



NEBRASKA RECYCLING STUDY

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Study Conducted by:

University of Nebraska Public Policy Center

Joslyn Institute for Sustainable Communities

University of Nebraska – Lincoln, Bureau of Sociological Research

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Executive Summary

Of the several methods that exist for the management of municipal solid waste—source reduction and reuse, recycling, composting, energy recovery through thermal treatment, and landfilling—the primary focus of this study is on end-of-life management of municipal solid waste—recycling.

Every year, Nebraskans spend tens of millions of dollars, an estimated \$33.5 million in 2013 alone, disposing of materials that could be recycled. This sum does not represent the grant funds distributed to support recycling and waste reduction programs, but rather represents the cost of burying recyclable materials in the landfill. The value of the material that could have been recycled is estimated at \$86.5 million based on 2013 market rates. Therefore, Nebraskans spent approximately \$33.5 million to dispose of roughly \$86.5 million worth of recyclables.

In 1992, legislation was enacted requiring each solid waste jurisdiction area in the state of Nebraska develop 20-year integrated solid waste management plans. This legislation established voluntary waste diversion goals—25% by 1996, 40% by 1999, and by 50% by 2002—without specifying strategies to meet these goals or a standardized means by which to measure progress. The 20-year planning period has ended, with many of the goals unfulfilled.

This is a critical juncture for waste management and recycling in the state of Nebraska. It is time to examine strategic planning efforts to enhance recycling services and infrastructure in the State.

The intent of this study is to better understand recycling in Nebraska at present in an effort to inform policy decisions and to establish a baseline to measure progress in the future. This study included 1) surveys of recyclers, city clerks and county treasurers, 2) a review of recycling practices in other states, and 3) public forums conducted in four communities across Nebraska.

The major findings of the study are: 1) Nebraska lags in recycling compared to other states; 2) there are significant gaps in availability and accessibility to recycling in the State; 3) there is not currently a comprehensive plan or strategy to improve recycling in Nebraska; and 4) there are best practices demonstrated to be effective in other locations and in Nebraska communities that could be implemented across Nebraska, leading to reductions in waste and increases in recycling.

Findings

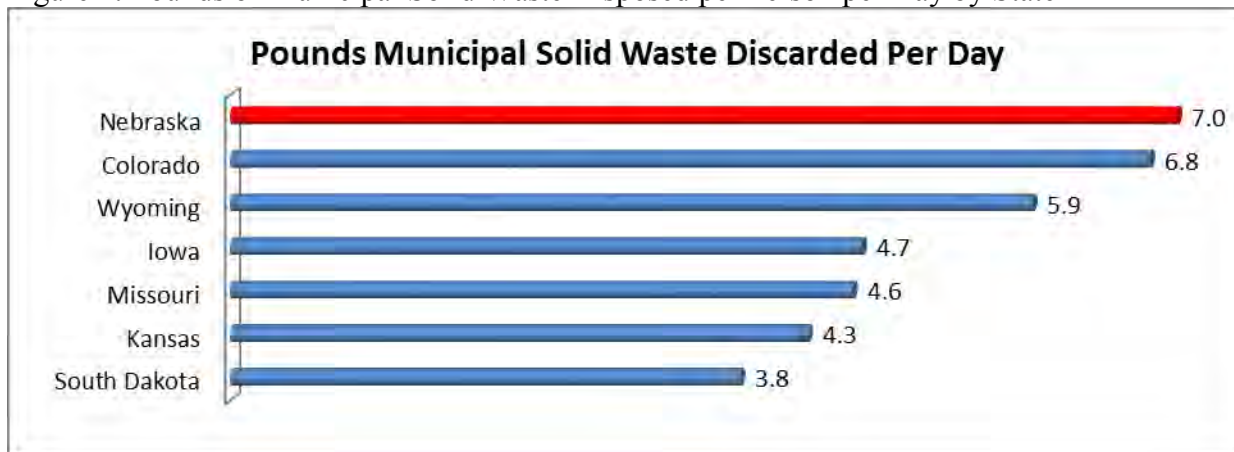
Through the study, it was determined that Nebraska has a recycling rate of 17.04% (17.04% of Nebraska's Municipal Solid Waste is recycled, while 82.96% is disposed). As shown in Figure 1, an average of 524.7 pounds of Municipal Solid Waste is recycled for each person in Nebraska each year, while 2554.1 pounds is disposed.

Figure 1: Pounds of Municipal Solid Waste per Person per Year



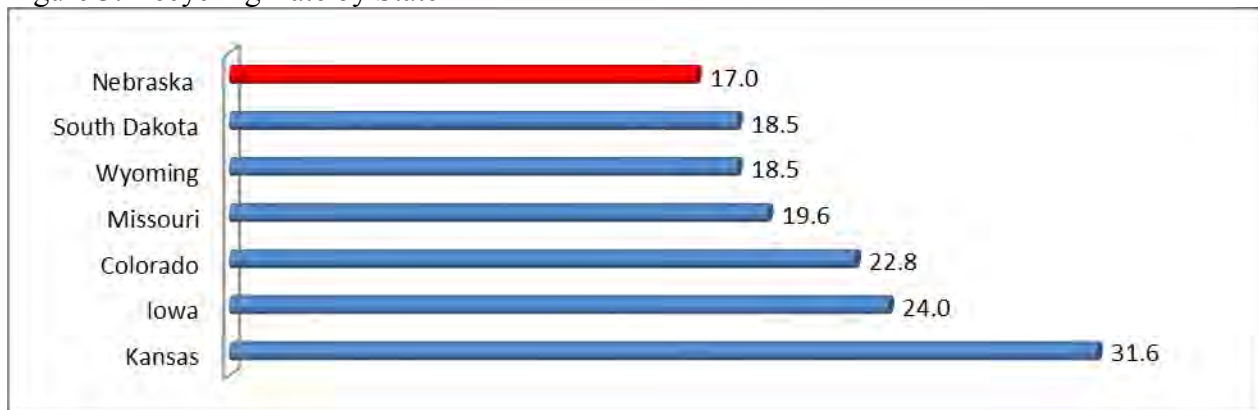
Based on estimates of recycling amounts from this study, amounts of Municipal Solid Waste disposed estimated by the Nebraska Department of Environmental Quality, and information obtained from surrounding states, it appears Nebraska discards more (see Figure 2) and recycles less (see Figure 3) Municipal Solid Waste than neighboring states.

Figure 2: Pounds of Municipal Solid Waste Disposed per Person per Day by State*



*Caution is urged in comparing municipal solid waste disposal across states since states may use difference methods for estimating amounts disposed

Figure 3: Recycling Rate by State*



*Caution is urged in comparing recycling rates across states since different methods may be used to calculate rates.

Recycling availability is related to population density. Nebraskans in smaller communities have less access to recycling than do people who live in larger communities. Table 1 shows recycling availability by City class.

Table 1: Recycling Availability by Community Size

Incorporation Class	Percent of responding communities with access to recycling
Village	55.2%
Second Class City	92.4%
First Class City	94.7%
Primary Class City	100%
Metropolitan Class City	100%
Total	66.4%

The study examined the extent recycling collection is available within 15 and 30 miles. As shown in Figure 4, there are areas in rural Nebraska, primarily in central and western parts of the State that do not have access to recycling collection within 15 and 30 miles.

Figure 4: Recycling Collection Accessibility

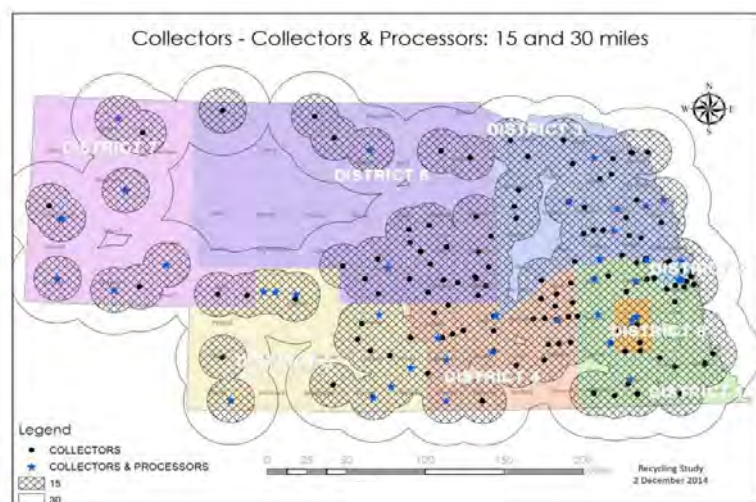
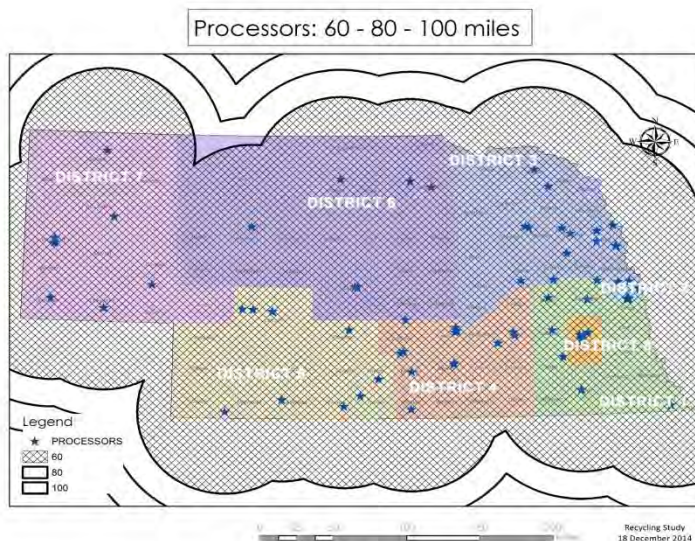
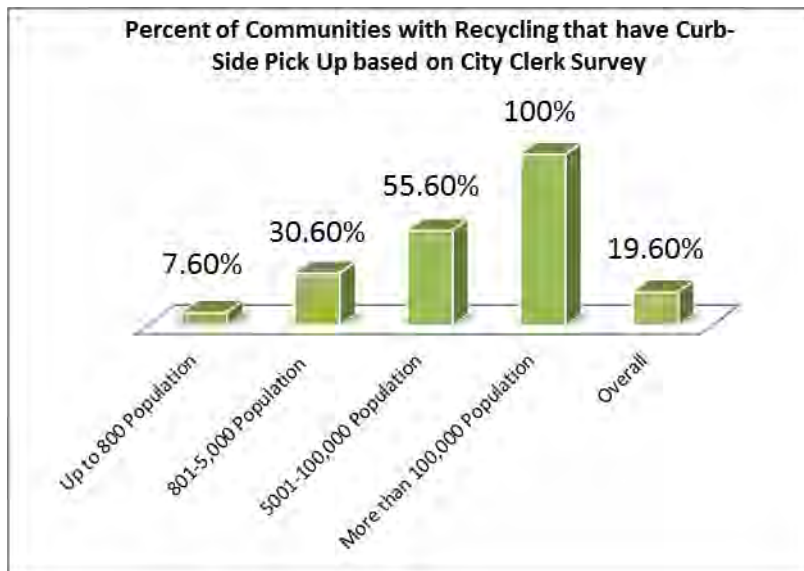


Figure 5: Recycling Processor Coverage



One of the models for developing recycling collaboratives is called the Hub & Spoke Model in which Recycling Processors serve Collectors within a 60 – 100 mile radius. As shown in Figure 5, Nebraska Processors are distributed geographically in a way that makes this model feasible.

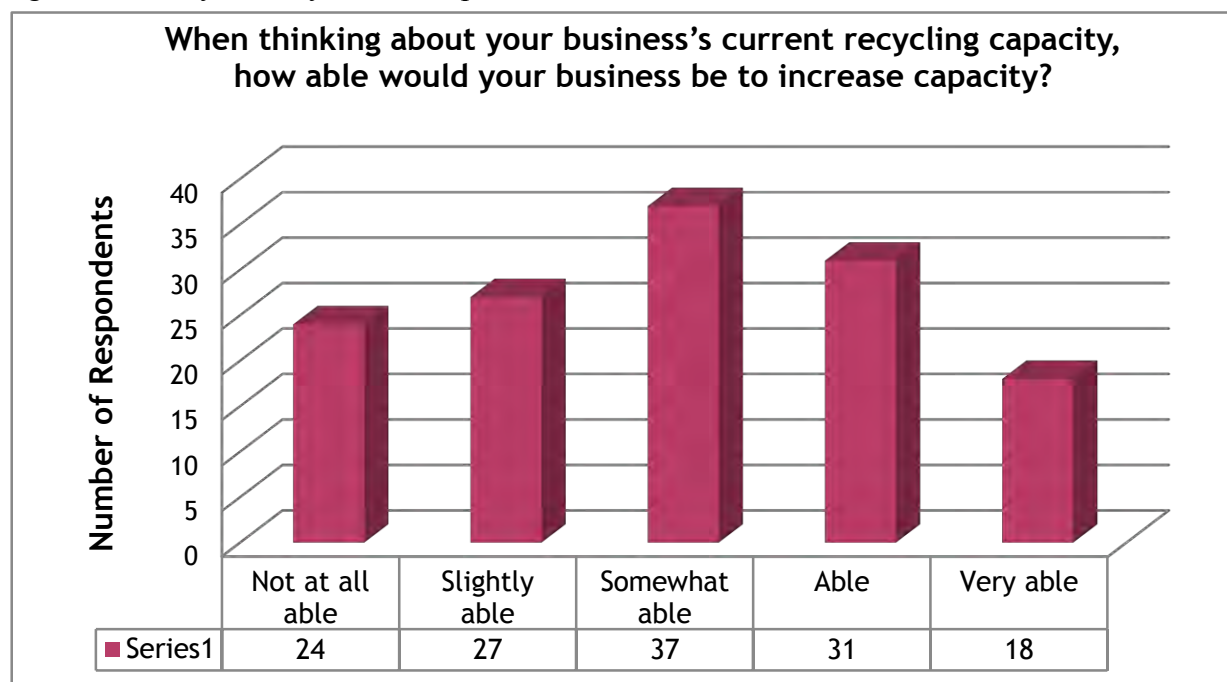
Figure 6: Communities with Curb-Side Pickup by Size



One method for maximizing access to recycling is through curbside pickup. As shown in figure 6, curbside pickup is more likely to be available in urban communities. Rural communities may not have the level of population and volume of recycling to allow curbside pickup to be feasible.

The recycling industry has a significant economic impact in Nebraska. Recyclers responding to the survey indicated they employ 2,302 employees and had a payroll of \$40,457,376 in 2013. Extending this to non-responding recyclers, it is estimated that total payroll for recycling in Nebraska was approximately \$90,000,000 in 2013. Many recyclers indicated they could expand their recycling operations, although some indicated they would need additional resources or partnerships to do so (see Figure 7).

Figure 7: Ability of Recyclers to Expand



Other study findings included the following:

- Most communities do not calculate their recycling rate and for those that do, there are different methods used in the calculations
- Few communities have policies giving preference to the purchase of recycled materials
- Few communities have recycling websites or are aware of school programs supporting recycling, although larger communities are more likely to have recycling websites and school recycling programs
- Public officials are often unaware of the recycling services available in their communities
- In rural areas, processors are more likely to receive material that is separated, while recyclers in urban areas are more likely to receive materials that are comingled
- The type of waste collection systems communities have are correlated with the existence of recycling services in that community
 - Communities with public waste collection systems and transfer stations are more likely to have recycling in their communities
 - Communities with private franchise waste collection systems are more likely to have curbside pickup recycling services
- There was widespread stakeholder support for a broad variety of strategies to enhance recycling, although landfill bans were considered least effective

Recyclers, public officials and participants at the four regional meetings identified a number of barriers to improving recycling in Nebraska. These barriers included the following:

- Lack of statewide approach and strategies for a comprehensive materials management approach including recycling
- Lack of data and standards related to recycling in Nebraska
- Lack of public support for and knowledge about recycling

- Lack of incentives for recycling
- Financial challenges for recycling businesses including lack of markets, lack of sustainable funding, the cost of transporting materials, and difficulties operating recycling businesses in areas with low population and low volumes of materials
- Additional barriers for recycling businesses included attracting qualified staff and having resources to invest in additional space and equipment

Based on results of the study, background research on innovative practices, and ideas generated through the surveys and regional meetings, the following strategies are recommended to improve recycling in Nebraska:

- Through State and community leadership, establish a comprehensive Zero Waste Planning Approach including a broad based participatory process designed to reduce waste and enhance recycling.
- Develop a coordinated and comprehensive strategic plan for sustainable materials management in Nebraska. The focus of this effort would be moving away from the concept of seeing the waste stream as “garbage” toward seeing the waste stream as “opportunity.”
- Direct and maintain local and state resources toward sustainable Hub and Spoke systems through local and regional public/private partnerships.
- Focus developmental efforts toward communities without access to recycling collection
- Work to develop product stewardship and extended producer responsibility initiatives through public/private partnerships.
- Focus on composting of food waste including promotion of on-farm composting and provide education about the benefits for improving the productivity of soil.
- Establish standard recycling measurement and reporting systems.
- Develop a comprehensive strategic communications plan that includes statewide universal labeling for recycling receptacles.
- Develop comprehensive infrastructure to promote public/private partnerships in Nebraska communities that includes sharing of best practices and technical assistance resources.
- Conduct a comprehensive analysis of the social, environmental and economic costs to waste production, collection, and disposal and an evaluation regarding how enhancements in recycling can reduce these costs.
- Examine the value of investing additional state and local public and private resources in more sustainable materials management for the benefit of current Nebraskans and future generations.

Section 1: Study Overview and Methods

Background to the Study¹

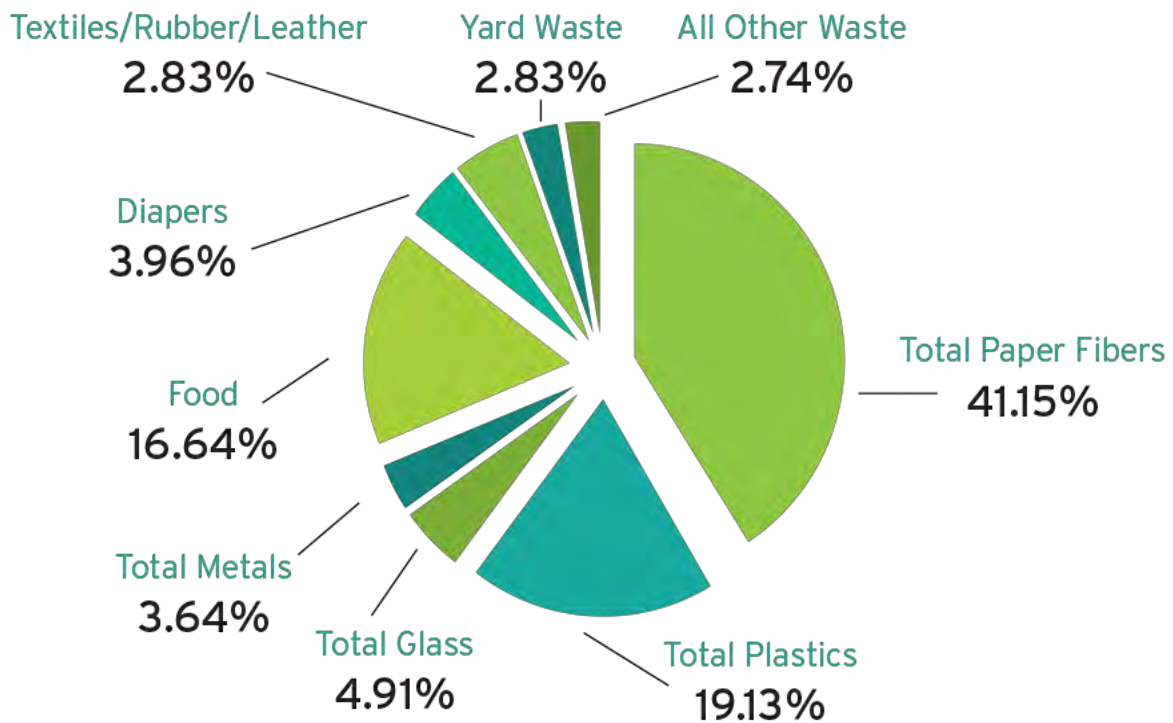
Nebraska has a long and rich history of recycling. There were two major recycling landmarks in Nebraska: In 1943, the Omaha World Herald received the Pulitzer Prize for Public Service for planning a state-wide campaign for the collection of scrap metal for the war effort. The Nebraska plan was adopted on a national scale by the daily newspapers, resulting in a united effort that succeeded in supplying our war industries with necessary scrap material. The second landmark occurred in 1992, when the Nebraska legislature instituted integrated solid waste plans, which closed open dumps and set up regional landfills. The legislation required jurisdictions to enter into interlocal agreements to have solid waste management plans, banned certain materials from landfills, established a \$1.25 landfill surcharge, and established a grant program. This legislation also established recycling goals and 20-year management plans.

Local recycling initiatives have been financed using a variety of means including general fund subsidizes, landfill fees, local contributions of labor and financial donations, and grant funds from the Nebraska Department of Environmental Quality (NDEQ) and the Nebraska Environmental Trust (NET). The NDEQ provides almost \$5 million annually to support recycling efforts, including \$1.75 million for the tire recycling fund, \$1.7 million for the litter reduction and recycling fund, and \$1.5 million for the waste reduction and recycling fund. In addition, the NET provides \$1.2 million annually to recycling efforts in the state. Since 1994, NET has distributed over \$20 million; since 1998, NDEQ has distributed over \$68 million to support recycling and solid waste management and education initiatives. Yet, even with this funding, there are areas of the state that do not have access to recycling.

A waste characterization study published in 2009 found that a significant amount of materials being thrown away are recyclable materials (see Figure 1.1). In addition to the materials in Figure 1.1, Electronic Waste was identified in more than 30% of sampled loads, furniture identified in more than 60% of sampled loads, and construction and demolition debris was identified in more than 75% of sampled loads.

¹Thanks to Gene Hanlon, City of Lincoln for compiling information for this section
Nebraska Recycling Study

Figure 1.1 Discarded Materials from State of Nebraska Waste Characterization Study, 2009



The 2009 waste characterization study found that half of the paper that is thrown away is recyclable and 27% of plastic that is thrown away can be recycled. The study also found that recyclable items made up 37.10% of all waste, accounting for 885,274 tons of material; based on the average commodity price for recyclables in the Chicago region, the value of recyclables thrown away was \$86,528,565 (see Table 1.1). At the time, the State was paying over \$33.5 million² to dispose of \$86.5 million worth of recyclables (in 2013 dollars).

² In 2010, the average landfill disposal fee was \$37.87 per ton.
Nebraska Recycling Study

Table 1.1: Value of Recyclables Buried in Nebraska Landfills in 2013 Based on Annual Average, 2013 Index Prices (2,386,183 MSW tons in 2013)

Material	Percent of Waste*	Tons Landfilled**	Annual Average Chicago Region Value /Ton***	Value of Recyclables in Landfills
Cardboard	8.04%	191,849	\$87.08	\$16,706,220
Paperboard	5.30%	126,468	\$42.50	\$5,384,875
Office Paper	4.37%	104,276	\$124.17	\$12,947,975
Newsprint	4.96%	118,355	\$12.92	\$1,529,140
Magazines	3.85%	91,868	\$42.50	\$3,904,390
Plastic Ctn 1-7	7.74%	184,691	\$61.67	\$11,389,865
Aluminum Cans	1.20%	28,634	\$1,101.67	\$31,545,430
Tin Cans	1.64%	39,133	\$80.00	\$3,130,670
Total	37.10%	885,274		\$86,528,565

*NDEQ Waster Characterization Study Consolidated Data by Weight, Table 5.10, p. 5-20, 2009

**Calculated by multiplying total MSW disposed in 2013 by percent of waste.

*** Prices based on 2013 average commodity prices for cardboard and paper index prices re based on the official Broad Market Pulp and Paper Index, while plastic, glass and can prices are based on the Waste and Recycling Secondary Materials Pricing Commodity Index.

It has been 20 years since Nebraska undertook a solid waste management planning effort and established voluntary waste reduction goals. Following the passage of the Nebraska Integrated Solid Waste Management Act in 1992, there has been no assessment on how the state is doing relative to waste reduction and recycling and there are areas of the state that have no access to recycling. There is no long-term comprehensive plan to ensure all residents and businesses have access to recycling services or to direct grant agencies funding toward common goals.

A coalition representing municipalities, non-governmental agencies, and solid waste agencies has been formed to enhance recycling by developing a plan and funding strategy so that every Nebraska resident and business has access to recycling services. Regional meetings were held in 2011 to help identify recycling needs and barriers; recommendations from these meetings included conducting a recycling study and hosting regional meetings to identify strategies to meet the coalition's goal. The current study was conducted to better understand recycling in

Nebraska in an effort to inform policy decisions and to establish a baseline to measure progress in the future.

Methods

Surveys

Surveys were constructed for three respondent groups: City Clerks County Treasurers, and Recyclers. The experience of the Bureau of Sociological Research is that, for this type of survey, the best response rates are achieved when surveys are administered by mail. Organizations agreeing to pilot the surveys were identified and contacted by the Nebraska State Recycling Association. The pilot surveys were sent to these organizations. The pilot organizations were contacted by phone and asked probing questions regarding the surveys. The surveys were revised based on feedback from the pilots. Surveys can be found in Appendix B.

The contact lists were compiled for recyclers, city clerks and county treasurers. The Nebraska League of Municipalities provided contact information for city clerks, developed and signed an introductory letter for surveys to be mailed by BOSR, and sent out reminder emails. The Nebraska Association of County Officials provided contact information for county treasurers, developed and signed an introductory letter for surveys to be mailed by BOSR, and sent out reminder emails. The Nebraska State Recycling Association provided an introductory letter for recyclers and BOSR sent pre-survey emails, mail surveys, and postcard reminders. The response rate for City Clerks was 72% (381 of 529) and 82.3% for County Treasurers (77 of 93).

The initial list consisted of about 350 recyclers that included city owned, independent companies, and community organizations such as Boy Scouts and Girl Scouts. These lists were compiled from the DEQ web site, Keep Nebraska Beautiful web site, the WasteCap Nebraska Online Recycling guide, a list of grants funded by the Environmental Trust, and other recyclers identified by the Nebraska State Recycling Association. The evaluation team worked with the Nebraska State Recycling Association to reduce the initial list using the following decision rules:

1. Liquids (oil, antifreeze) should NOT be included.
2. Auto repair shops should NOT be included (batteries will go to scrap metal yard)
3. Auto parts stores can be included because they ship lead acid batteries to distribution centers for recycling.
4. Auto scrap yards and demolition companies should NOT be included unless it is clear they are just reporting tin and aluminum cans.
5. Boy scouts, girl scouts, FFA, schools or other similar organizations should NOT be on the list unless they sort, bale, and ship recyclables to end user in addition to collection.
6. Computer repair or reuse companies should NOT be on included.
7. Primary electronic recyclers should be included (i.e. this is their main business)
8. Wooden pallet remanufacturers and wood processors should NOT be included.
9. Garbage haulers who only collect recycling should NOT be on the list (only include those that bale and ship recyclables).
10. Large retailers that ship directly to a recycling facility will NOT be included unless they process recycling in state.

The recycler contact list was pared down to 270 contacts. As treasurers and clerks returned surveys with additional recycling contacts listed, those recyclers received an inventory to

complete if they were not on our original list. These additions increased the number of recyclers to 378. The protocol for the surveys included the following:

1. Pre-notice letter sent
2. One week later, inventory sent
3. One week later, postcard sent
4. After returns tapered down for a certain group, a phone call was made to each non-responder. The Bureau of Sociological Research made one call that either resulted in talking to the contact person, or a voice message was left. Additional calls were not attempted unless a voicemail system was not available.
5. Key non-responders for the recycler's inventory were identified and additional calls were made to those organizations encouraging them to complete and return the inventory. An additional 17 surveys were received through this process.

There were 178 surveys returned. The response rate for the original list of recyclers was 56.8% and 53.6% for the original and subsequent identified lists submitted. The response rate for recycling processors, which were used to calculate Nebraska's recycling rate, was 69%.

Review of Recycling Practices

Total waste by region of the state was examined and analyses were conducted on per capita differences by community population and area of the state. Best practices and recycling rates in Midwest communities and in states with exemplary and innovative approaches were also examined. Finally, a literature review was conducted on recommended practices and promising models to enhance recycling. Information from this research was presented to participants at the four regional meetings.

Regional Meetings

Regional meetings were held in four locations around the State:

City	Date	Location
North Platte	1-4 pm, October 23	Harbor Lights Center, 711 North Lake Road
Grand Island	1-4 pm, October 30	Grand Island Public Library, 211 N. Washington
Norfolk	1-4 pm, November 12	Norfolk Arts Center, 305 North 5th Street
Omaha	1-4 pm, November 13	Abrahams Public Library, 5111 N. 90th Street

A similar format was used for each Regional Meeting:

- 1:00 Welcome and Introductions
- 1:10 Background for Recycling Study
- 1:20 Nebraska Recycling Inventory Results and Context
- 1:40 Trends and Innovations
- 2:00 Small Group Generation of Barriers, Opportunities and Solutions
- 3:00 Large Group Discussion of Solutions
- 3:50 Summary and Next Steps
- 4:00 Adjourn

Invitations were sent to a variety of stakeholders including the following:

1. Steering Committee members' mailing lists
2. Recycler, Clerk, Treasurer Lists
3. State Senators

4. NEDEV-L listserv(Nebraska Economic Development)
5. Nebraska Press Advertising Service

Stakeholders were encouraged to forward the invitation to others they believe might be interested in attending the meetings. Number of presenters and attendees at meetings are shown in Table 1.2.

Table 1.2: Participants and Sponsors at Four Regional Meetings

Location	Presenters/Sponsors	Participants
North Platte	6	13
Grand Island	7	15
Norfolk	7	20
Omaha	7	29

The results of the regional meetings were analyzed qualitatively to identify themes related to barriers, opportunities and strategies to improve recycling in Nebraska. Results can be found in Section 3.

Post-Meeting Survey

There was an interest in perceptions regarding the potential effectiveness of strategies generated at the regional meetings to improve recycling in Nebraska. A survey on perceived effectiveness was sent out after the meetings to recyclers, city clerks, county treasurers, and other persons interested in recycling including individuals who had attended the regional meeting. There were 206 valid surveys completed.

Section 2: Innovative Practices

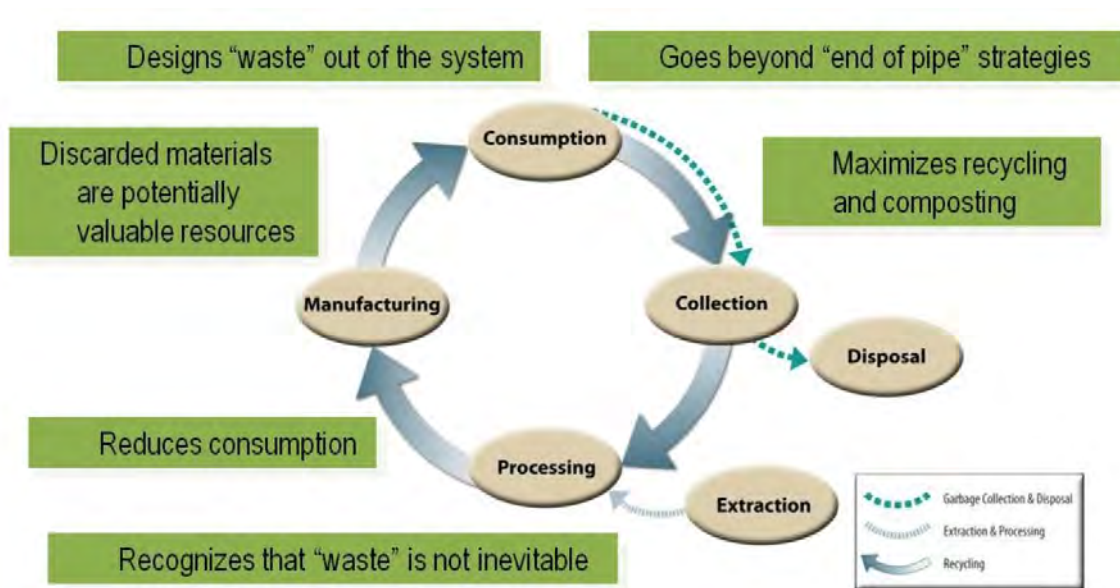
To help participants at the four regional meetings understand potential opportunities for innovation that could be applied to Nebraska, WasteCap Nebraska and the Joslyn Institute for Sustainable Communities identified and developed presentations on national and Nebraska recycling models. The highlights are presented here.

The Zero Waste Community Roadmap is a two-year project funded by the Nebraska Environmental Trust (NET) currently underway to educate public leaders on the principles of zero waste and those policies and procedures that can be implemented to reduce waste. WasteCap Nebraska has been working with Broken Bow, Louisville, Wayne, Imperial, and Hastings, using a model created by EcoCycle in Boulder, Colorado (see Figure 2.1). At its core, a Zero Waste strategy promotes elimination of the entire concept of waste, leading its implementers to look for inefficiencies in the use of materials, energy and human resources.

Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use. Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them.

—Zero Waste International Alliance (www.zwia.org).

Figure 2.1. What is Zero Waste?



Source: City of Lincoln's 2040 Waste Management Plan

Instead, waste should be thought of as a “residual product” or simply a “potential resource” to counter our basic acceptance of waste as a normal course of events. Opportunities such as

reduced costs, increased profits, and reduced environmental impacts are found when returning these “residual products” or “resources” as food to either natural or industrial systems. As described by the City of Lincoln’s 2040 Waste Management Plan and illustrated above, a Zero Waste strategy “maximizes recycling, minimizes waste, reduces consumption and encourages the development of products that are made to be reused, repaired or recycled back into nature or the marketplace.”

A Zero Waste strategy can be implemented at any scale—community, business, school, home, and events. Numerous municipalities have already enacted Zero Waste resolutions, including Boulder County, Colorado, San Francisco, California and Austin, Texas, among others.

In 2005, the Austin city council committed the City to achieving 20 percent reduction in solid waste disposal to landfills and incinerators by 2012, and Zero Waste to landfills and incinerators by 2040. Zero Waste is defined as an ambitious goal to divert 90% of waste from landfills and incinerators by 2040 using a “whole system approach to evaluate and manage the flow of solid waste created by our communities” (City of Austin, 2005).

Government entities inspired by the Zero Waste charge must determine the right combination of programming and policy tools to achieve the goals set forth by that policy. Although the suite of selected strategies will vary according to the characteristics, existing infrastructure, and market access of a given community, a Five Domains methodology—one assessing the environmental, socio-cultural, technological, economic, and public policy conditions relevant to the scale of the community selected—contextualizes this challenge and can serve both as a means to establish a baseline from which to measure progress as well as a way to prioritize program and policy selection. Five domain characteristics of a Zero Waste community include the following:

Environmental: Resource conservation and source reduction (materials, energy, and natural resources); Geographic distribution of collection points and sanitary landfill locations (water and air quality); Health and safety (toxicity); Recovery of organic content (yard and food waste)

Socio-cultural: Education (awareness of public benefit and promotion of existing services); Behavior modification for valuing waste as a utility rather than “garbage”; Peer-to-peer learning

Technological: Compatibility and lifespan (programs and equipment); Capacity (processing); Transportation; Product design for transfers, separations, and reuses

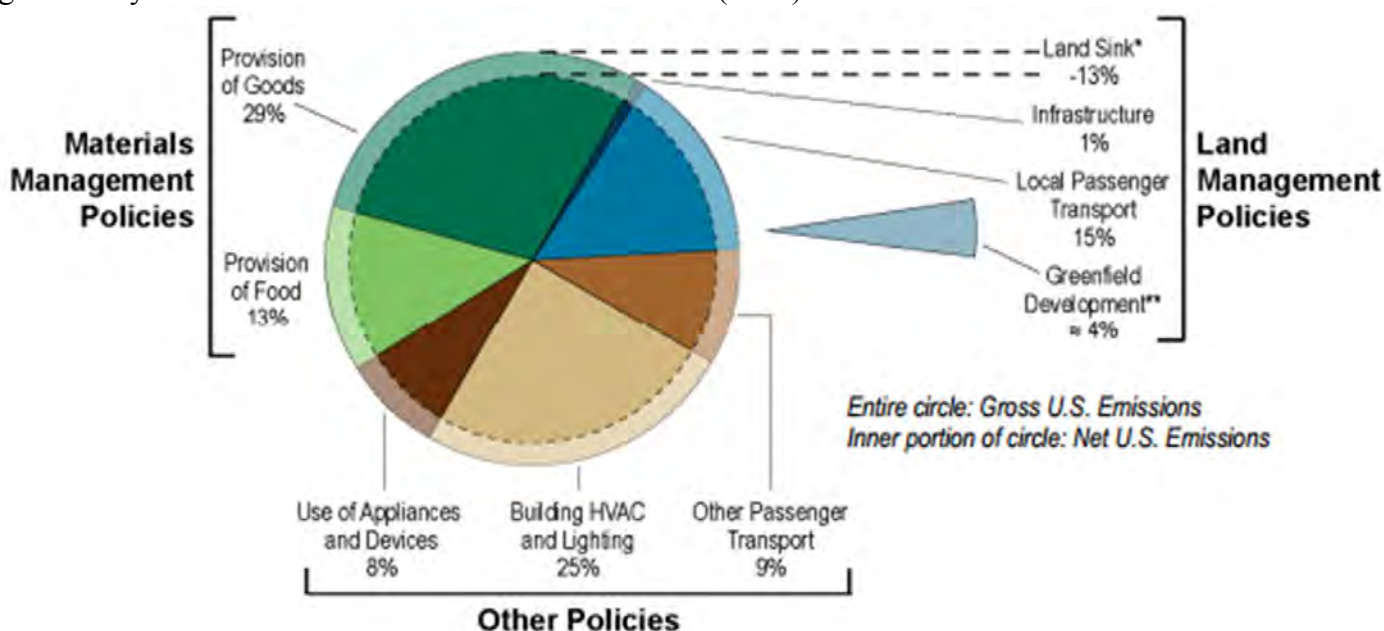
Economic: Economic development opportunity; Market development; Funding mechanisms (incentives and penalties); Costs and savings to residents, businesses and municipalities (capital investment, cooperative marketing)

Public policy: Supporting legislation; Disposal bans; Unit-based pricing (Pay-As-You-Throw); Mandatory recycling; Goal setting; support of public, private, and non-profit enterprises within the waste management stream; regulating the management of construction and demolition waste

Ultimately, higher recovery rates will be the result of a suite of program and policy tools unique to each community. This process is aided by recognition of the fact that there is value in the waste stream waiting to be reclaimed. Even at the end of the useful life of goods and food, these products have value that can be recovered. Products and their packaging can be recovered and made into new products rather than mining virgin materials to manufacture the products.

Food scraps can be recovered and made into to compost that can be used as a soil amendment that returns nutrients to produce more food. Instead of waste management, environmentalists argue that policy makers should instead view waste from a materials management perspective and develop the infrastructure to capture these products and recover the inherent value in them.

Figure 2.2 Systems-Based View of U. S. GHG Emissions (2006)



Source: U.S. EPA, "Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices,"

Figure 2.2 presents the US GHG Emissions data reported in the *Inventory of US GHG Emissions and Sinks*, allocated to systems and by materials and land management.

U.S. GHG emissions in 2006 were 7,054 MMTCO₂E. This converts to per capita emissions of approximated 23 metric tons. EPA's systems inventory estimated that 42% of these emissions are associated with the provision of goods and food (collectively referred to as materials management).

According to the findings of the 2009 Waste Characterization Study, food waste represents more than 16% of the waste stream in Nebraska. States and municipalities are beginning to aggressively pursue diversion of organics, including Massachusetts, which seeks 35% diversion of organic material by 2020, and the City of Seattle, which in 2015 instituted a new ban prohibiting the disposal of food and food waste—enforced through fines—in an effort to meet the city's goal to recycle and compost 60% of its waste by the end of the year.

The Massachusetts Department of Environmental Protection Organics Study and 2013 Action Plan targets businesses and institutions such as hotels, convention centers and supermarkets, building on the success of a market-based initiative piloted in the 1990s responsible for stimulating links among farmers, haulers, and commercial food generators. The On-Farm Composting Project recruited farmers outside of major commerce centers to accept organic materials from commercial entities, first approaching the current haulers contracted by the farmers to facilitate connection with organics generators (BioCycle, 1998).

Here in Nebraska, WasteCap Nebraska's Zero Waste Community Roadmap project engages its participants at the whole community level with the goal of reaching 50% diversion within the first four years of a 10-year plan. Elements from the Zero Waste Community Roadmap are shared in this report to highlight strategies for implementation elsewhere in Nebraska, including: conversion to a pay-as-you-throw refuse collection model; implementation of universal recycling in the community, including business recycling, and; mobilizing community ambassadors. These are a selection among many strategies a community might pursue.

Pay-As-You-Throw

Pay-As-You-Throw (PAYT) is a system for creating more equitable rates for household trash; this system incentivizes wastes reduction and increased recycling by charging for trash services based on the amount thrown away instead of a fixed rate. While most utilities, such as electricity, gas and water, are charged based on the amount used, often charges for garbage collection are based on a fixed rate—a missed opportunity to incentivize waste reduction.

Basing rates on volume is a way to incentivize conservation. There are a variety of methods that can be employed to measure waste, including tags, pre-purchased trash bags, or varying waste container size. According to the US EPA, over 7,100 communities nationally—about 25% of the US population—have embraced a PAYT system, with 90-95% satisfaction rate (US, EPA, 2006). The diversion rates of PAYT are also impressive. Pay-As-You-Throw communities generate about 49 percent less waste per capita than those that don't have unit based pricing (EPA, 2010).

At the state level, Minnesota has mandated that local governments charging waste generators for solid waste collection must implement a fee structure that increases as the volume or weight of waste collection from each generator's residence or business increases. In both Iowa and Wisconsin, PAYT at the local level can be required in the instance recycling goals are unmet. Upwards of 200 communities in each state currently rely upon a PAYT waste collection system.

Sample PAYT municipal ordinance language is available; additional information on PAYT programs can readily be found on the EPA's website or PAYTnow.org.

Locally, communities such as Imperial and Laurel, Nebraska, with 2,091 and 957 residents respectively, have reduced their waste generation with PAYT. Implementation of PAYT can vary widely. In Imperial, all households pay a base service fee of seven dollars, and select their preferred option among three measurement strategies: \$2.50 for a 30-gallon bag, \$7 for a sticker to place on their 90-gallon container when ready for pick-up, or \$30 a month for weekly tote pick up. Since the PAYT system was established in 1992, the amount of municipal solid waste

generated by Imperial has decreased by approximately 40%. Equally impressive is their landfill disposal rate of 2 pounds per person per day compared to Nebraska's average rate of 7 pounds per person per day. In Laurel, residents have a choice of two plans, an \$18 a month flat fee for weekly pickup of a 90-gallon container, or a combined monthly base fee of \$8 and \$1 per 15-gallon bag or \$2 per 30-gallon bag. Implemented in 2006, roughly half of Laurel's population now opts into the PAYT program, significantly reducing waste management and transportation expense. Recycling in the community has also increased dramatically.

Universal Recycling

Another component highlighted in the Zero Waste Community Roadmap is universal recycling. Universal recycling means that the opportunity to recycle exists everywhere in the community—at home, on the go, at work, and in public, generally.

Given that approximately 50% of waste stream comes from the commercial sector, it is essential to enlist businesses in recycling. Tonnage generated from the commercial sector also helps to support markets and infrastructure. It is approximated that on average, businesses subscribe to 30-40% more trash service than they need (EcoCycle). Waste reduction can also be tied to purchasing habits, procurement policies at the business and local government levels complement community wide recycling efforts. Nationally, 20% of Americans live in a community that requires businesses to recycle (EcoCycle).

There are three means by which universal recycling can be achieved: engage city services, amend hauler contracts, or enact ordinances. The best practices for working with haulers include ensuring fees cover the cost of providing services (rates may need to be adjusted), building public-private partnerships, and ensuring the initial rate is set appropriately and that risks are shared among the stakeholders. Cities or jurisdictions can support recycling by sharing costs with haulers, providing low-interest loans, phasing implementation, and providing grant opportunities. Options for local regulation include: requiring trash haulers to provide recycling service alongside trash service, have businesses submit a recycling plan with their building plan, ensure building plans have room for recycling containers, mandate recycling policies, and ban specific materials from landfills.

Education

Twin strategies to enhance community recycling—increase awareness of the public benefit of recycling and promote knowledge of existing recycling services—can be achieved simultaneously through peer-to-peer community education. Peer-to-peer community education employs block leaders to go door to door to discuss recycling guidelines and procedures, and collect pledges.

A door-to-door campaign launched in Longmont, Colorado is credited as essential to the community's successful conversion to PAYT and curbside recycling after an initial public backlash to the implementation of these programs without first bringing the community on board. A recycling ambassador pilot program in Alliance, Nebraska began in 2008 and is underway in seven other cities in the US and Canada.

Regionalization

Gaps in recycling processing capacity and collection sites in rural areas leave many smaller communities without access to recycling services, resulting in a disparity among Nebraskans. As a means to overcome this issue in rural communities, numerous state governments such as New Mexico, Colorado, Montana, and Tennessee, are adopting a Hub and Spoke strategy to prioritize capital investment where such gaps in infrastructure exist.

Hub and Spoke recycling is a replicable concept to consolidate marketable volumes and overcome rural transportation issues. Described simply, the Hub and Spoke recycling model consists of a centralized processing center for recyclables, or “hub,” where material is sorted, baled and/or sold to market, the revenue of which supports the cost of operations. Drop-off and recycling centers in the surrounding communities form the “spokes,” supplying the recyclables they collect into to the main hub; strategic placement of the hub can reduce tip fees and hauling. To ensure flow from the spokes to the hub for processing, collaborating entities typically enter into a formal agreement.

The benefits of a Hub and Spoke system include partnerships among small communities that can leverage greater investment from large recyclers, costs for equipment, personnel, transportation, shared marketing costs, conservation of landfill capacity, avoided tipping fees, and increased revenue potential.

New Mexico has developed the most comprehensive Hub and Spoke System. Beginning with a USDA Rural Utilities Solid Waste Management Grant in 2008, New Mexico began identifying potential hub locations in 2009. Three initiatives were established to boost recycling in these areas. First, six new recycling processing facilities (hubs) came on line in 2011, paid for by two different federal funding sources. Second, a marketing cooperative was launched to help developing hubs gain fair market pricing. This cooperative will also organize “milk runs” between processors in order to fill trucks, minimizing transport time and storage needs for individual materials. Finally, a PAYT education campaign was launched with the goal of establishing several pilot PAYT communities beyond the one currently in existence. Between 2007 and 2013, 115 new recycling locations have been established in New Mexico and their recycling rates have increased by 66% (New Mexico Recycling Coalition).

The state governments of Colorado and Tennessee are currently cultivating Hub and Spoke through targeted grant making. In 2014, Tennessee awarded \$2.3 million to support regionalization (tn.gov). Colorado recalibrated its Recycling Resources Economic Opportunity (RREO) Fund Grant Program in 2012 to support Hub and Spoke proposals.

Another exemplary example of regionalizing recycling, distinct from the Hub and Spoke model, is Northeast Resource Recovery Association (NRRA), an interstate marketing and purchasing cooperative providing technical assistance, education and networking opportunities to its member communities. Founded in 1981 as the New Hampshire Resource Recovery Association by four New Hampshire municipalities, today the 400 plus NRRA members include municipalities and businesses in Vermont, Massachusetts, Connecticut and Maine. NRRA promotes member best practices through an annual award program to towns, individuals, and schools to highlight local innovations.

In summary, innovative practices to increase community and statewide recycling include adopting PAYT price structures for refuse service, establishing universal curbside pickup in communities large enough to support it, leveraging the participation of the business community to increase tonnage, and engaging in community education before, during planned change, and, regionalizing recovery of recyclables through Hub and Spoke systems where infrastructure is spread thin.

Section 3: Estimate of Nebraska Recycling Rate

Amount of MSW Disposal in Landfills

The recycling rate is calculated by dividing the total amount of recycling by the amount of recycling plus the amount of Municipal Solid Waste (MSW) disposed of in landfills. Estimates for recycling were obtained through the Recycler Survey. The total Municipal Solid Waste collected in Nebraska Landfills for 2013 was obtained from the Nebraska Department of Environmental Quality. A caveat is that MSW collected at landfills is not all MSW generated in Nebraska as some waste may be transported to landfills in other states. Conversely, some Nebraska landfills receive waste from other states. The assumption is that the amount of waste coming into the state is roughly equal to the amount leaving the State. Total MSW collected at the 23 reporting landfills in 2013 was 2,386,183 tons. Most Construction and Demolition Waste (C&D) is separated and disposed of in dedicated C&D landfills. However, there is some C&D waste that cannot be separated from the MSW disposal estimates. Hence, the estimated recycling rate will be lower than if all C&D could be excluded.

Amount of Recycling

The amount of Nebraska Recycling (including yard waste) is derived from the Recycler Survey conducted in 2014 for calendar year 2013.

Methods and Caveats:

- The response rate was 56.8%, similar to the response rate for recycling surveys in other states; therefore, the amount of materials reported being recycled is less than the actual amount being recycled. In addition, many of the recyclers who did return surveys were not able to estimate amounts of material either in total or by type of recyclable material, which lowers confidence in these estimates. The total Nebraska recycling rate estimate is extrapolated from information obtained from the returned surveys.
- To avoid duplication of the amount of recyclable materials collected, processed and manufactured, the evaluators used only information obtained from recycling processors to estimate total amount of MSW recycled. Some processors could not estimate amounts for specific materials, but could give total amount of recyclables. There were 39 Nebraska processing organizations that could estimate total amount of recyclables processed for 2013.
- There may be materials in Nebraska that are transported out of state for processing; to this extent, our estimate under-represents the amount of materials generated in Nebraska that are recycled. The Nebraska inventory specifically asked about processed material that was collected in Nebraska; however, some respondents may have not distinguished between instate and out-of-state materials; to this extent, the estimate may over-represent the amount of materials generated in Nebraska that are recycled. The assumption used for this analysis is the amount of recyclable materials from Nebraska sent for processing in other states roughly equals the amount of materials from other states sent to Nebraska for processing.
- To avoid double counting, the survey asked processors if they sent their materials to another processor in Nebraska for further processing. The amount of recycled materials processed was reduced by this overlap.

- Some Processors reported non-MSW such as oil and metals (other than tin or aluminum cans). Amounts of these non-MSW materials were eliminated from processed amounts to obtain amount of MSW recycled.

Based on survey results and reported recycling for two additional processors, the amount of unduplicated recyclable MSW reported processed in Nebraska for 2013 was 289,436 tons. However, the evaluation team determined that yard waste figures are substantially under-reported because yard waste is generally managed by municipalities or solid waste agencies, not traditional recycling processing centers. Therefore a separate calculation is used to estimate yard waste, and yard waste is subtracted from the reported recycling processed. Survey responders which could separate types of MSW processed reported processing 33,531 tons of yard waste. So the estimated amount of recycled MSW processed by survey respondents excluding yard waste is 255,905 tons.

To estimate the amount of unreported recyclables processed in Nebraska, the evaluators estimated the average amount processed by general recycling processors that provided information (this does not include specialty processors such as scrap metal yards). To estimate non-yard waste MSW recycled in 2013, the following methods were used:

- a. The average MSW (excluding yard waste) processed by 39 reporting general processors was 4,521 tons in 2013. However, the median amount processed per processor was 598 tons, indicating that the distribution was greatly skewed to the high end. To get a more representative reflection of the average processor, the highest and lowest processors were eliminated from the estimate as outliers, which gave a revised per processor estimate of 2,753 tons of recycling for 2013.
- b. There were 25 identified recycling processors that did not respond to the survey and another 17 processors who responded but did not provide information about amount of material processed. Applying the average of 2,753 for all reporting processors, the estimate for non-reporting processors ($32 \times 2,753$ tons) is 88,096 tons.
- c. Therefore, the total MSW recycled in Nebraska in 2013 excluding yard waste is estimated to be $(255,905 + 88,096)$ 344,001 tons.

To estimate yard waste, information was received from seven Nebraska communities and estimated per capita yard waste recycling at .078224 tons per person. Applying this rate to the state population in 2013 results in an estimated 146,163 tons of yard waste processed. Hence, the total amount of MSW estimated to be recycled in 2013 was 490,164 tons (146,163 tons yard waste + 344,001 tons of other MSW). The recycling rate for Nebraska is estimated at 17.04% ($490,164$ tons recycled/ $2,876,347$ tons recycled and disposed).

This rate is based on the assumption that non-reporting processors average approximately the same annual tonnage as reporting processors. Also, as discussed above, the rate estimate for Nebraska is based on the assumption that the amount of recyclables collected in Nebraska is reflected in the processed tonnage (the amount of recyclable materials collected in Nebraska and shipped to out-of-state processors is equivalent to the amount of recyclable materials collected out-of-state and shipped to processors in Nebraska). In addition, it should be recognized that the Nebraska rate is an estimate based on extrapolation of data collected from the survey. Other states that have higher survey response rates may have more accurate estimates. For example,

states like Montana require licensed recyclers to report volumes of recycling (although reporting is voluntary for unlicensed recyclers); hence their estimated recycling rates are likely to be based on more accurate and complete data.

Disposal of MSW per Person

The Nebraska population estimated for July 1, 2013 was 1,868,516. Based on the study results, on average, the following amounts are generated per person (see Table 3.1):

Table 3.1: Amount of Municipal Solid Waste disposed of and recycled in Nebraska for 2013

	Pounds Per Year Per Person	Pounds Per Day Per Person
MSW in Landfills	2554.1	7.0
MSW Recycled	524.7	1.4
Total MSW	3078.8	8.4

Nebraska Rate Compared to Other States

Although it is difficult to make comparisons across states (e.g., states use different methods to measure and estimate waste disposal; available estimates are calculated for different years, some states include construction and demolition waste), Nebraska appears to dispose more of its Municipal Solid Waste in Landfills than does any neighboring state (See Table 3.2).

Table 3.2: Total Tonnages of MSW Discarded Per Capita in 2013 in the State of Nebraska and Contiguous States

State	Tons MSW Disposal	Population	Tons Per Capita/Year	Pounds Per Capita/Day
Nebraska*	2,386,191	1,868,516	1.28	7.00
Colorado	6,537,169	5,268,367	1.24	6.80
Wyoming ⁽²⁰¹⁰⁾	609,800	563,626	1.08	5.93
Iowa*	2,622,570	3,074,186	0.85	4.67
Missouri	5,054,103	6,044,171	0.84	4.60
Kansas	2,221,916	2,893,957	0.78	4.27
South Dakota*	581,673	844,877	0.69	3.77

Note: State environmental agencies provided tons MSW disposal data. Population is according to U. S. Census Bureau.

*State does not track C&D waste separate from MSW

Although it is difficult to compare recycling rates across states (e.g., states use different methods for estimating municipal solid waste disposal, states have different methods and response rates for estimating amount of Municipal Solid Waste recycled, estimates are available for different

years), Nebraska appears to recycle less of its Municipal Solid Waste than does any neighboring state (See Table 3.3).

Table 3.3: Estimated Percent MSW Recycled in 2013 in the State of Nebraska and Contiguous States

State	MSW Generated	% Recycled
Nebraska	2,876,347	17.0
Wyoming ^a (2010)	628,500	18.5
South Dakota ^a (2011)	711,378	18.5
Missouri ^b (2011)	4,933,141	19.6
Colorado ^a	8,692,117	22.8
Iowa ^b (2011)	3,930,863	24.0
Kansas ^a	3,246,767	31.6

^a Recycling rates furnished by state environmental agency for the year 2013 unless indicated otherwise.

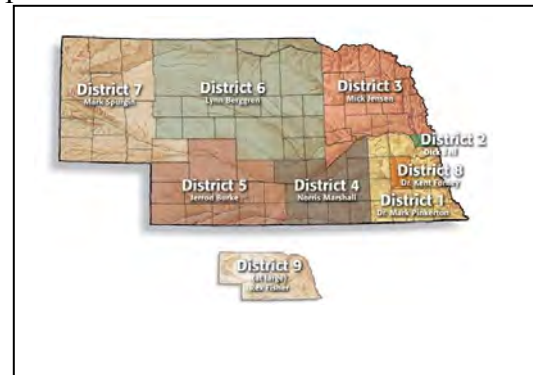
^b Shin, D. (2014). Generation and Disposition of Municipal Solid Waste (MSW) in the United States—A National Survey.

Recycling Rate by District

The evaluation team examined recycling rates by district based on the amount of recyclable materials processed in that district in comparison to MSW disposed of in landfills (see Table 3.4). Caution is urged in interpreting the results since materials are often transported across district lines for processing; hence, the recycled materials processed in each district is not an accurate reflection of the amount of recycled materials collected in that district. It is likely that urban centers are more likely to have processors who may receive recyclables from rural areas; hence, rural areas are likely to exhibit lower recycling rates based on this analysis. Nevertheless, the analysis may be useful in potentially identifying areas that could use more processing capacity. It may be that District 1 has lower processing rates than other regions because collectors are transporting recycling to Lincoln (District 8) and Omaha (District 2) for processing; however, Region 2 has a relatively low recycling rate as well.

Table 3.4: Recycling rates by district based on recyclables processed

District	Recycle Rate	Tons MSW Recycled	Tons MSW Disposed
1	1.44%	11,091.43	759,349
2	14.19%	97,608.30	590,426
3	28.63%	126,471.93	315,334
4	22.87%	55,009.26	185,500
5	9.97%	16,704.70	150,864
6	48.11%	16,019.00	17,277
7	22.88%	18,064.04	60,884
8	25.61%	105,524.12	306,549



Recycling by Material

Table 3.5 shows the amount of each type of recyclable material recycled in 2013 and the per person amount. Processor respondents to the survey were not able to distinguish 122,063.24 tons of recycled material by type. This analysis only included Processors that completed surveys and reported recycling amounts; therefore, recycling amounts are much lower than the total material estimated to be recycled.

Table 3.5: Amount of Recycling by Material based on Survey Reports

Material	Tons Recycled 2013	LBS Per Person Per Year
Comingled/undifferentiated MSW	122,063.24	130.65
Cardboard and paperboard	75,787.21	81.12
Yard waste & tree trimming/wood chipping	33,531.05	35.89
Newspapers	27,217.59	29.13
Paper	21,564.57	23.08
Wood waste	9,011.89	9.65
Plastic containers	4,239.89	4.54
Electronics	3,588.57	3.84
Glass bottles and jars	3,011.01	3.22
Tin Cans	1,389.77	1.49
Food waste	1,228.80	1.32
Appliances	1,210.43	1.3
Tires	1,135.99	1.22
Aluminum cans	981.91	1.05
Textiles	583.69	0.63
Lead-acid auto batteries	294.38	0.32

Section 4: Gaps in Nebraska Recycling

By Community Size

An important goal of the study was to examine differences in recycling availability by community size. As shown in Table 4.1, recycling is related to community size. Recycling is not as available in small communities: 55% of communities with a population of 800 or fewer people have recycling while over 90% of communities over 800 people have recycling.

Table 4.1: Recycling Availability by Community Size (City Clerk Survey)

Incorporation Class	Population in Class	Number in NE	% of responding communities with access to recycling
Village	800 or fewer	382	55.2%
Second Class City	801 to 5,000	116	92.4%
First Class City	5,001 to 100,000	30	94.7%
Primary Class City	100,001 to 300,000	1	100%
Metropolitan Class City	300,000 or more	1	100%
Total		530	66.4%

Collectors and Processors by Area of the State

To assess the geographic distribution of recycling collectors and processors across the State, recycler survey responses were used, and, for external sources and steering committee members identified non-responding collectors and processors. Figure 4.1 shows recycling collectors and processors and landfills and transfer stations across Nebraska

The study assessed the availability of recycling for people in Nebraska by geographic area; specifically, whether recycling is available within 15 and 30 miles of individuals. Figure 4.2 shows the locations of recycling collectors across Nebraska with the eight Nebraska Game and Parks Districts. Gaps in collection are located primarily in the north central area (District 6), parts of the panhandle (District 7), parts of southwest (District 5), and smaller areas in central (District 4) and southeast (District 1) Nebraska.

One model for developing recycling collaboratives is the Hub and Spoke Model in which a centralized processor receives materials from collectors within a 60-100 mile radius. Figure 4.3 shows the location of recycling processors across Nebraska with the eight Nebraska Game and Parks Districts. Nebraska appears to have a desirable distribution of recycling processors across the State that would be conducive to developing a Hub and Spoke Model.

An area of interest was comparing reports by County Treasurers and City Clerks to the actual availability of recycling collection services in each of the communities. Figure 4.4 shows based on reports from County Treasurers and City Clerks, where in the State recycling collection services are thought to be available. Interestingly, there are some counties in which the County Treasurer was not aware of recycling services, but City Clerks indicated collection was available in their communities. As shown in Figure 4.5, there are a number of counties that reported they

did not have access to recycling that actually do have recycling collectors located in their counties. Figure 4.6 shows similar results for City Clerks.

Figure 4.1 Recyclers: Collectors, processors, collectors & processors
Landfills & Transfer Stations

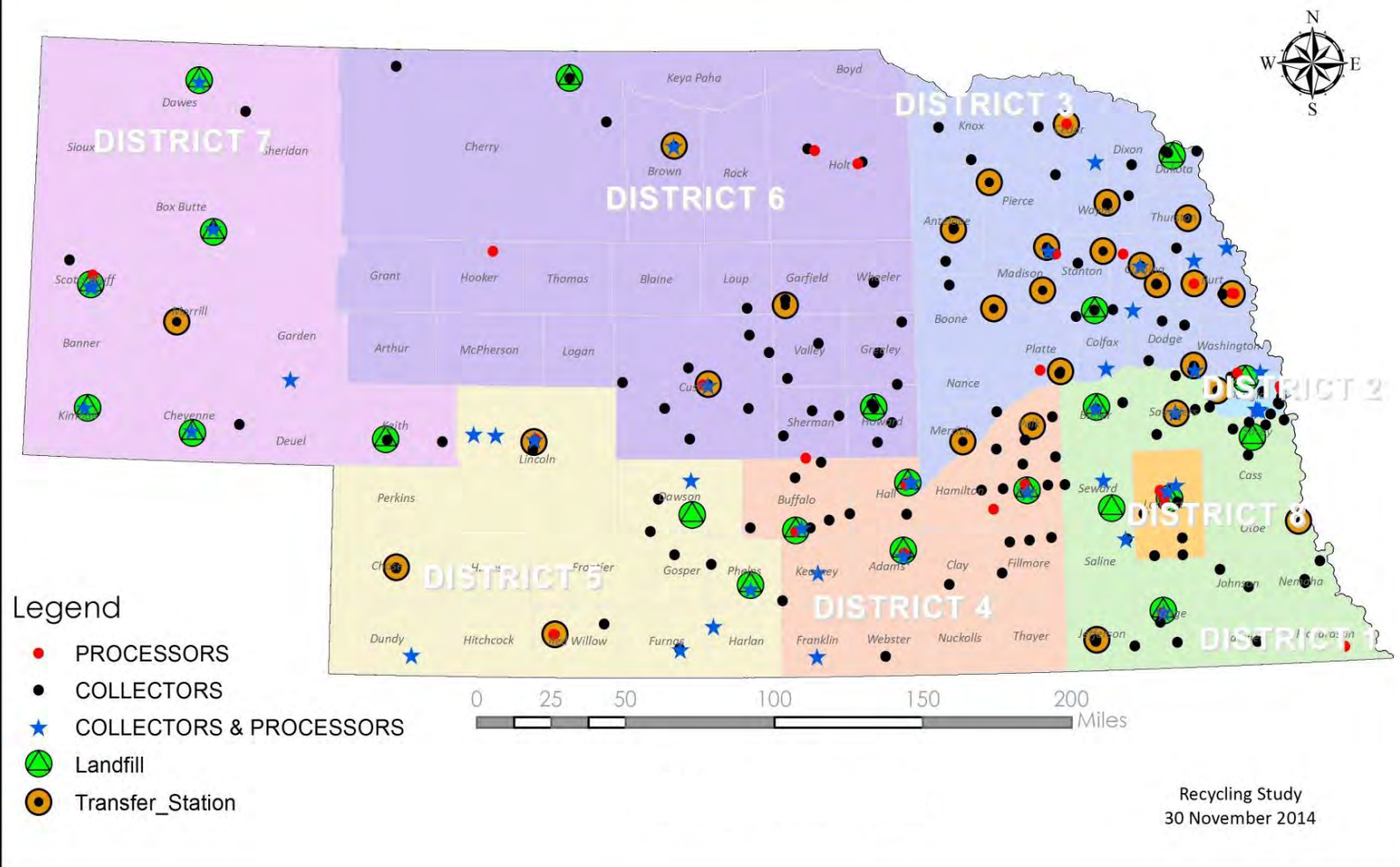


Figure 4.2 Collectors - Collectors & Processors: 15 and 30 miles

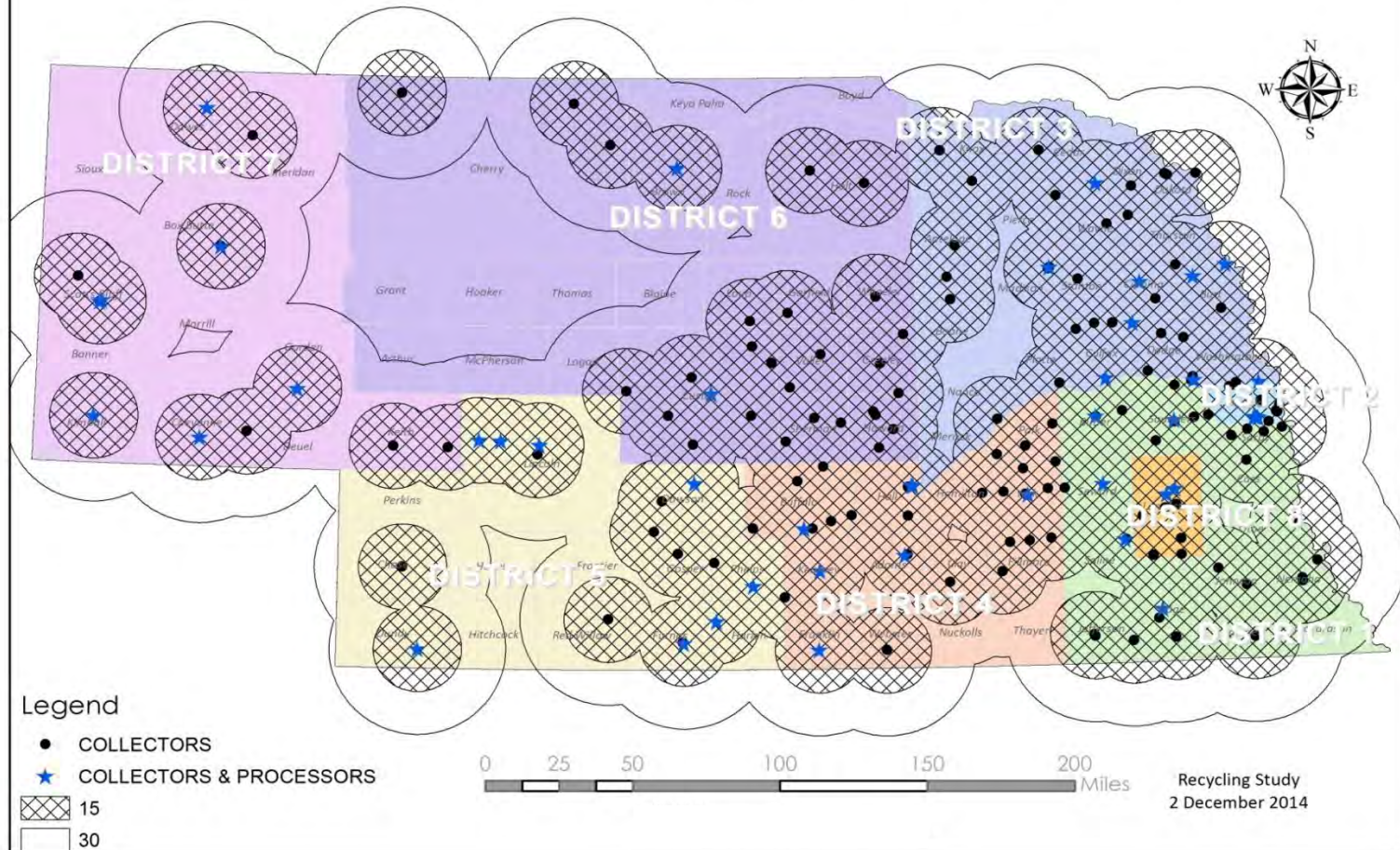


Figure 4.3

Processors: 60 - 80 - 100 miles

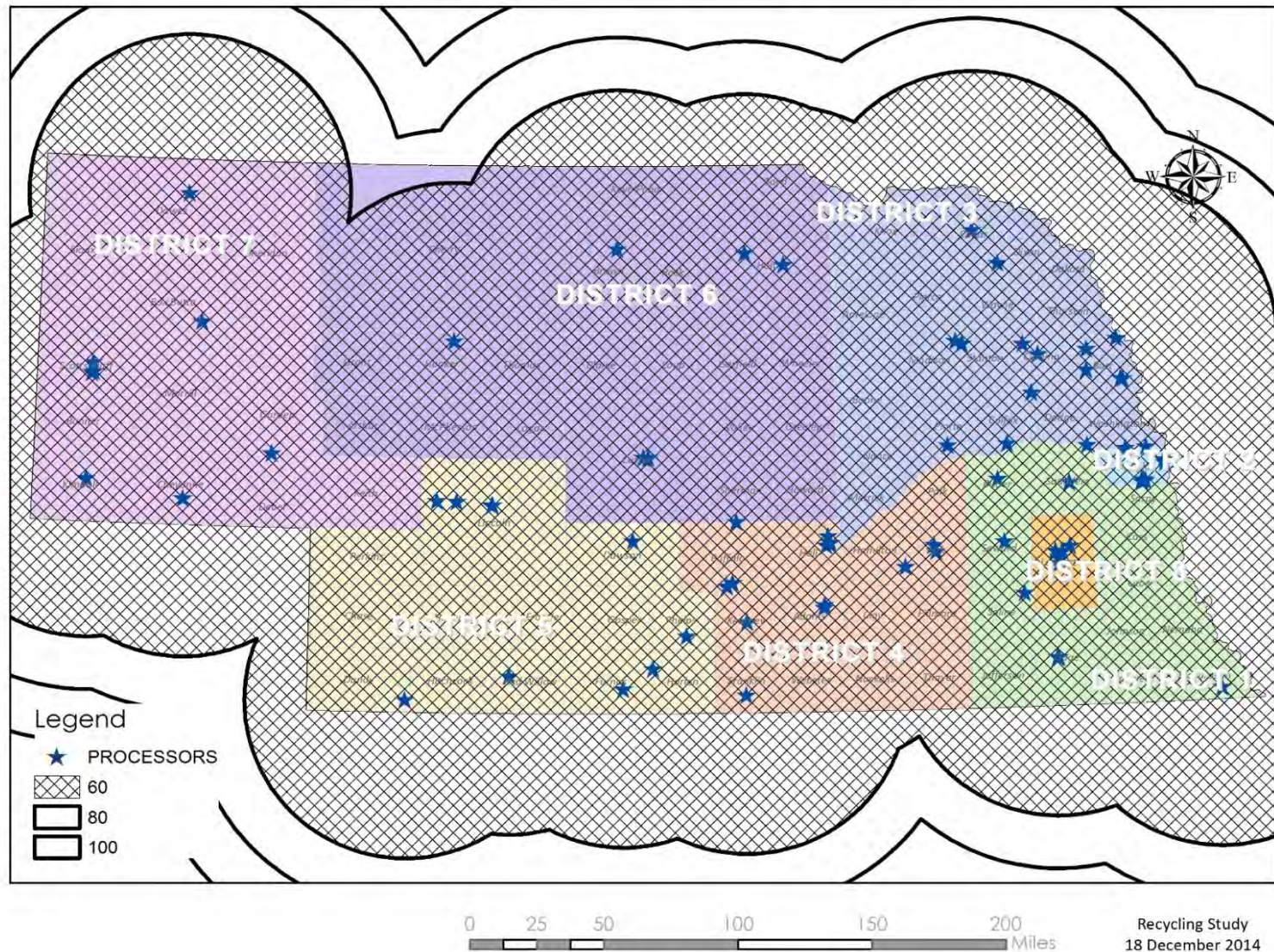


Figure 4.4

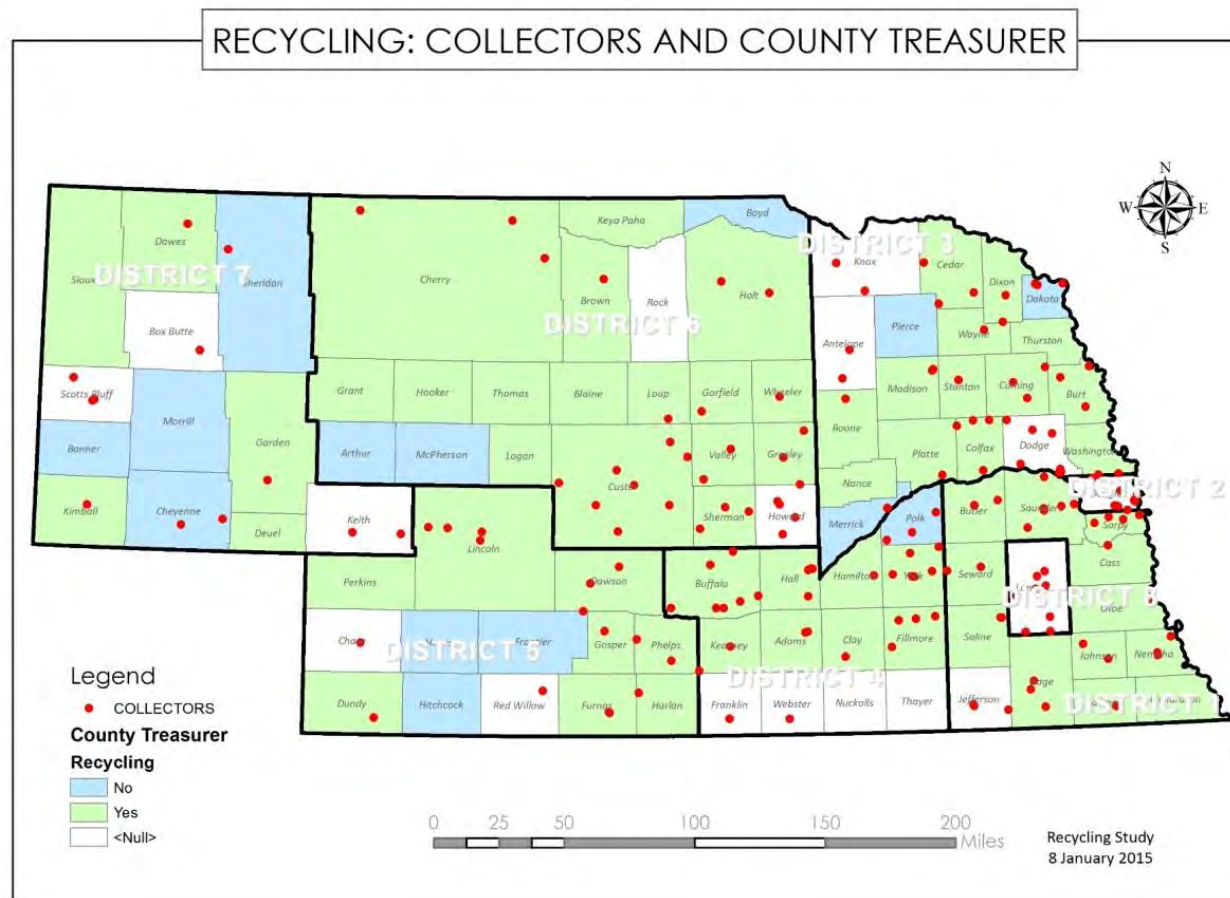


Figure 4.5

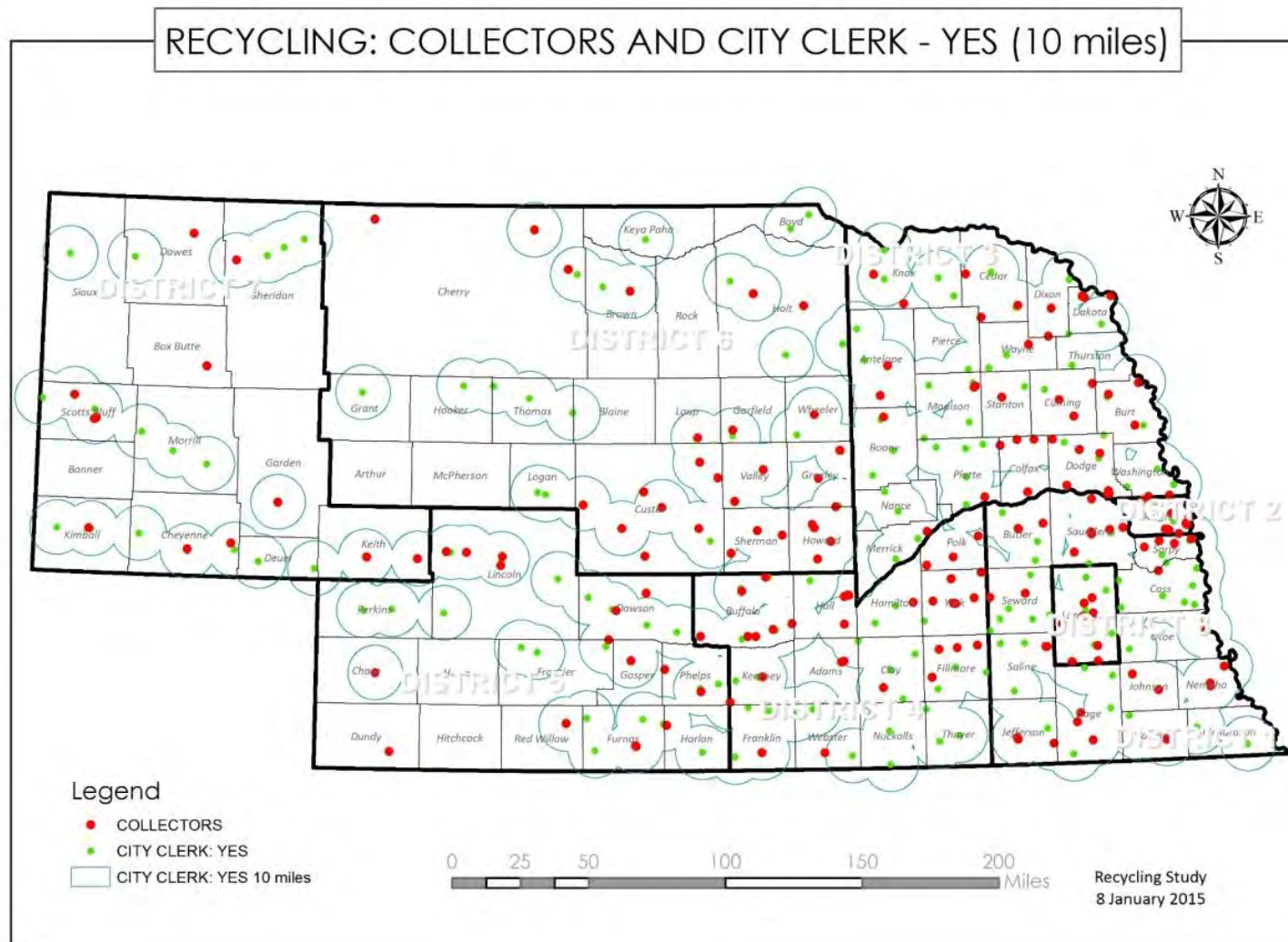
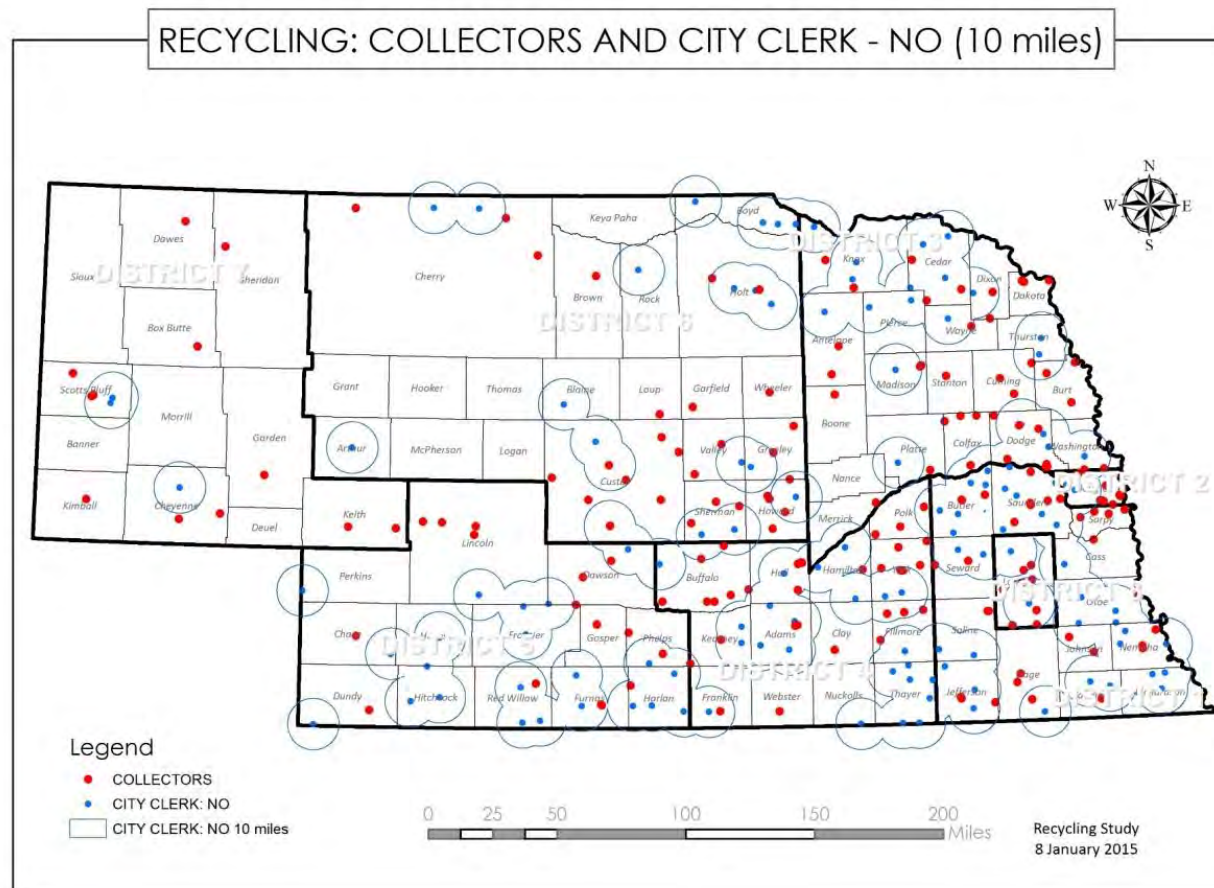


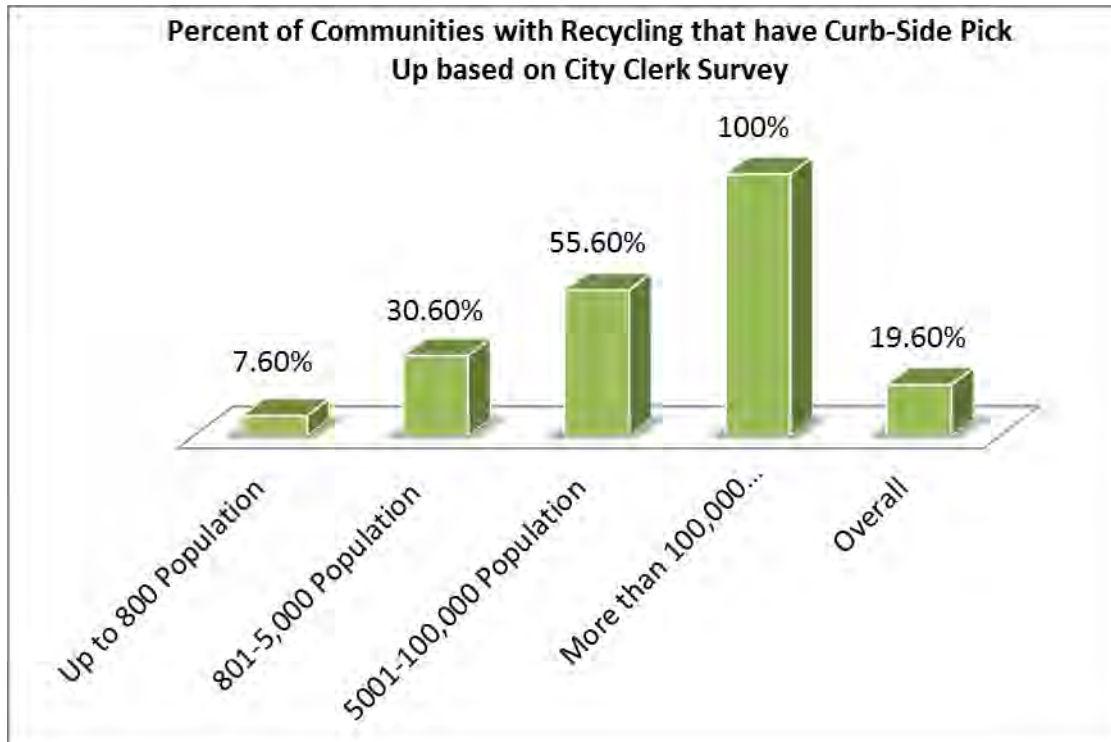
Figure 4.6



Recycling Ease of Access

An issue related to availability is accessibility to recycling. Perhaps the most accessible type of recycling is curbside pickup. An analysis was conducted to determine whether there are differences in curbside pickup by size of community. There was a significant difference based on size. Overall, curbside pickup is available in 19.6% of Nebraska communities; however, only 7.6% of communities of 800 people or less have access to curbside pickup (see Figure 4.7). It is likely that low population acts as a barrier to having curbside pickup in smaller communities.

Figure 4.7



Accessibility is generally enhanced when recycling is part of waste and disposal services. As shown in Table 4.2, larger communities are significantly more likely to include recycling as part of waste and disposal services. Specifically communities of under 5,000 people were significantly less likely to include recycling as part of waste disposal ($F=19.005$, $p<.001$).

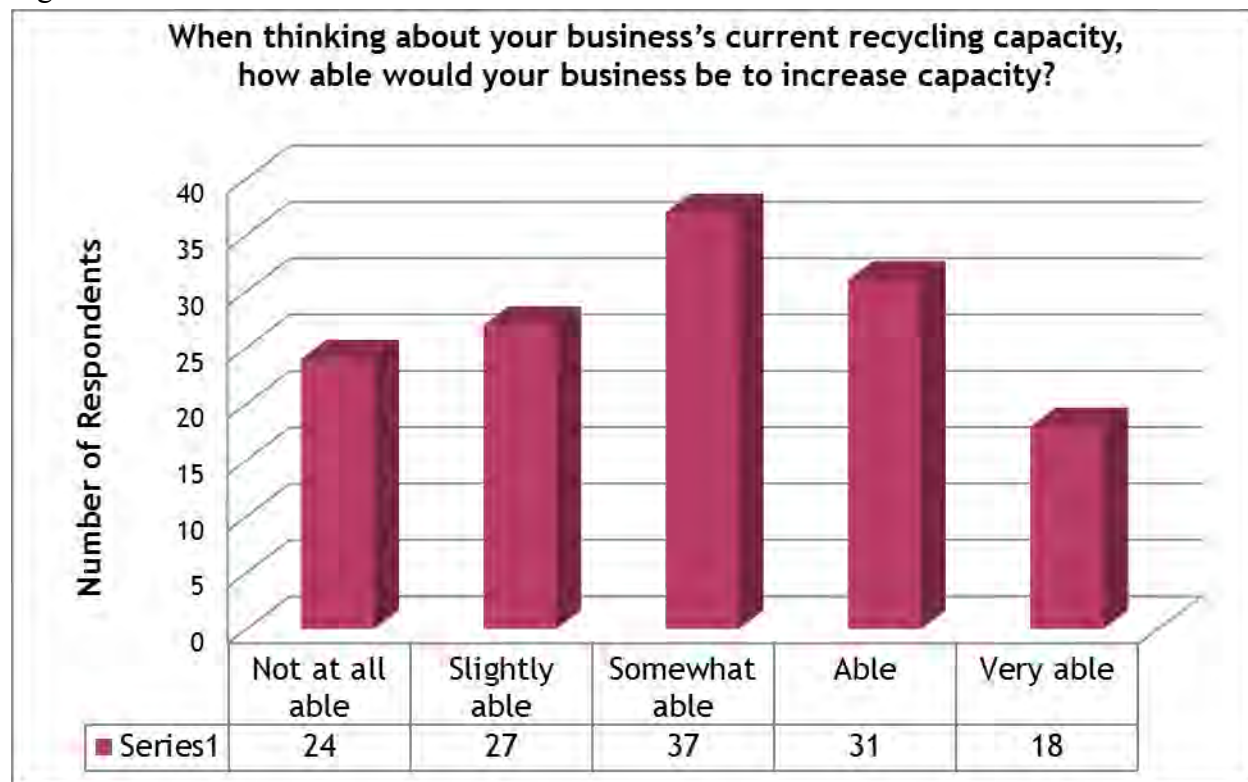
Table 4.2: Communities in which recycling is part of waste disposal by community size

Recycling is part of waste & disposal service	% yes	Number of Communities
Up to 800 population	16.5	188
More than 800 up to 5,000 population	47.6	82
More than 5,000 up to 100,000 population	83.3	12
More than 100,000 population	100.0	1
Total	28.6	283

Ability to Expand

To determine the feasibility of expanding recycling services in Nebraska, recyclers were asked about their capacity to expand services. Of 137 recyclers answering this question, about 37% indicated they are not able or only slightly able to increase capacity, while about 63% indicated they are somewhat to very able to expand capacity (see Figure 4.8). Some recyclers qualified their ability to expand capacity by indicating they would need more funding or additional space, equipment and staff to expand. Based on these results, it appears the majority of recyclers in Nebraska are willing to increase recycling.

Figure 4.8



A study question pertained to the ability of recyclers to expand capacity and how this ability relates to different areas of the state, particularly in areas that lack current recycling collection and processing services. There was a significant difference in recyclers' ability to expand based on location in the State ($F=2.364$, $p<.05$). Recyclers in District 2 and 8 (Douglas and Lancaster Counties) indicated the greatest ability to expand, while recyclers in Districts 1 (southeast Nebraska) 4 (South Central Nebraska) and 7 (Panhandle) indicated the least ability to expand (See Table 4.3). Interestingly, District 1 had the lowest processing recycling rate (refer back to Table 3.4) and is least able to expand capacity.

Table 4.3: Average ability to increase capacity by recyclers in each Game and Parks District

District	Means	Number of recyclers
District 1	2.45	22
District 2	4.00	6
District 3	2.90	30
District 4	2.59	27
District 5	3.00	11
District 6	3.00	12
District 7	2.79	14
District 8	3.83	12
Total*	2.90	134

*Does not include 3 out of State recyclers.

Scale: 1 = Not at all able, 2 = Slightly able, 3 = Somewhat able, 4 = Able, 5 = Very able.

The study included an assessment regarding the capacity of current recyclers to expand recycling to the extent that Nebraska would need to achieve a recycling rate on average with surrounding states. The survey asked processors about their current capacity and the amount of recycling processed. There were 28 processors that provided both pieces of information (see Table 4.4). On average, these 28 processors indicated they have the capability to process 33.64% more recycling than current capacity. Extending this percentage to all Nebraska processors, Nebraska could currently process an additional 150,203 tons of material. This would bring the Nebraska recycling rate up to 21.90% (669,023 tons recycled/3,055,206 total MSW), below the average of 22.53% recycling rate for surrounding states. If the goal for Nebraska is to reach the recycling average of surrounding states, increased capacity would need to be developed.

Table 4.4: Processing capacity and amount processed for 2013

Processing Capacity	Number of Recyclers	Mean Tons
Recycling processing capacity	28	11,790
Total tonnage processed in 2013	39	9,740
Capacity minus 2013 tonnage for 28 recyclers reporting both pieces of data	28	5,976

End Users were asked about their capacity and tonnage manufactured in 2013. Only three End Users were able to provide both pieces of data. Average excess capacity in 2013 was 1019 tons per End User (see Table 4.5).

Table 4.5: End Use capacity and amount manufactured for 2013

End Use Capacity	Number of Recyclers	Mean tons
Recycling end use capacity	3	9,000.00
Total tonnage used in 2013	6	5,206.25
Capacity minus 2013 tonnage	3	1,019.00

Section 5: Other Issues

Other issues of interest include how material is received by processors, the relationship between solid waste collection systems and recycling, and the number of recycling end users and the amount of products they produce.

How Processors Receive Material

Processors were asked how they receive recyclable materials. There was not a significant difference in how processors receive materials across Districts in the state ($\chi^2 = 16.3$, $p = .296$); however, it did appear that Douglas and Lancaster Counties were more likely to receive comingled materials compared to other areas in the State (see Table 5.1). Communities not located close to single stream processing capacity generally will have source-separated collection of recyclables.

Table 5.1: How Processors Receive Materials by District

Method Materials Received			
	Separated	Comingled	Both
<i>District</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
District 1	33.3	--	66.7
District 2	--	40.0	60.0
District 3	11.1	--	88.9
District 4	12.5	--	87.5
District 5	50.0	--	50.0
District 6	50.0	--	50.0
District 7	44.4	11.1	44.4
District 8	16.7	16.7	66.7
Total*	23.9	8.7	67.4

Waste Collection Systems and Recycling

A question posed by the study was whether there was a relationship between solid waste collection systems and recycling. Table 5.2 shows the relationship between types of waste systems and availability of recycling. Communities with Public Waste Collection Systems ($F = 5.909$, $p < .05$) and Transfer Stations ($F = 5.36$, $p < .05$) were more likely to have recycling than communities without those Waste Systems. There were no statistically significant differences in

availability of recycling based on whether communities had Private Collection Systems or Private Franchise Systems.

Table 5.2: Relationship between Waste Collection System and Recycling Availability

Municipal Solid Waste Collection System	%	Number
Private Collection System	54.7	360
• With recycling services	54.8	241
• Without recycling services	54.6	119
Private Franchise System	17.4	350
• With recycling services	20.1	234
• Without recycling services	12.1	116
*Public Collection System	30.7	348
• With recycling services	34.9	235
• Without recycling services	22.1	113
*Transfer Station	15.3	360
• With recycling services	18.3	246
• Without recycling services	9.1	121

*Significant difference.

There also appears to be a relationship between type of solid waste collection system and the availability of curbside recycling pickup. As shown in Table 5.3, communities with private franchise waste collection systems are significantly more likely to have curbside recycling pickup ($F = 10.45$, $p=.001$). There were no statistically significant differences in availability of curbside pickup based on whether communities had Private Collection Systems, Public Collection Systems, or Transfer Stations.

Table 5.3: Relationship between Waste Collection System and Recycling Curbside Pickup

Municipal Solid Waste Collection System	%	Number
Private Collection System	54.3	234
• With curbside recycling pickup	60.4	48
• Without curbside recycling pickup	52.7	186
*Private Franchise System	20.2	228
• With curbside recycling pickup	37.0	46
• Without curbside recycling pickup	15.9	182
Public Collection System	35.7	230
• With curbside recycling pickup	27.7	47
• Without curbside recycling pickup	37.7	183
Transfer Station	18.4	239
• With curbside recycling pickup	26.5	49
• Without curbside recycling pickup	16.3	190

*Significant difference.

Another study question related to whether households paid a separate fee for recycling collection. As shown in Table 5.4, separate recycling fees are significantly related to community

size. Communities over 100,000 are more likely to have separate fees for recycling than smaller communities ($F = 3.373$, $p < .05$).

Table 5.4: Recycling Fees by Size of Community

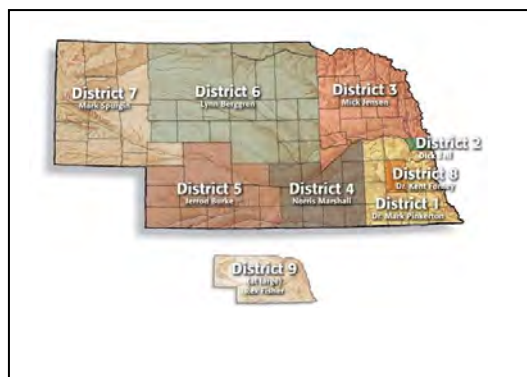
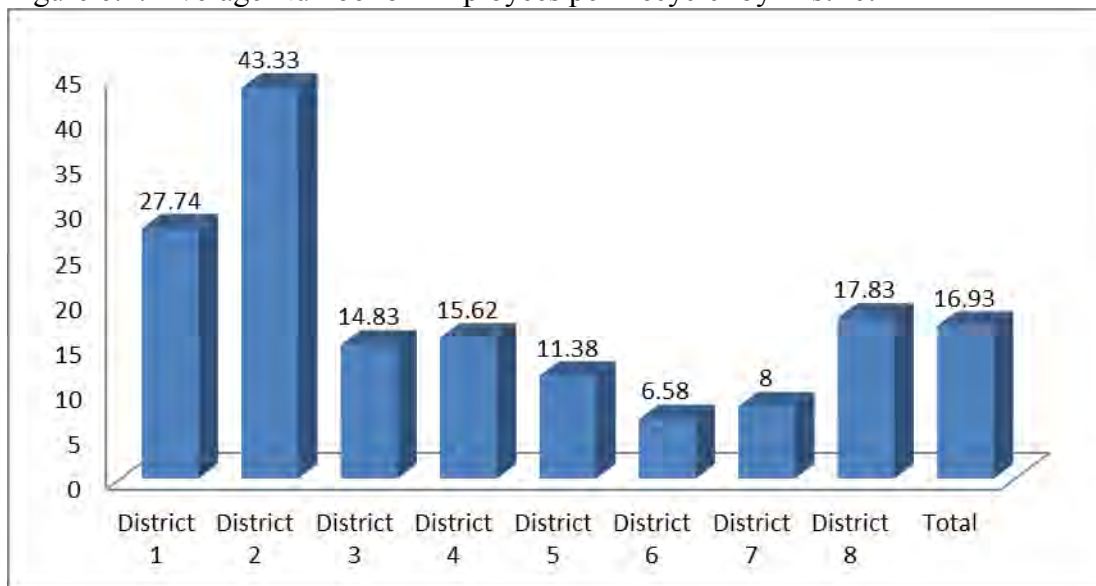
Households pay monthly fee for recycling collection	% yes
Up to 800 population	12.9
More than 800 up to 5,000 population	36.8
More than 5,000 up to 100,000 population	50.0
More than 100,000 population	100.0 *
Total	30.0

* Significant difference

Section 6: Economic Impact

Based on recyclers who responded to the survey, 2302 employees are employed by 136 Nebraska recycling companies completing this survey question. In addition, recyclers indicated they use volunteer labor, particularly in rural areas, that are not included in the employee numbers. If this average is extended to 72 recyclers which did not complete the survey, it is estimated there are 3,520 individuals employed by recyclers in Nebraska. The average number of employees per recycler was calculated for recyclers in each Game and Parks District. For the 136 recyclers who responded to the survey, there was a significant difference in number of employees by District ($F = 2.191$, $p < .05$) (see Figure 6.1). Cyclers in Districts 1 (Southeast Nebraska) and 2 (Douglas County) have larger numbers of employees than other districts. Recyclers in Districts 6 (North Central Nebraska) and 7 (Panhandle) have the fewest employees.

Figure 6.1: Average Number of Employees per Recycler by District



The total payroll for 96 Nebraska recycling companies completing the survey question was \$40,457,376 for 2013. Average payroll of recyclers in each Game & Parks District was assessed and there are no significant differences by District (see Table 6.1) ($F = 1.281$, $p = .269$).

Table 6.1: Average Payroll per Recycler by District

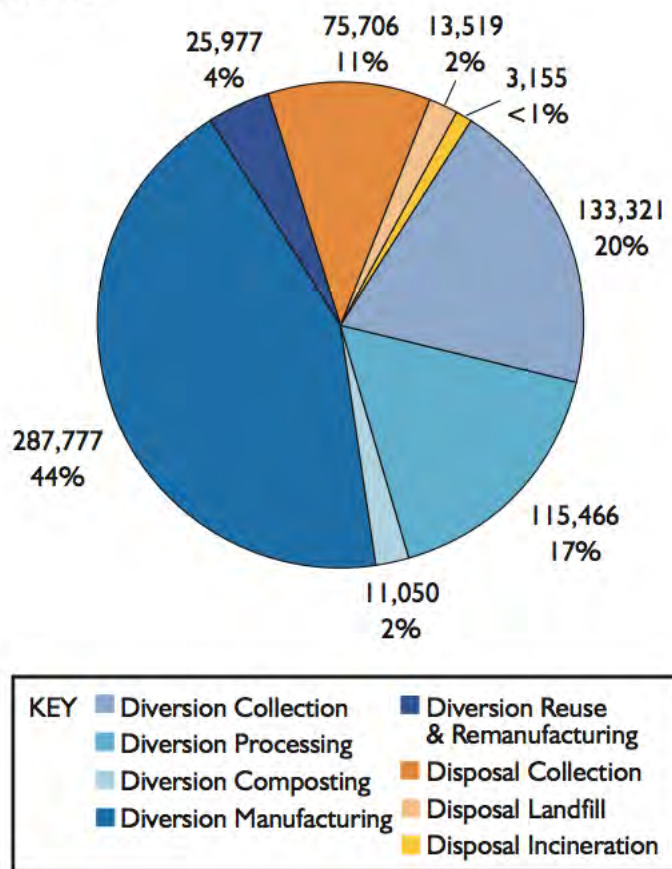
	Mean Payroll	Number of Recyclers
District 1	503,093.56	17
District 2	1,361,000.00	3
District 3	322,786.49	21
District 4	606,896.57	19
District 5	284,430.26	11
District 6	118,639.56	9
District 7	243,080.80	10
District 8	480,822.33	6
Total	421,430.96	96

There were an additional 122 recyclers identified which either completed the survey and did not respond to the question, or did not complete the survey. Assuming the non-responders had an equivalent payroll as responders, it is estimated that total payroll for recycling in Nebraska was \$91,871,949. This figure suggests significant job growth has occurred in the recycling sector since 2010, when an economic impact study was conducted by the Institute of Scrap Recycling Industries, at which time it was estimated that 1,620 recycling jobs existed in Nebraska with these workers receiving wages totaling \$74,570,000 and generating a total economic impact of \$274,820,000 and state and local tax contribution of \$10,360,948.

Recycling is an economic driver, supplying more jobs per ton of waste than waste disposal. According to the 2011 Tellus Institute study on the economic impact of recycling, waste disposal generates the fewest jobs per ton of waste (0.1 jobs per 1,000 tons) because it is least labor intensive. The study estimated different job production rates for three types of materials management: collection, processing, and manufacturing/reuse. Materials collection is also on the low on the spectrum, generating 1.67 jobs per 1,000 tons of materials collected; this figure is expected to decline to 1.23 jobs per 1,000 tons by 2030 with the growth of single-stream recyclables. Reuse and manufacturing of recyclables leads to considerably higher job creation dependent on the material and sector (roughly 4 jobs per 1,000 tons), whereas processing (2 jobs per 1,000 tons) and composting (0.5 jobs per 1,000 tons) are not as labor intensive. Based on the Tellus study's assessment of 2008 conditions, approximately 666,000 jobs were directly associated with the management of MSW in the U.S. for the year 2008.

Figure 6.2. U.S. Jobs by MSW Management Activity, 2008

(Total jobs=665,971)



Source: Tellus Institute, "More Jobs, Less Pollution: Growing the Recycling Economy in the U.S."

As illustrated by Figure 6.2, only 14% of jobs relating to waste management are associated with waste disposal through landfilling and incineration. The findings of this study underscore just how significant the recycling sector's impact on job creation might be with increased diversion rates.

Section 7: Recycler Perceptions about Barriers to Recycling and Strategies to Improve

Recycler Opinions Related to Barriers and Opportunities to Improve Recycling

Opportunities for Improvement

Recyclers were asked to suggest ideas to improve recycling both in the State of Nebraska and in their region. Responses to both questions were catalogued under the following headings: Education (public awareness of benefit and marketing and promotion of existing services); Additional diversion strategies (composting, repurposing, C&D recycling); Infrastructure (collection, capacity, and processing); Regional coordination; and Policy recommendations (voluntary, non-voluntary, market intervention, and producer responsibility). Responses that were descriptive of future intent or suggested actions were cataloged under these aforementioned headings. Responses descriptive of existing practices are not represented here.

Table 7.1: Responses to “Please suggest ideas your business has to increase recycling in Nebraska.”

Education	21	Voluntary policy recommendations	4
Public awareness of benefit	(13)	Recycling goals	(4)
Marketing and promotion (existing services)	(8)	Non-voluntary policy recommendations	7
Additional diversion strategies	2	Landfill disposal bans (material specific)	(4)
Composting	(1)	Recycling requirement	(1)
Repurposing	(1)	Mandates (material specific)	(2)
C&D Recycling	-	Market intervention policy recommendations	25
Infrastructure	21	Market development (material specific)	11
Collection	15	Incentives / Disincentives	8
<i>More collection points</i>	(9)	<i>Incentives (general)</i>	(4)
<i>Single-stream</i>	(3)	<i>Disincentives (general)</i>	(1)
<i>Special event</i>	(1)	<i>Variable rate system or Pay As You Throw</i>	(3)
<i>Curbside</i>	(2)	<i>Higher tipping fee</i>	-
Capacity	2	Subsidies	-
Processing	4	Deposit laws / Bottle bills	-
Regional coordination / Hub & Spoke	3	Low-interest loans	-
Producer responsibility policy recommendations	3	Grants	5
Extended producer responsibility laws	(2)	Tax breaks	-
Packaging policies and product design improvement	(1)	Advance disposal fees / Disposal fee surcharges	1

Sixty-five recyclers responded to the survey’s prompt to generate suggestions to improve recycling in the state of Nebraska, with many responses containing multiple ideas. To take an example, one recycler suggested the following: “*More curbside recycling. Easier access to funding. Better marketing opportunities.*”

A challenge exists in capturing the intended meaning of some suggestions. Take for instance, Infrastructure (Collection: Service area coverage) and Infrastructure (Capacity). The intent to add a trailer could expand both service area and capacity. Unless both benefits are explicitly cited, where the benefit of adding trailers or other equipment is cited, it is classified under the Capacity heading. When geographic locations and access to drop-off sites is referenced, it is organized under the Collection heading.

Recyclers indicated a need to better develop markets for recyclables (25) as the greatest overall recommendation, citing either the general need to cultivate a market for specific materials (11)—often, glass—or supporting the use of incentives or disincentives (8), among other tactics, including greater access to grant funding. Enhancing infrastructure to better support recycling (21), primarily at the point of collection (15), is regarded as a necessary strategy for advancing recycling. Increasing education (21 overall) around the benefit of recycling (13) and making residents aware of the availability of existing services (8) also viewed as essential.

Table 7.2: Responses to “Please suggest ideas to increase recycling in your area.”

Education	22	Voluntary policy recommendations	-
Public awareness of benefit	(12)	Recycling goals	-
Marketing and promotion (existing services)	(10)	Non-voluntary policy recommendations	6
Additional diversion strategies	5	Landfill disposal bans (material specific)	(1)
Composting	(1)	Recycling requirement	(3)
Repurposing	(3)	Mandates (material specific)	(2)
C&D Recycling	(1)	Market intervention policy recommendations	20
Infrastructure	24	Market development (material specific)	4
Collection	18	Incentives / Disincentives	12
<i>More collection points</i>	(11)	<i>Incentives (general)</i>	(3)
<i>Single-stream</i>	(2)	<i>Disincentives (general)</i>	(1)
<i>Special event</i>	(2)	<i>Variable rate system or Pay As You Throw</i>	(8)
<i>Curbside</i>	(3)	<i>Higher tipping fee</i>	-
Capacity	3	Subsidies	2
Processing	3	Deposit laws / Bottle bills	-
Regional coordination / Hub & Spoke	3	Low-interest loans	-
Producer responsibility policy recommendations	1	Grants	2
Extended producer responsibility laws	-	Tax breaks	-
Packaging policies and product design improvement	(1)	Advance disposal fees / Disposal fee surcharges	-

Sixty-nine recyclers provided responses to the question of how to improve recycling in their area. Ninety-two discrete suggestions were identified and tabulated. Expanding Infrastructure ranks highest (24), with Education (22) closely following as the most commonly cited means to enhance recycling in the recycler’s own community. As with the previous table, the Collection (18) subheading of Infrastructure—specifically service area coverage (11 of the 18 total responses for Collection related topics) ranks highest. Market intervention (20) is again emphasized here as well, however, there is uptick for a specific incentive, Variable rate systems, also known as Pay As You Throw (PAYT) (8 of the 12 listed under the Incentive/Disincentive

category). The suggestion of one recycler hits many categories: *“Mandate recycling as part of garbage service; institute volume-based waste collection fees; expand yard waste composting to include other organics; expand C&D waste recycling; require commercial recycling.”*

Barriers

There were 120 recyclers who responded to the question, “What, if any, obstacles does your business face when collecting, processing, or using recyclable materials?” Of those responding, 21 indicated there were no obstacles. The most common obstacle related to economic issues including challenges in covering the costs of recycling (*“Storage of truckloads of materials is expensive for what we do recycle.”*), finding resources for adequate staffing and equipment (e.g., *“Space and money. We are looking to expand, but waiting to grow our income levels to support this.”*), and the challenges of balancing budgets in rural areas (*“Being a small municipality, cost and labor expenses play a big part in what our community can afford. Most of what we do is volunteer based.”*)

Table 7.3: Responses to “What, if any, obstacles does your business face when collecting, processing, or using recyclable materials?”

No obstacles	21	Need for increased/improved staffing	18
Need for additional facility space and equipment	18	Contamination	13
Transportation issues (cost, distance from markets)	11	Economic Issues	31
Limits on types of recyclable materials	10	Difficulty in covering costs	(15)
No glass	(4)	Finding funds for needed staff/equipment	(10)
No plastic	(2)	Economy of scale in small communities	(2)
Only collect one item (e.g., paper)	(2)	Lack of tax funding	(2)
Other	(4)	Rates – citizens don’t want to pay for service	(1)
Accessibility	5	Unstable prices	(1)
Small population/large area	6	Finding markets	6
Lack of community buy-in/education	5	Government regulations	4
Other (e.g., wind-blown debris)	7		

Many respondents identified lack of equipment/facilities (e.g., storage space, containers, trailers, larger vehicles) and lack of trained staff (e.g., finding good help, education of employees, using volunteers rather than paid staff to hold down costs) as barriers. Transportation was identified as a barrier including the cost of hauling and distances to recycling markets. Respondents noted accessibility as a barrier including lack of curbside pickup and access to recycling centers. Some respondents indicated lack of community support for recycling is a barrier: *“People don’t take the time to clean, collect, store, and deliver recyclables. It is easier to throw it in the trash and let the hauler get rid of it.”* Other respondents thought regulation was a barrier; however, opinions differed about the nature of this barrier; some thought the problem was unnecessary regulation, while others thought there should be stronger government involvement (e.g., *“The lack of state legislation requiring municipalities and businesses to recycle is by far the single greatest impediment to ... recycling in Nebraska.”*)

Requirements to Grow Recycling Business

Ninety-eight respondents answered the question, “What would your business need to grow?” Of these, 12 indicated they were not interested in growing or the question was not applicable to their business.

Table 7.4: Responses to “What would your business need to grow?”

Nothing / not applicable	21	Equipment/facility expansion	34
Additional funding	18	Equipment (e.g., bailers, trailers, sorting equip.)	(30)
More funding in general	(12)	Space (e.g., additional space, another building)	(14)
Funding for more equipment	(4)	Additional staff or volunteers	13
Funding for additional facility/space	(3)	Increase in public support of recycling	7
Funding for additional staff	(2)	Better prices/incentives	6
Small population/large area	6	More population/volume	5
Increase in accessibility (e.g. capacity for curbside)	4	Regulatory/statutory change	4
Other (e.g., easier way to collect and transfer)	7	Expanded partnerships (communities, schools)	3

Section 8: City Clerk and County Treasurer Perspectives

Community Recycling Rate

Only 7 of 381 reporting communities indicated they calculated a recycling rate for their community. There did not appear to be a standard way to calculate the recycling rate. Some communities used the calculation of amount of recycling divided by recycled materials plus disposed municipal solid waste; however, it was difficult to understand how other communities calculated their rates. In addition, it was unclear what materials communities excluded and included in their recycling rates. It should be noted there is no state requirement for communities to calculate recycling rates and no standard formula for rate calculation in Nebraska.

Procurement Policies

Of the 381 participating municipalities, only 14 indicated they had such procurement policies favoring the purchasing of recycled-content materials (130 did not reply to the question and 237 indicated they had no such policy). These policies often specified favoring the purchase of recycled materials as long as prices were competitive and quality satisfactory. Some municipal policies set numerical goals (e.g., 30% post consumer materials for office paper). Some policies encouraged reducing waste generally. Some municipalities indicated they had no formal policy but their practices supported the purchase of recycled materials and recycling of materials.

Types of web sites, school programs, and education available in communities

Education is essential to increasing collection and recycling rates in communities. Proactively informing the public as to what waste is recyclable, the process of recycling in the community, and what happens to the recycled product postconsumer contribute to greater diversion rates.

Online presence of recycling information

An effective recycling system requires municipal support and leadership. The role of local government in fostering recycling extends beyond financial investment. As a trusted resource, municipal and county authorities are in a position to provide essential public information. Increasingly this information is being made available online. City clerks and county treasurers were asked to indicate whether their community maintains a website providing education on recycling for the area.

County

Sarpy County is the only county, of those responding, currently maintaining a website providing information and education on recycling.

City

The availability of a recycling-related website was significantly related to community size ($F=26.492$; $p<.001$). Smaller communities were significantly less likely to have web sites (see Figure 8.1). Although only 39 communities reported having web sites, 83.4% of the population of reporting communities lives in those 39 communities; 16.6% live in 206 responding communities without websites. There was also a significant difference in

websites by District with recyclers in Districts 2, 7, and 8 more likely to have web sites ($F = 3.113$; $p = .004$) (see Figure 8.2).

Figure 8.1: Percent of communities with websites by community size

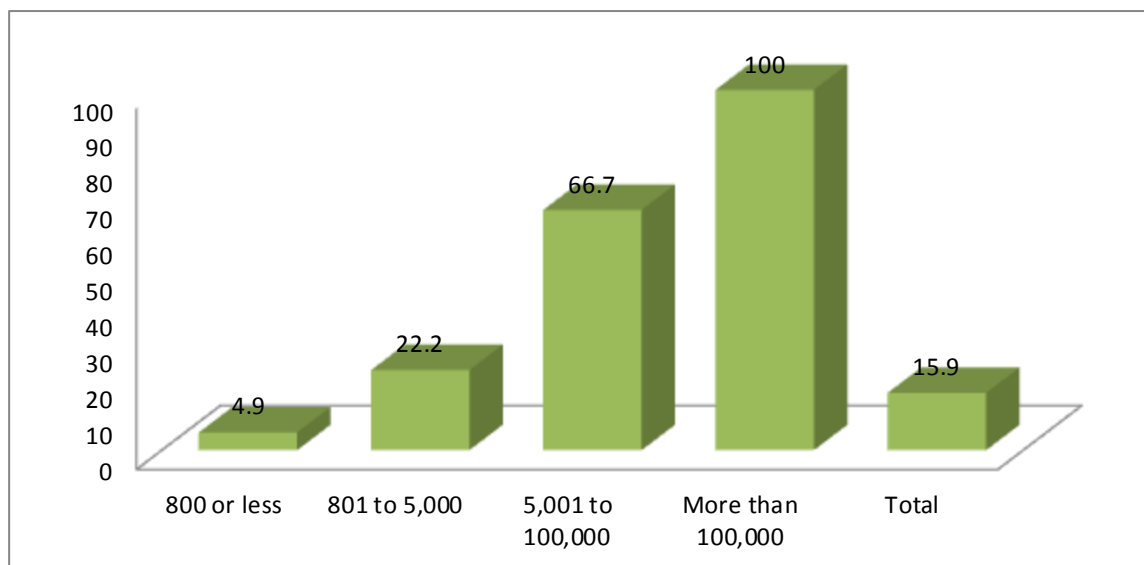
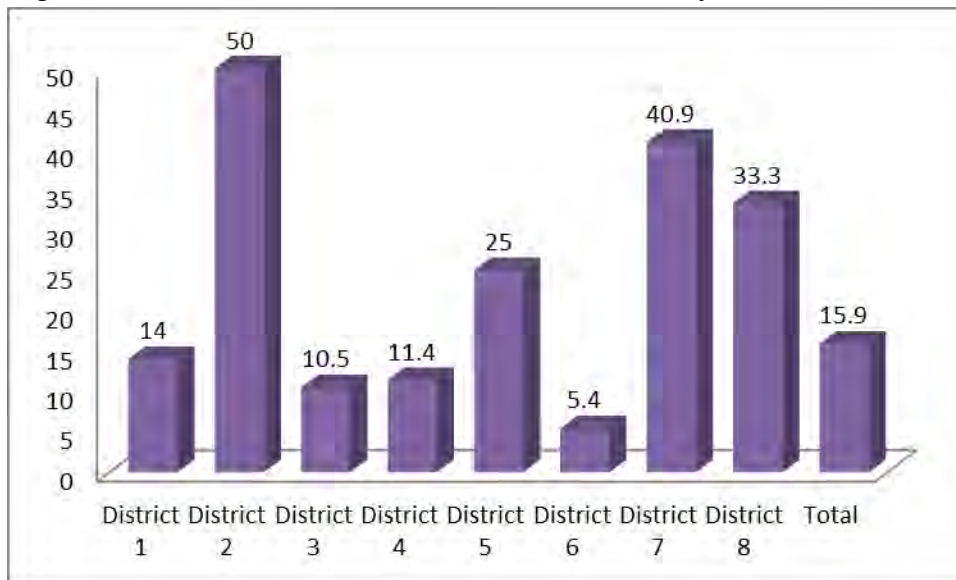


Figure 8.2: Percent of communities with websites by Game & Parks District



Approximately 14% of those 253 population centers indicating recycling is available to their community also maintain information online about community recycling. Primarily these are municipally owned and operated websites. A number of villages provide online content via a local chapter of Keep Nebraska Beautiful.

Knowledge of available school programs

Academic institutions also offer an important platform for educating young consumers about the environmental impact of the products and packaging they use.

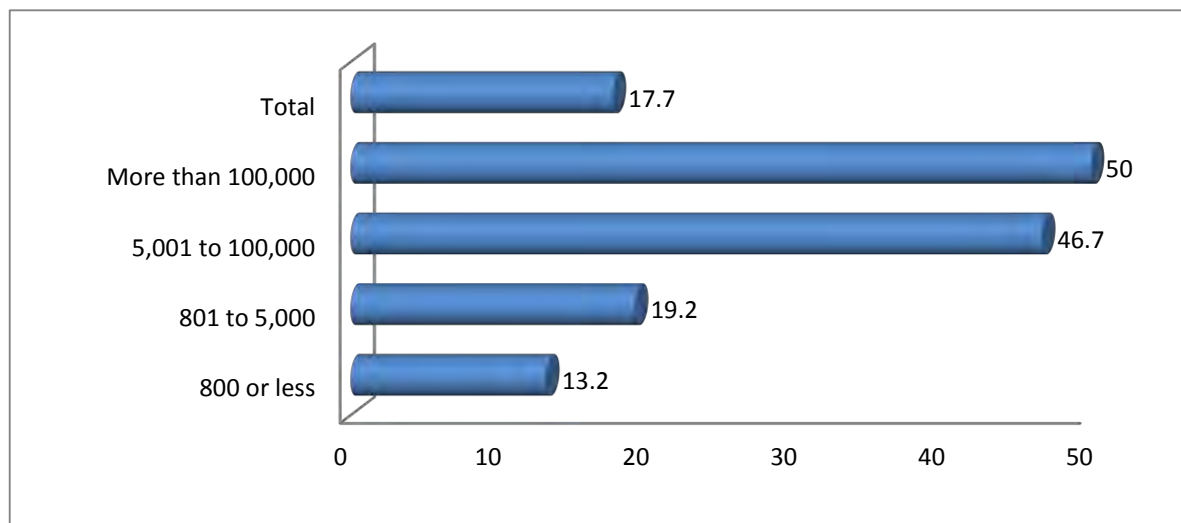
City

In communities without access to recycling, the clerks knew of no school programming supportive of the behavior.

In communities with access to recycling, 16.2% of the clerks indicated awareness of school programs supportive of recycling. Description of these programs ranged from specific materials collected (ink cartridges, paper, cardboard, plastic, aluminum) to acknowledging sponsoring agencies (such as the area Natural Resource District, Keep Nebraska Beautiful affiliate, or a chapter of Future Farmers of America) or the grade level at which the activity is taught and encouraged (the 2nd and 3rd grades are commonly cited). Programming includes tours of recycling facilities and presentations. Uniquely, Lincoln Public Schools employs a part time recycling coordinator and boasts a recycling rate of 25-30%.

The existence of school recycling programs was significantly related to the size of community. Large communities were more likely to have school recycling programs (see Figure 8.3).

Figure 8.3: Reported Availability of School Recycling Programs by Community Size



Presence of community organizations also supportive of recycling

The nonprofit sector both complements existing recycling programs and fills gaps in service to provide essential services otherwise unavailable, such as deconstruction, business energy audits, and community wide engagement and education. In communities without access to recycling, however, there is little to nothing an organization can augment, short of providing recycling services, without the needed infrastructure in place.

County

When asked to identify any active organizations or citizen groups supportive of recycling in the community, treasurers in counties with recycling available most often identified other local government entities such as cities, villages, and NRDs. Keep Nebraska Beautiful (KNB) affiliates and youth groups (Girl and Boy Scouts of America and Future Farmers of America) were also cited frequently (see Table 8.1). In counties without recycling services, responding treasurers knew of no other community organizations or groups supportive of recycling in the area.

Table 8.1: Community groups supportive of recycling in counties with recycling

Type of community group	Example	Frequency
Local government	Burt County Courthouse, Minden, Stanton	8
Community improvement	Keep Nebraska Beautiful affiliates	4
Youth organizations	GSA, BSA, FFA	4
Community groups	Lions Club, Knights of Columbus	2
Green teams	Broken Bow Green Coalition	1
Nonprofit	Habitat for Humanity	1

City

In communities with recycling services, city clerks most frequently cited educational institutions, community groups, and youth organizations as entities supportive of recycling (see Table 8.2). Public schools (with groups ranging from the associated honor societies and student councils to specific grades emphasizing the subject in the classroom) were most commonly identified. Secular citizen groups, such as Rotary and Lions Clubs, also featured prominently, followed closely by youth organizations, including Girl Scouts and Boy Scouts of America and Future Farmers of America, and affiliates of Keep Nebraska Beautiful. City Clerks mentioned dedicated nonprofits with a focus on recycling is infrequent, even of those nonprofits with a statewide focus and explicitly related to recycling.

Table 8.2: Community groups supportive of recycling in cities and villages with recycling

Type of community group	Examples	Frequency
Schools	Hershey Public Schools, Student Council	20
Community groups	Lions Club of Utica, Rotary, VFW	17
Youth organizations	GSA, BSA, FFA, 4-H, FCCLA	15
Community improvement (KNB)	Lexington, Fremont, Norfolk	14
Local businesses	Hogelands Market, Bennet Builders	7
Churches	Elba United Methodist, Immanuel Lutheran	6
Community improvement (other)	Hadar Comm. Improvement, Hwy Cleanup	6
Nonprofits	Green Bellevue, WasteCap, EcoStores	5
Local government	Friend Fire Dept.	5

Green teams	Wayne Green Team, Zero Waste Committee	4
Public health	Lexington Regional Health Center	3
Senior centers	Gosper County, North Platte	3
Chambers / Econ. Dev. Corp.	Ravenna Economic Development Corp.	3
Other	Achievement Board, Region V Services	3
Recycling Association	Washington County	1
Waste Management Association	Seward/Saline County	1

Changes planned in communities

County

Of the surveys returned, only two county treasurers indicated that the county planned to modify its approach to recycling in the community. One county is considering adding a part-time recycling coordinator; another indicated its intent to change to a waste management company providing recycling services at no additional charge.

City

Twenty-eight city clerks responded to the question “Do you have any plans for changing recycling in the community,” Many indicated multiple ways in which the community seeks change.

In those 253 communities with access to recycling services, one out of every ten responding city clerk indicated awareness of plans to modify community recycling in some form. These changes primarily center on expansion activities ranging from enhancing access and storage capability to adding materials, programs, and equipment. Eight communities plan to collect additional materials. Of these, villages frequently cite the addition of plastics, although paper and tin are also cited as targets for inclusion in the recycling stream; two second class cities intend to begin composting. A first class city seeks to add electronics to its recycling stream via a dedicated annual event.

Although the need for equipment is likely ubiquitous across communities of all sizes—as is the need for funding to make such purchases—that it is cited here only by communities under 100,000 demonstrates how essential the single unit can be to a recycling operation. Recycling trailers are sought by villages and second and first class cities alike. Beyond recycling trailers, equipment sought included a plastic baler, composter, storage bins, wood chipper, and dumpsters.

The addition of a recycling trailer helps to address another area of change: access. Traction in this category is anticipated only among first and second class cities, as is the addition of storage capacity to better process what is collected.

Clerks also identified additional ways in which their community intends to modify its recycling, including community assessment, grant seeking, often cited in combination with the aforementioned expansion activities, and enhanced education and outreach activities.

In those communities without recycling available, two village clerks indicated they are currently assessing options to bring recycling to their community and that they will be seeking grant funding to do so.

Ideas to increase recycling

County

At the county level, suggestions to improve recycling center primarily on enhancing access, either by providing curbside recycling or making a recycling trailer available, and making recycling mandatory. Respondents also indicated financial support and education as lacking.

Suggestions to improve statewide recycling from clerks representing communities with access to recycling most often centered on enhanced education and outreach activities. The recommendation to add a specific material to the recycling stream was often paired with the observation that the market for that particular material must be developed further.

Where recycling services do not already exist, education did not rank as highly. This is perhaps owing to the fact that when cited in communities with access, education is regarded both as the benefit of the act of recycling as well as making available to the consumer information on how and what is recyclable in their community. It is possible where the service is unavailable, little to no education exists as to where recycling may be done elsewhere. Rather the case for recycling must be the first focus to advance the practice.

Respondents described the nearest alternative source of recycling external to their community in this answer field, as described in the above table. Unsurprisingly, among this cohort, the need for greater access to recycling via more collection points is most commonly cited as the means to improve recycling statewide.

Section 9: Regional Meetings and Post-Meeting Survey Results

Regional Meeting Results

Participants in the four regional meetings identified a number of barriers to recycling in Nebraska and opportunities for enhancing recycling. Some of the key barriers include the following:

- Barriers related to citizen knowledge or support of recycling such as citizens not knowing where to take their recycling, citizens not wanting to pay recycling fees in addition to paying for garbage collection, citizens not understanding the benefits of recycling and the costs of disposal, recognizing there are benefits to recycling beyond the economic value of the materials, citizens not using recycling and trash containers appropriately (lack of standard signage for recycling), lack of school and other education programs, lack of community involvement.
- Lack of incentives to recycle such as flat fees for garbage collection, lack of easy access to recycling such as curb-side pickup, lack of bans of specific materials (e.g., plastic containers, electronics) from landfills, long distances for citizens to transport recyclables in some parts of the state, cost for collectors and processors to transport materials to end users (distance to markets), difficulty in getting necessary volume in rural areas.
- Lack of state policy or standard information such as reliable data on recycling rates, lack of a comprehensive plan or policy related to recycling, lack of state recycling goals, absence of a statewide mandate requiring deposits for beverage containers.
- Barriers related to recycling businesses such as the lack of end use markets, the lack of local or regional partnerships that could make recycling financially viable, lack of business involvement in stewardship programs, the cost of removing contamination from collected materials, lack of ongoing sustainable funding (reliance on grant funds that eventually run out).
- Other barriers including the lack of food waste composting, lack of local leadership in some communities, lack of recycling of particular materials in some communities (e.g., glass).

Regional meeting participants suggested many strategies for enhancing recycling in Nebraska including the following:

- Increased educational opportunities
 - Peer to peer educational campaigns
 - More neighborhood and community education efforts and events (e.g., green events, fairs)
 - Use tipping fees for increasing education
 - Media outreach
 - Framing recycling as public health issue and social responsibility as well as an economic benefit
 - Standardizing recycling signage
 - Work with Chambers of Commerce on how to be a green business
 - Learn from other states and countries that recycle more

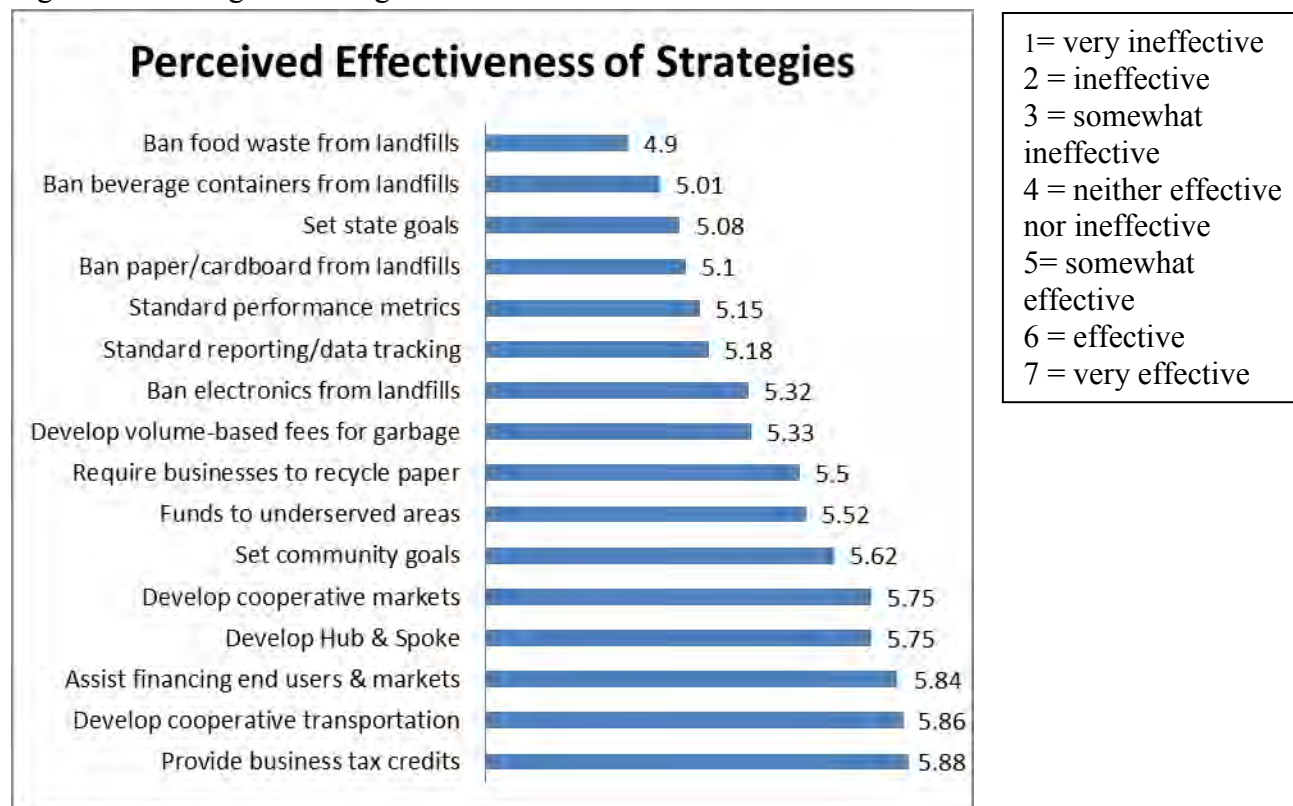
- Promote existing recycling guides and ways to tailor approaches to the unique needs of each community
- Communicate how far we have come in recycling and tap into Husker pride
- Use effective graphs and other visuals to communicate and use more social media
- Provide standard information for all communities – where to recycle and what materials accepted
- Increased incentives for recycling
 - Develop volume-based garbage collection fees such as Pay-As-You-Throw to encourage more recycling
 - Increase tipping fees
 - Addressing gaps in availability of and accessibility to recycling
 - Bottle deposits and plastic bag fees
 - Ban materials from landfills to develop incentives to recycle
 - Encourage/require trash haulers to offer recycling
- Statewide approach and leadership for recycling
 - Develop a whole-system, statewide approach to recycling
 - Develop state legislation so the burden isn't just local; develop a statewide culture for recycling and reducing waste (e.g., Zero Waste)
 - Develop standard metrics for reporting amount of recycling and community recycling rates
 - Fund ongoing comprehensive evaluation of waste disposal and recycling
 - Develop state and standard community recycling goals
 - Adopt a Highway Program should include recycling
- Develop recycling leadership in communities
 - Develop ways to share lessons learned to communicate community successes
 - Mentoring relationship with successful communities
 - Develop more community websites and school programs
 - Collect more data from communities on waste (e.g., true economic cost of waste disposal, work with grocers and restaurants to obtain data on food waste)
 - Develop and communicate local ordinance guidelines
- Assistance for businesses
 - Develop models such as Hub and Spoke through regional partnerships
 - Develop closer partnerships between businesses and other organizations involved in recycling
 - Work to develop more markets for recyclable material
 - Financial assistance and tax breaks for recycling businesses
 - Communities and businesses sharing resources to invest in recycling infrastructure, equipment, and human resources
 - Involve other businesses and manufacturers (e.g., product stewardship programs, including recycling content on packaging) including working at the federal level on these issues

Post-Meeting Survey Results

Strategies to enhance recycling in Nebraska were identified during the regional meetings, and a post meeting survey was sent to stakeholders. The survey focused on perceived potential for effectiveness of the strategies. There were 206 valid responses. As shown in Figure 9.1, nearly

all strategies were considered at least somewhat effective, with the highest potential given for 1) business tax credits, cooperative transportation, and financial assistance to develop markets and end use. Lowest rated strategies were 1) banning food waste from landfills, 2) banning beverage containers from landfills and 3) setting state goals, although all three of these strategies were rated at about “somewhat effective.”

Figure 9.1: Ratings of Strategies



An analysis was conducted to determine if ratings of strategies were affected by attendance at the regional meetings. As shown in Table 9.1, attendees at the Regional Meetings rated seven of the strategies substantially higher than did survey respondents who did not attend the meetings. A number of these strategies (such as the Hub and Spoke model, paying volume-based fees for garbage, and establishing standard reporting) were discussed extensively at the meetings. These findings indicate that education may play an important role in perceptions about the effectiveness of strategies.

Table 9.1: Rating by Attendance at Regional Meetings

Strategy	By Attendance at Regional Meetings		
	Total N=206	Attended N=48	Not Attended N=149
Ban food waste from landfills	4.90	4.18	4.06
Ban beverage containers from landfills	5.01	4.96	5.03
Set state goals	5.08	4.98	5.11

Ban paper/cardboard from landfills	5.10	5.23	5.06
Standard performance metrics	5.15	5.42	5.06
Standard reporting/data tracking	5.18	5.47	5.09
Ban electronics from landfills	5.32	5.41	5.30
Develop volume-based fees for garbage	5.33	5.71	5.21
Require businesses to recycle paper	5.50	5.43	5.52
Funds to underserved areas	5.52	5.54	5.52
Set community goals	5.62	5.48	5.66
Develop Hub & Spoke	5.75	6.06	5.69
Develop cooperative markets	5.75	6.13	5.65
Assist financing end users & markets	5.84	6.10	5.76
Develop cooperative transportation	5.86	6.08	5.82
Provide business tax credits	5.88	5.90	5.88

Green shading indicates higher rating for strategy

An analysis was conducted to determine if strategies were associated with the size of communities. Table 9.2 shows that on average the most positive ratings across all strategies were given by respondents from communities of 100,000 or larger, followed by respondents from communities with populations between 801 and 5,000. In the table below, red is used to indicate the three lowest rated strategies for each group and green indicates the highest rated strategies. All four groups had similar ratings; however persons from communities of 100,000 or more rated “standard performance metrics” low, and persons from communities of 801-5,000 rated “volume-based fees for garbage” low. Respondents from communities of 801-5,000 rated “funds to underserved areas” high, and respondents from communities of 800 or less rated “Hub and Spoke” as high.

Table 9.2: Rating by Population of Community

Strategy	Population			
	800 or less N=42	801-5000 N=33	5001-100000 N=56	100000+ N=66
Ban food waste from landfills	3.63	4.24	3.64	4.69
Ban beverage containers from landfills	4.29	5.36	4.66	5.60
Set state goals	5.05	5.18	4.84	5.26
Ban paper/cardboard from landfills	4.36	5.56	4.81	5.60
Standard performance metrics	4.88	5.30	4.91	5.45
Standard reporting/data tracking	4.86	5.27	4.93	5.57
Ban electronics from landfills	4.71	5.79	5.14	5.65
Develop volume-based fees for garbage	4.80	5.12	5.14	5.92
Require businesses to recycle paper	5.43	5.67	4.82	6.02
Funds to underserved areas	5.98	5.88	4.95	5.61
Set community goals	5.60	5.52	5.46	5.82
Develop Hub & Spoke	6.00	5.82	5.39	5.96
Develop cooperative markets	5.79	5.53	5.52	6.08

Assist financing end users & markets	5.90	6.12	5.57	5.89
Develop cooperative transportation	6.07	5.85	5.56	6.06
Provide business tax credits	6.07	5.88	5.45	6.14
Average	5.21	5.51	5.05	5.71

Red shaded cells indicate lowest rated strategies for each population size; green shaded cells indicate highest rated strategies for each population size.

Table 9.3 shows ratings of strategies by respondent role. Recycling educators and advocates tended to view all strategies as more effective than did other respondent groups. Recycling processors and end users and government administrators tended to view all strategies as less effective than did other groups, although sample sizes for processors and end users were small. In the table below, red is used to indicate the three lowest rated strategies for each group and green indicates the highest rated strategies. Respondent groups were similar in their highest and lowest ranking strategies. One notable exception is while recycling processors, elected officials and citizens included volume-based fee structure for garbage as a low-rated strategy, recycling educators included this strategy as one of their top three.

Table 9.3: Rating by Respondent Role

	Role							
	Collector	Processor	End User	Educator	Elected	Admin	Advocate	Citizen
Strategy	N=21	N=6	N=7	N=22	N=6	N=47	N=23	N=64
Ban food waste from landfills	3.68	3.33	3.14	4.86	4.67	3.94	4.27	4.16
Ban beverage containers from landfills	4.47	4.33	4.86	5.50	4.67	4.40	5.45	5.49
Set state goals	5.38	5.17	5.43	5.50	5.33	4.83	5.35	4.89
Ban paper/cardboard from landfills	4.79	4.17	5.43	5.67	5.00	4.55	5.23	5.50
Standard performance metrics	5.19	4.17	4.86	5.90	5.33	4.74	5.45	5.23
Standard reporting/data tracking	5.38	4.83	4.14	5.95	5.50	4.72	5.50	5.25
Ban electronics from landfills	4.95	4.83	5.29	5.86	6.00	4.77	5.77	5.54
Develop volume-based fees for garbage	5.52	3.33	4.86	6.14	4.67	5.13	6.04	5.22
Require businesses to recycle paper	5.81	4.67	5.00	5.50	5.83	5.09	5.91	5.67
Funds to underserved areas	5.95	5.17	4.71	5.64	5.50	5.38	5.83	5.53
Set community goals	5.81	5.67	6.43	6.14	5.67	5.38	5.70	5.47
Develop Hub & Spoke	5.71	5.33	6.14	6.05	6.17	5.62	6.30	5.63
Develop cooperative markets	6.05	4.67	5.29	6.05	5.67	5.68	6.09	5.70
Assist financing end users & markets	6.14	6.17	5.43	5.86	5.67	5.81	6.05	5.78
Develop cooperative transportation	6.19	5.33	6.17	5.91	6.17	5.60	6.35	5.84
Provide business tax credits	6.05	5.67	5.14	6.09	6.50	5.38	6.14	6.12
Average	5.44	4.80	5.14	5.79	5.52	5.06	5.71	5.44

Red shaded cells indicate lowest rated strategies for each respondent category; green shaded cells indicate highest rated strategies for each respondent category

Section 10: Conclusions and Recommendations

Recycling is just one component for building sustainable communities and is interrelated with other methods of reducing waste such as limiting consumption, reusing materials outside of the traditional recycling process, composting, and product stewardship. There are many good reasons to reduce the amount of waste generated in Nebraska, including increasing recycling:

- Recycling reduces the amount of natural resources consumed by people such as metals and timber, thereby saving resources for the future
- Conserves resources and energy used in the manufacturing of products made from those resources
- Reduces the amount of waste going into landfills and the costs associated with waste hauling and disposal
- Reduces toxins that may infiltrate water, food and air, that can negatively affect the health of people in Nebraska
- Reduces greenhouse gas emissions that contribute to global climate change
- Processes such as composting are valuable because they improve the quality of soil and allow land to be more productive
- Recyclable materials are commodities that have value to society, but only if they are recycled and not disposed
- Recycling creates local jobs and economic opportunity in Nebraska communities where recycled materials are collected, processed and manufactured. The Tellus Institute (2008) estimated recycling employs more than seven times the number of workers as are employed in waste disposal

The study determined that Nebraska recycles less and discards more of its municipal solid waste than surrounding states. Because recycling is so important to improving the future of Nebraska communities, implementing strategies to enhance recycling is critical. Through the recycling study, a number of strategies were determined to be viable and are therefore recommended for Nebraska:

1. Develop a statewide framework/ approach to facilitate comprehensive materials management including recycling and other methods to reduce waste (e.g., reuse) in Nebraska communities. Although the focus of recycling should be on Nebraska communities, the State has an important leadership role in facilitating recycling. The State could exercise leadership through legislation or executive action that could benefit Nebraska community recycling efforts. This type of leadership could manifest itself through a number of components:
 - a. Commit to a Zero Waste Approach to eliminate the inefficient disposal of solid waste and enhance recycling, as a priority for the State in promoting sustainability for Nebraska communities. Develop a shift in thinking from considering the waste stream as garbage to seeing the waste stream as opportunity.
 - b. Establish statewide recycling goals and timelines for reaching those goals through a strategic planning process that identifies action steps to achieve these goals. The strategic planning should be broad-based and inclusive, involving communities, recycling businesses, advocates, and citizens across the State. Engagement of the public should include mechanisms for state-wide input through surveys and focus

groups as well as consensus building through stakeholder deliberative processes. These goals should be focused and may be concentrated on a select group of recyclable materials that have the most economic, environmental, and health impacts. The strategic planning could include both recycling and waste reduction through revision of the Solid Waste Management Plan requirements.

- c. Serious consideration should be given to establishing a framework such as a Hub and Spoke Model for Nebraska and developing action steps to implement the model. Other states have successfully used this type of approach to develop strong public/private partnerships and greater accessibility and profitability for recycling. The current study found that the current availability of collectors and processors makes this a realistic model for Nebraska. It may be beneficial to involve the Department of Economic Development in these efforts.
- d. Work to develop product stewardship and extended producer responsibility initiatives through public/private partnerships.
- e. Focus on composting of food waste including promotion of on-farm composting and provide education about the benefits of composting for improving the productivity of soil.
- f. Focus on communities that do not have recycling collection by prioritizing funding to fill infrastructure and service gaps identified by this study. The study found that in most areas of Nebraska, individuals have access to recycling collection; however, in many rural areas, recycling is lacking. Also, an emphasis should be made to increase the accessibility of recycling collection, such as looking at curb-side pickup.
- g. Establish standard measurement and reporting systems. A key finding of the study is the lack of established standards for measuring and reporting the amount of recycling. If Nebraska establishes goals for recycling, there must be a uniform and comprehensive way to measure progress toward those goals. A method other states have found beneficial to reporting is to have state licensure or permits for recyclers that require reporting.
- h. Coordinate resources to achieve the State goals. There are a number of grant programs operated by the State including the Department of Environmental Quality and the Nebraska Environmental Trust. Establishing State goals and aligning resources to meet those goals would be a natural outcome of the strategic planning process.
- i. Conduct a comprehensive analysis of the social, environmental and economic costs to waste production, collection, and disposal and an evaluation regarding how enhancements in recycling can reduce these costs; similarly, conduct a study on the value of diverting materials from landfills and maximizing the economic benefit from recycling, composting and reuse of materials.
- j. Increasing resources allocated for recycling. One option would be to increase tipping fees (e.g., add \$1.00 to the current \$1.25 per ton fee) to fund the projects that further the strategic goals. Stakeholders involved in this study highly recommended state financial assistance to improve recycling operations such as providing business tax credits or low interest loans or other financial assistance.
- k. Establish technical assistance to help communities improve their recycling efforts. These technical resources could include a website with information that includes

information for communities ranging from those that want to start recycling programs to those that want to enhance existing recycling programs. Other assistance could include forums for communities and businesses to share best practices, linkages to national resources, and matching communities to form mentoring relationships.

- l. Develop statewide universal labeling of recycling receptacles. Often there is confusion about where to recycle and what types of materials are accepted in recycling containers. Developing universal labeling that can be used in all Nebraska communities would help provide consistency and reduce confusion. Also, having a standard format for websites and informational materials pertaining to communicating recycling locations or options within each community would help citizens better understand recycling options. This could be modeled on the Nebraska 211 system which is used to communicate about health and human services available in communities across the State.
 - m. Develop a statewide messaging campaign to inform individuals about the importance of recycling and waste reduction, strategies for enhancing recycling, and linkages to potential resources.
 - n. The State may consider other policies to promote recycling such as banning certain materials (e.g., electronics) from landfills and developing enforcement mechanisms to ensure compliance. In isolation, these types of approaches may not be optimal and may lead to dumping in unauthorized areas. However, landfill bans may be useful if implemented in conjunction with more comprehensive reform measures.
2. Although State leadership is important in developing a comprehensive approach to waste management and recycling, communities and businesses have opportunities to improve recycling and waste reduction as well:
- a. Set community goals for recycling through broad-based public involvement.
 - b. Implement public policies at the local level to encourage recycling such as developing government procurement policies that favor purchasing recycled materials and mandating recycling within public agencies.
 - c. Developing private and public partnerships to maximize public participation in recycling and to help ensure economic sustainable recycling business opportunities.
 - d. Partner with schools, faith organizations and community groups interested in recycling to create community synergy around sustainability and waste reduction. Use these partnerships to implement best practices such as door-to-door educational campaigns.
 - e. Develop community economic policies such as Pay-As-You-Throw disposal fees that dis-incentivize waste and incentivize recycling.
 - f. Create regional partnerships to form networks such as the Hub and Spoke model and to examine possibilities for expanding markets and creating cooperative transportation networks to reduce costs and realize economies of scale.
 - g. Develop cross-community learning collaboratives to share information about community recycling best practices. This may be especially important for rural and frontier communities that have low population density and struggle with having enough MSW volume to ensure viable recycling operations.

- h. Communities can increase access to recycling through development of more recycling drop off sites or by examining the feasibility of curb-side pickup. Partnering with trash haulers may be beneficial to achieve waste reduction and recycling enhancements. Communities can develop their own strategic plans beginning with an examination of economic incentives from the perspectives of citizens, waste haulers, landfills and transfer stations, recycling collectors, and recycling processors. The study found that the type of trash collection system within communities was related to the availability of recycling; hence looking at the bigger picture may be useful.
- i. Maximizing communication between public officials and recyclers. In many communities there is a strong public private partnership focused on improving recycling. In other communities, the study found that public officials were not aware of the recycling businesses within their communities.
- j. Recognizing the economic, social, environmental and health benefits of recycling, communities may consider the benefits of supporting waste reduction and recycling enhancements with public funding. Input from stakeholders involved in this study suggest public officials work with community partners to take a comprehensive look at the economic, environmental and social costs of waste production, collection and disposal. Investing in recycling improvements may be a way to reduce these costs and enhance sustainability.

Appendix A: References

- BioCycle. (January 1998). Expanding On-Farm Composting (p. 78-80).
- City of Lincoln. (November 2013). Solid Waste Management Plan for Lincoln and Lancaster County. Retrieved from:
<http://lincoln.ne.gov/city/pworks/waste/sldwaste/solidwasteplan2040/pdf/a-c-20120814-handout3-rev1.pdf>
- City of Austin. (2005). Council Resolution No. 20090115-050. Retrieved from
http://austintexas.gov/sites/default/files/files/Trash_and_Recycling/Zero_Waste_Plan_-_full_version_-_Council_Adopted_w-resolution.pdf.
- City of Seattle. (n.d.) Ordinances Prohibiting Recyclables in Garbage.
<http://www.seattle.gov/util/MyServices/Garbage/AboutGarbage/SolidWastePlans/AboutSolidWaste/BanOrdinance/index.htm>. Accessed March 11, 2015.
- EcoCycle. (n.d.) <http://www.ecocycle.org>. Accessed December 20, 2014.
- Engineering Solutions & Design, Inc. (2009). State of Nebraska Waste Characterization Study, prepared for State of Nebraska Department of Environmental Quality.
- Massachusetts Department of Environmental Protection. (January 2013). Organics Study and Action Plan.
<http://www.mass.gov/eea/docs/dep/public/committee-4/orgplan12.pdf>. Accessed March 13, 2015.
- New Mexico Recycling Coalition. (n.d.)
http://www.recyclenewmexico.com/hub_and_spoke_resources.htm. Accessed October 20, 2014.
- New Mexico Recycling Coalition. (2012). Access to Recycling Nearly Doubles in New Mexico: More recycling available in both rural and urban areas [Press release]. Retrieved from
<http://www.recyclenewmexico.com/pdf/AccessToRecyclingIncreases.pdf>.
- Shin, D. (2014). Generation and Disposition of Municipal Solid Waste (MSW) in the United States—A National Survey.
http://www.seas.columbia.edu/earth/wtert/sofos/Dolly_Shin_Thesis.pdf. Accessed September 28, 2014.
- Skumatz, L. A. and Freeman, D. J. (2006). Pay As You Throw (PAYT) in the US: 2006 Update and Analyses, prepared for US EPA and SERA, by Skumatz Economic Research Associates. Superior, CO.

- Reclay StewardEdge Inc. (2014). Research and Analysis of Policies that Drive Increased Recycling, prepared for Carton Council of North America.
- Scrap Recycling Industries. (2011). Economic Impact Study: U. S.-Based Scrap Recycling Industry. www.isri.org/jobs. Accessed January 5, 2015.
- State of Colorado. (n.d.) <https://www.colorado.gov/pacific/cdphe/hub-and-spoke-recycling-model>. Accessed January 5, 2015.
- State of Tennessee. (December 23, 2014). Grants Will Help Communities Meet Waste Reduction Goals. <https://news.tn.gov/node/11824>. Accessed January 5, 2015.
- Steward, W. C. and Kuska, S. B. (2011). Sustainometrics: Measuring Sustainability: Design, Planning and Public Administration for Sustainable Living. Greenway Communications. Norcross, GA.
- Tellus Institute with Sound Resource Management. (2011). More Job, Less Pollution: Growing the Recycling Economy in the U.S. <http://www.recyclingstar.org/publications/more-jobs-less-pollution-growing-the-recycling-economy-in-the-us/>. Accessed March 11, 2015.
- U.S. EPA, (September 2009). Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices. http://www.epa.gov/oswer/docs/ghg_land_and_materials_management.pdf. Accessed March 10, 2015.

Appendix B. Recycling Inventories

Nebraska Recycling Study

City Clerk Recycling Inventory

A glossary has been provided on page 7 of this inventory for correct use of terms.

Section A: Recycling Information

The following questions pertain to recycling operations in your community.

1. Are recycling services available to your city, town, or municipality?
☐ No → *Go to Question #11 on page 4*
☐ Yes
2. (If yes): Please list the names and contact information of each of the recycling facilities and organizations that are available to your community, including any contractor used by your municipality if applicable, and indicate the type(s) of services available in the sections below.

Facility or Organization 1

Name:

Email, Address, and/or Phone Number:

Materials collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center (Collection site where individuals bring and sort recyclables)
- ☐ Commercial recycling service (Service provided to businesses)
- ☐ Repurposing center (Center that reuses building or other materials for secondary uses)
- ☐ Private buy-back center (Center where individuals can bring recyclables for payment)
- ☐ Residential curbside pickup (Recyclables collected from private residences)
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

Facility or Organization 2

Name:

Email, Address, and/or Phone Number:

Materials collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center
- ☐ Commercial recycling service
- ☐ Repurposing center
- ☐ Private buy-back center
- ☐ Residential curbside pickup
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

Facility or Organization 3

Name:

Email, Address, and/or Phone Number:

Materials collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center
- ☐ Commercial recycling service
- ☐ Repurposing center
- ☐ Private buy-back center
- ☐ Residential curbside pickup
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

NOTE: If you will need additional space to complete the list of facilities/organizations and their service type, please make a photocopy of this sheet before filling it out and attach to the back of the questionnaire.

**Facility or
Organization 4**

Name:

Email, Address, and/or Phone Number:

Materials collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center (Collection site where individuals bring and sort recyclables)
- ☐ Commercial recycling service (Service provided to businesses)
- ☐ Repurposing center (Center that reuses building or other materials for secondary uses)
- ☐ Private buy-back center (Center where individuals can bring recyclables for payment)
- ☐ Residential curbside pickup (Recyclables collected from private residences)
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

**Facility or
Organization 5**

Name:

Email, Address, and/or Phone Number:

Materials collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center
- ☐ Commercial recycling service
- ☐ Repurposing center
- ☐ Private buy-back center
- ☐ Residential curbside pickup
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

**Facility or
Organization 6**

Name:

Email, Address, and/or Phone Number:

Materials collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center
- ☐ Commercial recycling service
- ☐ Repurposing center
- ☐ Private buy-back center
- ☐ Residential curbside pickup
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

**Facility or
Organization 7**

Name:

Email, Address, and/or Phone Number:

Materials collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center
- ☐ Commercial recycling service
- ☐ Repurposing center
- ☐ Private buy-back center
- ☐ Residential curbside pickup
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

The following questions ask about financing recycling services in your city, town, or municipality.

3. Please estimate the amount of sources of public and private funding for recycling services or market development activities in your city, town, or municipality. If none, please put "0."

Collection fees: \$

Private Grant: \$

City tax dollars \$

County tax dollars: \$

Federal Grant: \$

State Grant: \$

Other, specify \$

4. Do you calculate your recycling rate meaning the proportion of solid municipal waste diverted through recycling?

- ☐ No → *Go to Question #5*
☐ Yes

- a. (If yes): What is the most recent recycling (diversion) rate for your community?

Residential: %

Commercial: %

- b. (If yes): What formula do you use to calculate your recycling (diversion) rate?

- c. (If yes): What materials do you include in this formula?

- d. (If yes): What materials do you exclude in this formula?

The following questions ask about recycling programs in your community.

5. Does local government have any procurement policies supporting the purchase of goods made from recycled materials?

- ☐ No → *Go to Question #6*
☐ Yes

- a. (If yes): Please describe, or attach a document describing to this questionnaire:

6. Does your city maintain a website providing education to the community on recycling?

- ☐ No → *Go to Question #7*
☐ Yes

a. (If yes): What is this website's URL?

7. Is a school program available to the community on recycling?

- ☐ No → *Go to Question #8*
☐ Yes

a. (If yes): Please describe:

8. Is other education available to the community on recycling?

- ☐ No → *Go to Question #9*
☐ Yes

a. (If yes): Please describe:

9. Please identify any active organizations or citizen groups supportive of recycling in the community.

- ☐ No organizations or groups

Name:

Email, Address, and/or Phone Number:

Name:

Email, Address, and/or Phone Number:

Name:

Email, Address, and/or Phone Number:

10. Do you have any plans for changing recycling in the community?

- ☐ No → *Go to Question #11*
☐ Yes

a. (If yes): Please describe these plans.

11. Please suggest ideas to increase recycling in Nebraska.

Section B: Municipal Solid Waste Collection Information

12. Do you have a private collection system for Municipal Solid Waste Disposal in your community?

- ☐ No → **Go to Question #13**
☐ Yes

a. (If yes): Is this private collection system residential, commercial, or both?

- ☐ Both Residential and Commercial
☐ Residential Only
☐ Commercial Only

13. Do you have a private franchise system for Municipal Solid Waste Disposal in your community?

- ☐ No → **Go to Question #14**
☐ Yes

a. (If yes): Is this private franchise system residential, commercial, or both?

- ☐ Both Residential and Commercial
☐ Residential Only
☐ Commercial Only

14. Do you have a public collection system for Municipal Solid Waste Disposal in your community?

- ☐ No → **Go to Question #15**
☐ Yes

a. (If yes): Is this public collection system residential, commercial, or both?

- ☐ Both Residential and Commercial
☐ Residential Only
☐ Commercial Only

15. Does your community utilize a transfer station or stations for Municipal Solid Waste Disposal in your community?

- ☐ No → **Go to Question #16**
☐ Yes

a. (If yes): Is this transfer station(s) residential, commercial, or both?

- ☐ Both Residential and Commercial
☐ Residential Only
☐ Commercial Only

b. (If yes): Please identify the transfer station or stations your community uses along with the residential and/or commercial tipping fees your community pays at each Transfer Station.

Name:	<input type="text"/>	City, State:	<input type="text"/>
Residential fee:	\$ <input type="text"/>	Commercial fee:	\$ <input type="text"/>
Name:	<input type="text"/>	City, State:	<input type="text"/>
Residential fee:	\$ <input type="text"/>	Commercial fee:	\$ <input type="text"/>
Name:	<input type="text"/>	City, State:	<input type="text"/>
Residential fee:	\$ <input type="text"/>	Commercial fee:	\$ <input type="text"/>
Name:	<input type="text"/>	City, State:	<input type="text"/>
Residential fee:	\$ <input type="text"/>	Commercial fee:	\$ <input type="text"/>
Name:	<input type="text"/>	City, State:	<input type="text"/>
Residential fee:	\$ <input type="text"/>	Commercial fee:	\$ <input type="text"/>
Name:	<input type="text"/>	City, State:	<input type="text"/>
Residential fee:	\$ <input type="text"/>	Commercial fee:	\$ <input type="text"/>

16. What is the annual budget for providing waste/garbage collection and disposal service in your community for Calendar Year 2013? If none, please put "0."

\$

a. Does your city, town, or municipality currently budget funds to support community recycling?

- ☐ No → *Go to Question #17*
☐ Yes

b. (If yes): Please indicate the annual budget amount for Calendar Year 2013.

\$

17. Do households pay a separate monthly fee for waste/garbage collection and disposal service?

- ☐ No → *Go to Question #18*
☐ Yes

a. (If yes): What is the amount each household pays monthly?

\$

b. Please use the space below to describe the services covered by this fee.

c. Is recycling a component of this service?

- ☐ No → *Go to Question #18*
☐ Yes

d. (If yes): Do households pay a separate monthly fee for recycling collection?

- ☐ No → *Go to Question #18*
☐ Yes

e. (If yes): What is the amount each household pays monthly?

\$

Section C: Stakeholder Information

18. In 2014, four regional meetings will be convened to discuss the results of this inventory and develop strategies to filling any recycling service gaps. Who is the best person in your community to contact for a list of civic officials or stakeholders who may be interested in attending such a meeting?

Name:

Title:

Email, Address, and/or

Phone Number:

Glossary

Buy-Back Center	Refers to a facility where individuals or groups of individuals exchange recyclables for payment. (U.S. EPA, 1989)
Drop-Off Center	Refers to a method of collection whereby recyclable or compostable materials are taken by individuals to a collection site and placed in designated containers. (U.S. EPA, 1989)
Municipal Solid Waste	Refers to wastes such as durable goods, nondurable goods, containers and packaging, food scraps, yard trimmings, and miscellaneous inorganic wastes from residential, commercial, institutional, and industrial sources, such as appliances, automobile tires, old newspapers, clothing, disposable tableware, office and classroom paper, wood pallets, and cafeteria wastes. <i>Excludes</i> solid wastes from other sources, such as construction and demolition debris, autobodies, municipal sludges, combustion ash, and industrial process wastes that might also be disposed of in municipal waste landfills or incinerators. (U.S. EPA, 1996b)
Recycling	Refers to the series of activities by which discarded materials are collected, sorted, processed, and converted into raw materials and used in the production of new products. <i>Excludes</i> the use of these materials as a fuel substitute or for energy production. (National Recycling Coalition, 1995)
Repurposing Center	A retail center that provides customer access to reusable materials, primarily construction materials.
Transfer Station	An intermediary collection point for commercial haulers prior to landfilling that augments separation to reduce additional transportation from further hauling.

Please remember to return any additional documents (additional sheets of recycling operations and/or procurement policies) with this inventory.

Please use the space below to provide any comments or feedback.

Thank you!

We greatly appreciate the time you have taken to complete this inventory. For your convenience, please use the postage-paid return envelope included in your inventory packet to return your inventory to the Bureau of Sociological Research.

Questions or requests from this inventory can be directed to:

Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102
Phone: 1-800-480-4549 (toll free)
Email: bosr@unl.edu

Nebraska Recycling Study

County Treasurer Recycling Inventory

A glossary has been provided as a separate sheet for correct use of terms.

Section A: Recycling Information

The following questions pertain to recycling operations in your county.

1. Are recycling services available to your county?

- ☐ No → *Go to Question #9 on page 4*
☐ Yes

2. (If yes): Please list the names and contact information of each of the recycling facilities and organizations that are available to your county, and indicate the type(s) of services available in the sections below.

**Facility or
Organization 1**

Name:

Email, Address, and/or Phone Number:

Materials Collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center (Collection site where individuals bring and sort recyclables)
☐ Commercial recycling service (Service provided to businesses)
☐ Repurposing center (Center that reuses building or other materials for secondary uses)
☐ Private buy-back center (Center where individuals can bring recyclables for payment)
☐ Residential curbside pickup (Recyclables collected from private residences)
☐ Other general provider (e.g., paper, plastics, glass)
☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

**Facility or
Organization 2**

Name:

Email, Address, and/or Phone Number:

Materials Collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center
☐ Commercial recycling service
☐ Repurposing center
☐ Private buy-back center
☐ Residential curbside pickup
☐ Other general provider (e.g., paper, plastics, glass)
☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

**Facility or
Organization 3**

Name:

Email, Address, and/or Phone Number:

Materials Collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center
☐ Commercial recycling service
☐ Repurposing center
☐ Private buy-back center
☐ Residential curbside pickup
☐ Other general provider (e.g., paper, plastics, glass)
☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

NOTE: If you need additional space to complete the list of facilities/organizations and their service type, please make a photocopy of this sheet before filling it out and attach to the back of the questionnaire.

**Facility or
Organization 4**

Name:

Email, Address, and/or Phone Number:

Materials Collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center (Collection site where individuals bring and sort recyclables)
- ☐ Commercial recycling service (Service provided to businesses)
- ☐ Repurposing center (Center that reuses building or other materials for secondary uses)
- ☐ Private buy-back center (Center where individuals can bring recyclables for payment)
- ☐ Residential curbside pickup (Recyclables collected from private residences)
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

**Facility or
Organization 5**

Name:

Email, Address, and/or Phone Number:

Materials Collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center
- ☐ Commercial recycling service
- ☐ Repurposing center
- ☐ Private buy-back center
- ☐ Residential curbside pickup
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

**Facility or
Organization 6**

Name:

Email, Address, and/or Phone Number:

Materials Collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center
- ☐ Commercial recycling service
- ☐ Repurposing center
- ☐ Private buy-back center
- ☐ Residential curbside pickup
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

**Facility or
Organization 7**

Name:

Email, Address, and/or Phone Number:

Materials Collected:

What type of facility/organization is this? Please select all that apply.

- ☐ Drop-off center
- ☐ Commercial recycling service
- ☐ Repurposing center
- ☐ Private buy-back center
- ☐ Residential curbside pickup
- ☐ Other general provider (e.g., paper, plastics, glass)
- ☐ Other specialty provider (e.g., appliances, batteries, electronics, tires)

The following questions ask about financing recycling services in your county.

3. Does your county currently budget funds to support county recycling?

- ☐ No → **Go to Question #4**
☐ Yes

a. (If yes): Please indicate the annual recycling budget amount for Calendar Year 2013.

\$

4. Please estimate the amount of other sources of public and private funding for recycling services or market development activities in your county. If none, please put "0."

Collection fees: \$

Private Grant: \$

Federal Grant: \$

State Grant: \$

Other (specify:): \$

The following questions ask about recycling programs in your county.

5. Does your county maintain a website providing education to the county on recycling?

- ☐ No → **Go to Question #6**
☐ Yes

a. (If yes): What is this website's address?

6. Is other education available to the county on recycling?

- ☐ No → **Go to Question #7**
☐ Yes

a. (If yes): Please describe:

7. Please identify any active organizations or citizen groups supportive of recycling in the county.

- ☐ No organizations or groups

Name:

Email, Address, and/or Phone Number:

Name:

Email, Address, and/or Phone Number:

Name:

Email, Address, and/or Phone Number:

8. Do you have any plans for changing recycling in the county?

- ☐ No → **Go to Question #9**
☐ Yes

a. (If yes): Please describe these plans.

9. Please suggest ideas to increase recycling in Nebraska.

Section B: Stakeholder Information

10. In 2014, four regional meetings will be convened to discuss the results of this inventory and develop strategies to filling any recycling service gaps. Who is the best person in your county to contact for a list of civic officials or stakeholders who may be interested in attending such a meeting?

Name:

Email, Address, and/or

Title:

Phone Number:

Please remember to return any additional documents (additional sheets of recycling operations) with this inventory.

Please use the space below to provide any comments or feedback.

Thank you!

We greatly appreciate the time you have taken to complete this inventory. For your convenience, please use the postage-paid return envelope included in your inventory packet to return your inventory to the Bureau of Sociological Research.

Questions or requests from this inventory can be directed to:

Bureau of Sociological Research

University of Nebraska-Lincoln

301 Benton Hall

PO Box 886102

Lincoln, NE 68588-6102

Phone: 1-800-480-4549 (toll free)

Email: bosr@unl.edu

Nebraska Recycling Study

Recycler Inventory

- For this inventory, there are three main sections (Section A for collectors, Section B for processors, and Section C for end users). You should only complete the sections that are applicable to your organization.
- If information is better or more easily provided by someone else at your organization, please pass this document on to anyone at your organization necessary to provide the requested information.
- If at any time attaching a document to the inventory is an easier way to provide the same information, please feel free to do so by returning that document when sending back the inventory.
- A glossary has been provided on the back of this inventory for correct use of terms.

About Your Business

1. Please indicate if your business does each of the following with recyclable materials.

	Yes	No
a. Collect (haul) recyclable materials	<input type="radio"/>	<input type="radio"/>
b. Process (bale) recyclable materials	<input type="radio"/>	<input type="radio"/>
c. End user (produce a new product or products from recyclable materials)	<input type="radio"/>	<input type="radio"/>

2. Who is the best contact person for issues related to recycling?

3. What is that person's email address?

4. What is your business's phone number?

5. If your business has a website, please provide the URL in the space below.

☐ My business does not have a website

6. In what year was your business established?

7. How many part-time and full-time employees did your business have in 2013?

employees

8. What was your 2013 total annual payroll?

\$

Improving Recycling in Nebraska

9. Please suggest ideas your business has to increase recycling in Nebraska.

10. Please suggest ideas your business has to increase recycling in your area.

11. When thinking about your business's current recycling capacity, how able would your business be to increase capacity?

- ☐ Not at all able
- ☐ Slightly able
- ☐ Somewhat able
- ☐ Able
- ☐ Very able

12. What, if any, obstacles does your business face when collecting, processing, or using recyclable materials?

13. What would your business need to grow?

Collecting Recyclables

14. Does your business collect recyclables?

- ☐ No → Go to Question #18
☐ Yes

Section A: Collectors

15. What was the total tonnage of recyclable materials that your business collected in 2013?

tons

16. Please indicate below if your business collected each type of recyclable material in Nebraska in 2013.

	Did collect	Did NOT collect
a. Newspapers	<input type="radio"/>	<input type="radio"/>
b. Paper	<input type="radio"/>	<input type="radio"/>
c. Cardboard and paperboard	<input type="radio"/>	<input type="radio"/>
d. Aluminum cans	<input type="radio"/>	<input type="radio"/>
e. Tin (steel) cans	<input type="radio"/>	<input type="radio"/>
f. Plastic containers	<input type="radio"/>	<input type="radio"/>
g. Glass bottles and jars	<input type="radio"/>	<input type="radio"/>
h. Yard waste and tree trimming/wood chipping	<input type="radio"/>	<input type="radio"/>
i. Appliances	<input type="radio"/>	<input type="radio"/>
j. Electronics	<input type="radio"/>	<input type="radio"/>
k. Tires	<input type="radio"/>	<input type="radio"/>
l. Lead-acid auto batteries	<input type="radio"/>	<input type="radio"/>
m. Textiles	<input type="radio"/>	<input type="radio"/>
n. Wood waste	<input type="radio"/>	<input type="radio"/>
o. Food waste	<input type="radio"/>	<input type="radio"/>
p. Single stream	<input type="radio"/>	<input type="radio"/>
q. Other, specify: <input type="text"/>	<input type="radio"/>	-----

17. Please list the counties in which your business collects recyclables.

Processing

18. Does your business process recyclables?

- ☐ No → Go to Question #28
☐ Yes

Section B: Processors

19. What is the recycling processing capacity of your business?

tons/year

20. What was the total tonnage of recyclable materials that your business processed in 2013?

tons

Section B: Processors (Continued)

21. Are you able to break down your business's tonnage processed in 2013 by type of material?

- ☐ No → Go to Question #23
☐ Yes

22. How many tons of each type of recyclable material did your business process that was collected in Nebraska in 2013?

	Tons	Did not process
a. Newspapers	<input type="text"/>	<input type="radio"/>
b. Paper	<input type="text"/>	<input type="radio"/>
c. Cardboard and paperboard	<input type="text"/>	<input type="radio"/>
d. Aluminum cans	<input type="text"/>	<input type="radio"/>
e. Tin (steel) cans	<input type="text"/>	<input type="radio"/>
f. Plastic containers	<input type="text"/>	<input type="radio"/>
g. Glass bottles and jars	<input type="text"/>	<input type="radio"/>
h. Yard waste and tree trimming/wood chipping	<input type="text"/>	<input type="radio"/>
i. Appliances	<input type="text"/>	<input type="radio"/>
j. Electronics	<input type="text"/>	<input type="radio"/>
k. Tires	<input type="text"/>	<input type="radio"/>
l. Lead-acid auto batteries	<input type="text"/>	<input type="radio"/>
m. Textiles	<input type="text"/>	<input type="radio"/>
n. Wood waste	<input type="text"/>	<input type="radio"/>
o. Food waste	<input type="text"/>	<input type="radio"/>
p. Other, specify: <input type="text"/>	<input type="text"/>	-----

23. Are the materials you receive from customers separated, comingled or both by type of recyclable?

- ☐ Separated
☐ Comingled
☐ Both

24. Please provide addresses for the processing centers this business operates.

Center Name	Street Address	City, State, Zip
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

Section B: Processors (Continued)

25. Please provide a map of your processing service area if one is available when returning this inventory. If one is not available, please use the space below to describe your processing service area.

- ☐ Attached
☐ Do not have one

26. Do you send processed materials to other processors for further processing?

- ☐ No → Go to Question #28
☐ Yes

27. Where do you take materials for further processing?

Center Name	Street Address	City, State, Zip

Using Recyclables to Make New Products

28. Does your business produce a new product or products from recyclable materials?

- ☐ No → Go to Question #36
☐ Yes

Section C: End-Users

29. What is the recycling end use capacity of your business?

tons/year

30. What was the total tonnage of recyclable materials that your business used to make other products in 2013?

tons

31. Are you able to break down your business's tonnage used in 2013 by type of material to make new products?

- ☐ No → Go to Question #33
☐ Yes

32. How many tons of each type of recyclable material did your business purchase in Nebraska in 2013?

	Tons	Did not purchase
a. Newspapers	<input type="text"/>	<input type="radio"/>
b. Paper	<input type="text"/>	<input type="radio"/>
c. Cardboard and paperboard	<input type="text"/>	<input type="radio"/>

Section C: End-Users (Continued)

32(Continued). How many tons of each type of recyclable material did your business purchase in Nebraska in 2013?

	Tons	Did not purchase
d. Aluminum cans	<input type="text"/>	<input type="radio"/>
e. Tin (steel) cans	<input type="text"/>	<input type="radio"/>
f. Plastic containers	<input type="text"/>	<input type="radio"/>
g. Glass bottles and jars	<input type="text"/>	<input type="radio"/>
h. Yard waste and tree trimming/wood chipping	<input type="text"/>	<input type="radio"/>
i. Appliances	<input type="text"/>	<input type="radio"/>
j. Electronics	<input type="text"/>	<input type="radio"/>
k. Tires	<input type="text"/>	<input type="radio"/>
l. Lead-acid auto batteries	<input type="text"/>	<input type="radio"/>
m. Textiles	<input type="text"/>	<input type="radio"/>
n. Wood waste	<input type="text"/>	<input type="radio"/>
o. Food waste	<input type="text"/>	<input type="radio"/>
p. Other, specify: <input type="text"/>	<input type="text"/>	-----

33. Please provide addresses for the manufacturing centers this business operates.

Center Name	Street Address	City, State, Zip
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

34. Please provide a map of your service area (area from which products come to you) for producing new products from recyclable materials if one is available when returning this inventory. If one is not available, please use the space below to describe your end-user service area.

- ☐ Attached
☐ Do not have one

Section C: End-Users (Continued)

35. Please identify end products generated by your business.

	Product Name	Description
Product 1	<input type="text"/>	<input type="text"/>
Product 2	<input type="text"/>	<input type="text"/>
Product 3	<input type="text"/>	<input type="text"/>
Product 4	<input type="text"/>	<input type="text"/>
Product 5	<input type="text"/>	<input type="text"/>

Please remember to return any additional sheets of recycling operations with this inventory.

36. Please use the space below to provide any comments or feedback.

Thank you!

You have reached the end of this inventory. We greatly appreciate the time you have taken to complete this inventory. For your convenience, please use the postage-paid return envelope included in your inventory packet to return your inventory to the Bureau of Sociological Research.

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Bureau of Sociological Research
University of Nebraska-Lincoln
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Lincoln, NE 68588-6102
Phone: 1-800-480-4549 (toll free)
Email: bosr@unl.edu

Glossary

Broker: refers to an individual or group of individuals who act as an agent or intermediary between the sellers and buyers of recyclable materials. (U.S. EPA, 1989)

Collector: refers to public or private haulers that collect nonhazardous waste and recyclable materials from residential, commercial, institutional, and industrial sources. Collectors act as intermediaries between residential, commercial, institutional, and industrial sources and processors. *Also see Hauler.*

Drop Off Center: refers to a method of collection whereby recyclable or compostable materials are taken by individuals to a collection site and placed in designated containers. (U.S. EPA, 1989)

End User: refers to an entity that produces a new product from recycled materials.

Hauler: refers to a public or private waste collection company that provides complete refuse removal services. Many will also collect recyclables. *Also see Collector.* (U.S. EPA, 1994d)

Processors: refers to intermediate operators that handle recyclable materials from collectors and generators for the purpose of preparing materials for recycling (material recovery facilities, scrap metal yards, paper dealers, and glass beneficiation plants). Processors act as intermediaries between collectors and end users of recovered materials.

Recycling: refers to the series of activities by which discarded materials are collected, sorted, processed, and converted into raw materials and used in the production of new products. *Excludes* the use of these materials as a fuel substitute or for energy production. (National Recycling Coalition, 1995)

Textiles: refers to fiber from apparel, furniture, linens (sheets and towels), carpets and rugs, and footwear. (U.S. EPA 1997)