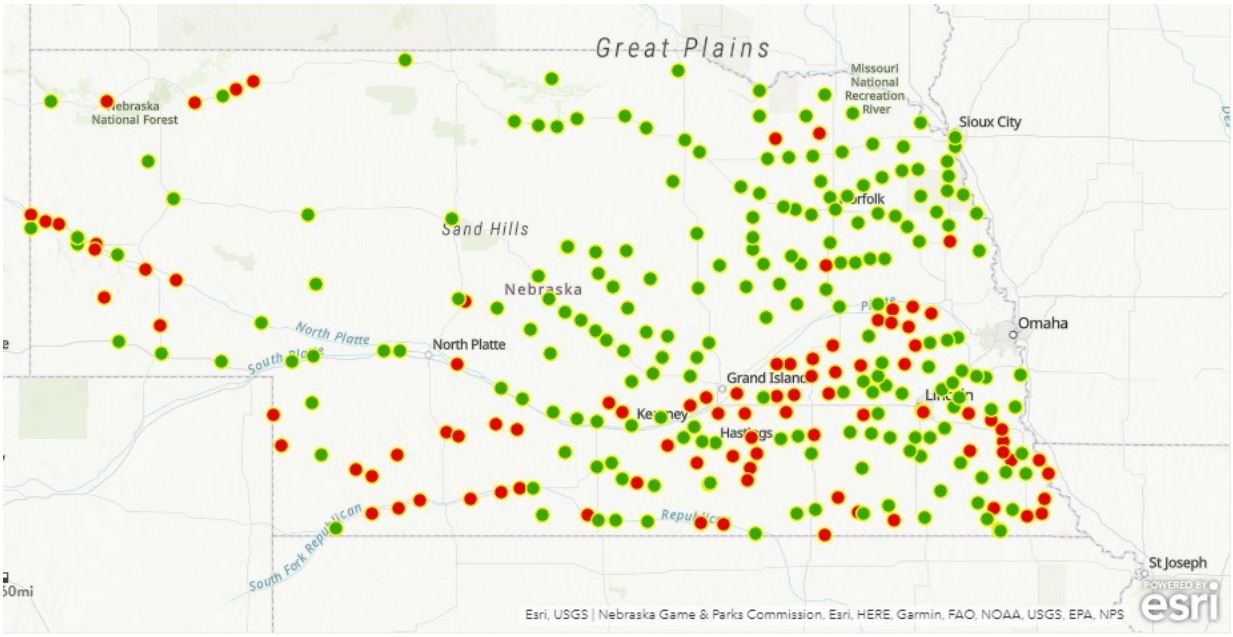

Figure 6 Recycling Accessibility in Nebraska. Respondents included municipal clerks, public work technicians, and public administrators. Municipalities in Douglas County and Sarpy County were not included in the surveys.

Recycling Centers

There are currently 32 Nebraska recycling centers in operation and 5 that are suspended, see figure 7. Between economic instability in rural communities and rising costs of processing recyclable materials, recycling programs are suspending in Nebraska, sometimes temporarily and at other times permanently.

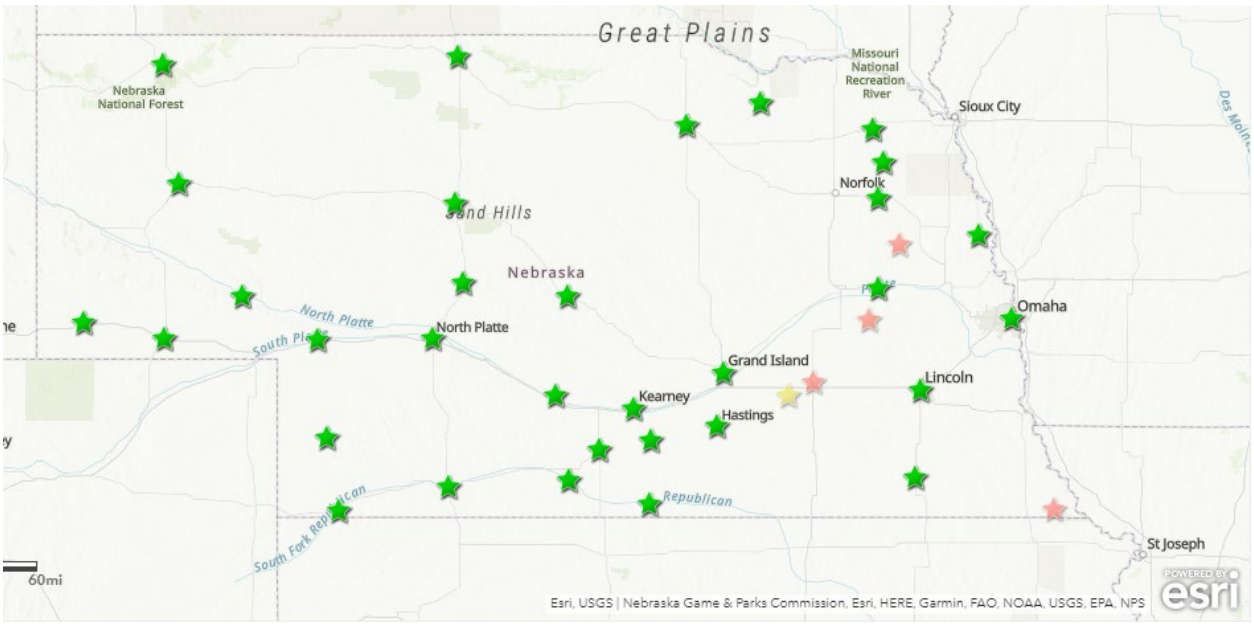

Figure 7 Recycling Centers in Nebraska. Green icons indicate currently operating recycling centers. Red icons demonstrate centers that are currently or temporarily suspended.

Issues

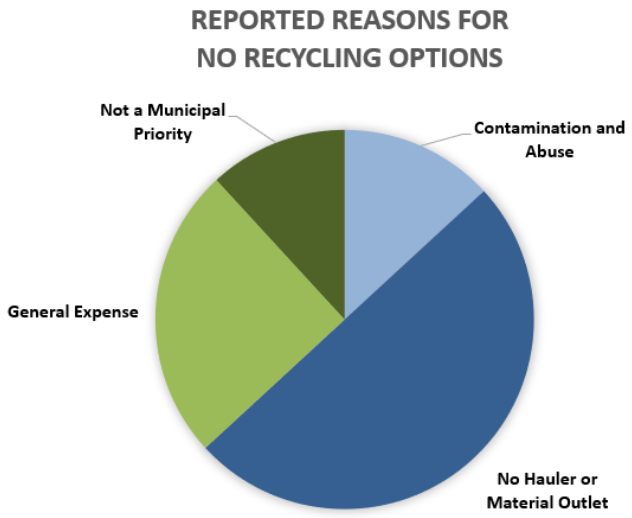

Figure 8 Reported Reasons for No Recycling Options

Seventy-six municipalities with no recycling options provided a response as to why their program never began or why it ended. Half indicated they would like to recycle but had no hauler that could service the area, often because the recycling center was too far or not accepting materials. Many shared their desire to start again if another hauler or contract with a recycling center could be arranged. The temporary suspension of recycling services in Scottsbluff and ongoing suspension of recycling services in York, and Falls City impacted a significant number of communities. Twenty five percent indicated that recycling became too expensive, some citing quoted costs of $500 a haul or higher. It's important to consider the expenses associated with municipal labor costs in maintaining the site or hauling the trailer. Most municipalities reported average haul costs of $200 per haul, usually pulled once per month. Thirteen percent of responding municipalities stated that their drop off containers were too "contaminated" but most often provided examples of illegal dumping and vandalism. Twelve percent of municipalities responded that their communities were too small to support a container or that other governmental operations were a greater priority at the time.

Cost of Service and Equipment

The clerks mentioned "cost", "money", or "funding" 50 times throughout the project. In the Southeast region for communities that managed their recycling drop off containers through a hauler, the average cost of service was $2,775 annually, with a median cost of $3,000. The average cost to have a drop off container picked up was $200, with a median cost of $165. Additionally, the cost of equipment and labor is sometimes not feasible or justifiable for small

communities and new or used equipment is a large investment. Of the responding communities, 48% had a population of 500 or less.

Service Options

Half of the municipalities that ended their program stated that they did so because they had no service options. 139 communities that currently have recycling options described the number of haulers that operate in their communities. Seventy one percent of these communities only have one hauler that provides recycling services. Seventeen percent had two haulers and twelve percent had 3 or more recycling hauler options.

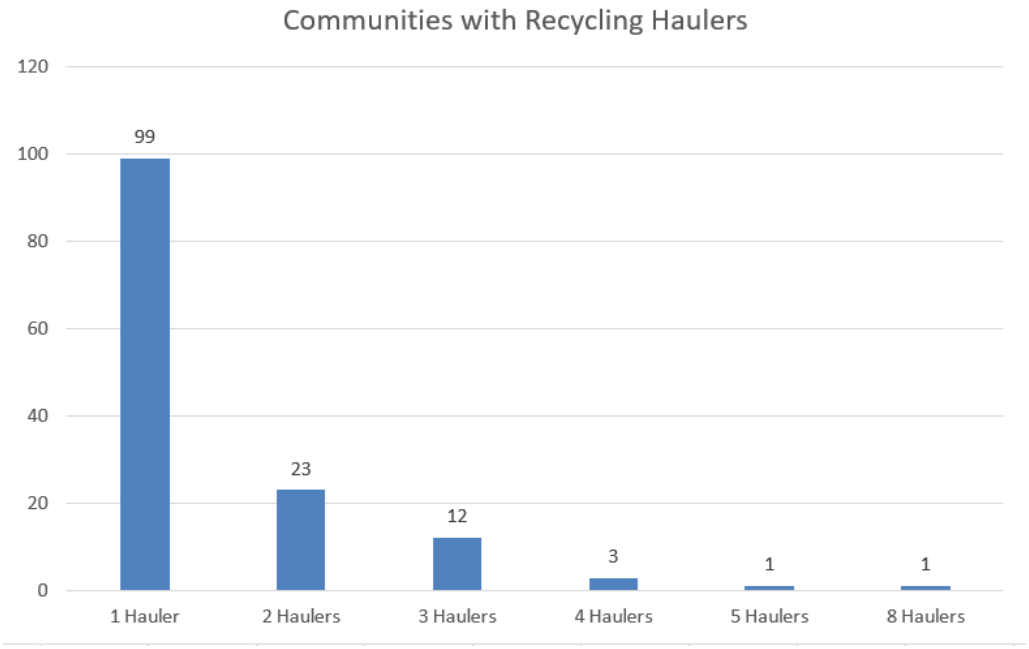

Figure 9 Communities with Recycling Haulers

Contamination

Of the 107 communities that responded to the question "Based on feedback from your waste management provider, how contaminated is your recycling intake?" Seventeen percent of respondents stated that materials were "very" or "somewhat" contaminated, threatening the continuation of the program.

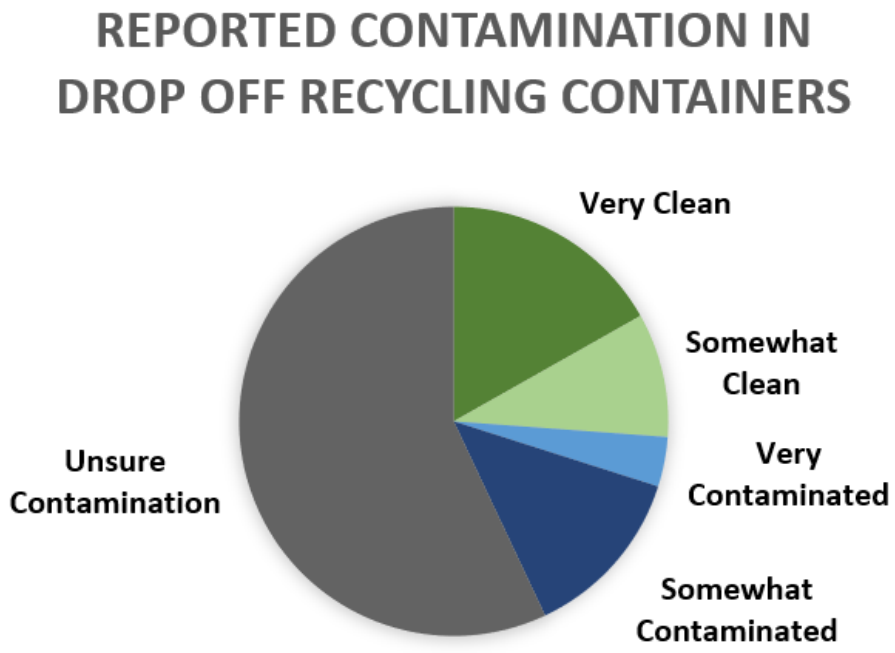

Figure 10 Of 107 responding municipalities, 26% reported their drop off sites were "Very Clean" or "Somewhat Clean," 17% reported their sites were "Very Contaminated" or "Somewhat Contaminated" and 57% reported "unsure" to the question.

Discussion

The data exposes the reality of the recycling system within Nebraska and highlights multiple reasons why it exists that way based off feedback from city clerks from across the state. While there was not a definite hypothesis to be tested, I am very confident in the explanations discovered. The findings agree with literature available on the subject and reinstate the previous work by NRC. Small populations and low population densities caused recycling insecurity and many other findings within the 2015 recycling study which aligned with this research such as recycling gaps and issues of contamination and cost.

As observed in the "Recycling Availability" map, even in areas where there are available materials outlets, contamination can drive a community to determine that the cost or risk of maintaining a drop off site is not worth it. Contamination is generally thought to be caused by a lack of education or understanding from residents of what materials can be recycled. However, most reports from communities that ended recycling programs did so based on criminal activity, including illegal dumping or vandalism. The Village of Eustis in Frontier County, the Village of Trenton in nearby Hitchcock County, and the Village of Union in Cass County permanently or temporarily ended recycling due to illegal dumping at the site, creating additional work for municipal maintenance technicians or presenting a hazard to clean.

Community support and desire to recycle is present across the state. Many communities expressed interest in starting a program or rebuilding a suspended one. It is critical to recognize this when NRC data becomes public because there is evidence that supports the need for a more structured recycling system. The findings are simply fact but community feelings spur change.

Summary & Conclusions

This study was conducted to gather current information and add to the limited literature available on the Nebraska recycling system. The purpose was to give a general overview of recycling and offer explanations. The findings reveal that of 312 responding municipalities, 214 offer one or more recycling options. There are currently 32 Nebraska recycling centers in operation and 5 that are suspended. 76 municipalities with no recycling options provided a response as to why their program never began or why it ended. Half indicated they would like to recycle but had no hauler that could service the area, often because the recycling center was too far or not accepting materials. The clerks mentioned "cost", "money", or "funding" 50 times throughout the project as a barrier. Half of the municipalities that ended their program stated that they did so because they had no service options. 139 communities that currently have recycling options described the number of haulers that operate in their communities. Seventy one percent of these communities only have one hauler that provides recycling services. Seventeen percent of respondents stated that materials were "very" or "somewhat" contaminated, threatening the continuation of the program.

None of the findings were inordinately shocking. While the results can be disappointing, it is clear there is room for improvement and comprehensive data is provided for various organizations to work from. To address transportation and operating costs, currently, there is no outside incentive to develop a Hub and Spoke programs in Nebraska which makes it difficult for smaller rural communities to recycle. And even when a center is conveniently located, some are at max capacity and cannot accept more material. Precarious hauling is also an issue with half the state only having one hauler option, contracting may be more common moving forward. Cost

of hauling and equipment costs could be assisted with grant funds and systems like Hub and Spoke that share the cost of material management. Additional research would be extremely beneficial, the more evident and information is available, the easier it would be to combat the problems seen.

I would highly recommend the time frame for another study of this nature be condensed to less than 2 years. Because this project was grant funded region by region, it makes it difficult to quickly survey the entire state and a lot of change can happen from the beginning to end of a 4-year study like this. Additionally, it's important to ensure everyone involved in surveying is trained in the same manner. Topics that need closer examination would be the municipalities themselves, and what can be done to correct the issues of cost and hauling along with end market development and recycling center support. It's important to make clear that the Nebraska Recycling Council project had to do with Hub and Spoke recycling in Nebraska. I was able to collect data as an employee of NRC for their research and then analyze it to fit my thesis project as a student.

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