Nebraska: The Tree Planters' State

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Abstract

From the ponderosa pine forests of the Panhandle's Pine Ridge to the hardwood forests of the Missouri River bluffs, Nebraska is rich in tree and forest resources. Early settlers, however, encountered a land with few trees. Nebraskans have planted millions of trees since those early days, earning the nickname The Tree Planters' State in the late 1800s. Today, Nebraska has more than 3 million acres of treed land with 516 million trees that represent at least 39 species. Eastern redcedar (*Juniperus virginiana* L.) is the most abundant, followed by ponderosa pine (*Pinus ponderosa* Lawson and C. Lawson) and green ash (*Fraxinus pennsylvanica* Marsh.). Nebraska has more miles of river than any other State, and nearly two-thirds of its forest land is adjacent to streams and rivers. About 13.3 million trees can be found in Nebraska communities, but that is half of what was present 30 years ago. Several tree-planting programs are under way to reverse this decline. Trees have long been an important component of Nebraskan agriculture, and about 1 million conservation tree seedlings are distributed in the State annually.

Introduction

In the mid-1800s, when the first settlers ventured into the area that is now Nebraska, they encountered a land that was largely void of trees. Trees and forests existed along rivers and streams and in other areas that were protected from frequent prairie fires and were also present in the hills of the State's northwestern corner. Settlers quickly depleted these tree and forest resources. The relative scarcity of trees posed an enormous hardship for settlers—they lacked the materials needed to build homes, barns, wagons, and other everyday items. They adapted in several ways, one of which was to build their homes from Nebraska marble (prairie sod).

Pioneers adapted by planting trees to fulfill other basic needs. Nebraska became known as the Tree Planters' State because residents planted so many trees. When European settlement began, it is likely that trees covered less than 1 million acres, or less than 2 percent of Nebraska's land area. Today, Nebraska has about 3 million acres of land with trees and forests. The increase has occurred because wildfires have been suppressed, forests along rivers and streams have expanded, marginal croplands have been converted to pastures with trees, and because the people who live in Nebraska have planted trees.

Nebraskans have planted woodlots, orchards, firewood plantations, shelterbelts, wildlife habitat, and community forests. Despite a relatively low population, Nebraska is one of the top 10 States in the Nation in the number of communities designated as Tree City USA by the Arbor Day Foundation. In fact, the Arbor Day Foundation was established in Nebraska and has branches in Nebraska City on the eastern border, the Missouri River, and in Lincoln, Nebraska's capital.

Today, trees enhance living conditions on the Great Plains by providing shade, wood products, food, and beauty, and by protecting crops, reducing soil erosion, sheltering farmsteads and livestock, and providing wildlife habitat.

History

Archeologists estimate that humans arrived in Nebraska approximately 10,000 to 25,000 years ago. Before European settlers colonized the Midwest, Native Americans had inhabited the area for thousands of years. The Missouri, Omaha, Oto, and Ponca tribes farmed and hunted along rivers in Nebraska. The Pawnee tribe established agriculture-based settlements along the Platte and Loup Rivers. Wandering tribes, such as the Arapaho and Cheyenne, lived in western and central Nebraska.

In 1803, present-day Nebraska was sold to the United States as part of the Louisiana Purchase. Meriwether Lewis and William Clark were among the first Americans of European descent to visit Nebraska.

Nebraska's first recorded tree planting was by squatter G.B. Lore in 1853. Legal efforts soon followed to encourage more tree planting. Drawn by the promise of free land under the 1862 Homestead Act, many settlers traveled from the East to claim a new life on the Plains. Numerous "timber claims," many of which still exist, were planted by these early settlers to secure legal rights to their homesteaded lands. Early settlers often transported seeds or seedlings hundreds of miles to plant on barren homesteads to protect their homes and crops from the ever-present winds.

Arbor Day, which is celebrated in every State and many foreign countries, began in Nebraska in 1872. According to newspaper reports, Nebraskans planted more than 1 million trees on that one day.

Plantings increased under the Timber Culture Act of 1873, which offered free land to settlers if they planted trees as a part of their homestead (Schmidt and Wardle 1986). Remnants of these homestead plantings remain today throughout Nebraska.

Organized tree distribution began in Nebraska as far back as 1904, when Congressman Moses P. Kincaid introduced a bill (the Kincaid Act) that authorized free distribution of trees west of the 100th meridian. The plan included the western half of Nebraska, and records show that nearly 2 million trees were distributed from the Charles E. Bessey Nursery between 1912 and 1924.

In 1924, the Clarke-McNary Act authorized the U.S. Secretary of Agriculture to cooperate with States to procure, produce, and distribute tree seeds and seedlings to establish windbreaks, shelterbelts, and farm woodlots. More than 100 million Clarke-McNary tree and shrub seedlings were planted for conservation purposes in Nebraska.

The great drought in the 1930s stimulated creation of national programs to plant windbreaks across the Plains to slow the wind and reduce soil erosion. Thousands of miles of windbreaks were planted during this time.

Nebraska's State tree is the eastern cottonwood (*Populus deltoides* Bartram ex Marsh.). This historically significant species provided lumber to construct homes and barns, and to make other improvements. Distinctive trees also served as geographic markers for Native Americans and settlers traveling through the area. Cottonwood is still the primary tree species harvested in the State.

Trees and Nebraska's Economy

Nebraska's forest resources contribute significantly to the State's economy through the harvest and use of commodities, nonmarket environmental services, employment opportunities, and wealth creation. Nebraska's wood products manufacturing industry employs more than 2,300 workers with an output of more than $362 million (Walters and others 2012).

Nebraska's 57 mills processed 4.1 million cubic ft of industrial roundwood in 2006 (Walters and others 2012) (figure 1). More than 89 percent of the industrial roundwood processed by Nebraska mills was cut from Nebraska forests; cottonwood accounted for 83 percent of the total volume processed (Walters and others 2012). Nebraska sawmills processed 19.3 million board ft of saw logs in 2009, a decrease of 16 percent from 2006 (Walters and others 2012). In 2009, 5.6 million cubic ft of wood material was harvested from Nebraska's forests, of which 73 percent was used for primary wood products (Walters and others 2012).

Forest Ownership

Nebraska's forest land is distributed among private owners (85 percent) and public agencies (15 percent). Among private owners are families, corporations, tribes, and associations (figure 2). Although 74 percent of the family forest owners

Figure 1. Cottonwood (shown here), ponderosa pine, and eastern redcedar are the most frequently harvested trees in Nebraska. (Photo from Nebraska Forest Service [NFS], circa 2004).

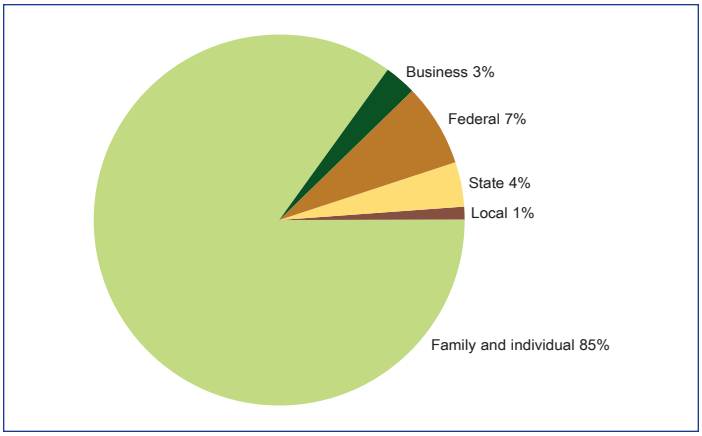

Figure 2. Distribution of Nebraska's forest land by ownership; approximately 85 percent (slightly more than 1 million acres) of Nebraska's forest land is privately owned. (Data source: Meneguzzo and others, 2005).

hold fewer than 10 acres of forest land each, 90 percent of the family forest land is in holdings of 10 acres or greater (Butler 2008).

Nebraska's Forests

Nebraska has 1.5 million acres (607,000 hectares) of forest land, an increase of 200,000 acres (81,000 hectares) since 2005, as defined through the Forest Inventory and Analysis program of the U.S. Department of Agriculture (USDA), Forest Service (figure 3). These forests contain nearly 394 million trees and are a unique mix of vegetation types, including central hardwood forests, ponderosa pine (*Pinus ponderosa* Lawson and C. Lawson) forests, and birch/aspen (*Betula Populus*) forests (Meneguzzo and others 2011). These forest types, combined with elm/ash/cottonwood (*Ulmus*/*Fraxinus*/*Populus*) riparian forests, mixed conifer forests, conservation tree plantings, and urban forests, create a highly diverse and unique array of tree and forest resources growing within an agricultural and range landscape.

In addition to forest land acres, Nebraska has an estimated 1.5 million acres (607,000 hectares) of rural nonforest land (defined as less than 1 acre, less than 120 ft wide, and less than 10-percent stocked), with approximately 119 million live trees across the State. Dominant species in these areas are eastern redcedar (*Juniperus virginiana* L.), Siberian elm (*Ulmus Pumila* L.), hackberry (*Celtis occidentalis* L.), red mulberry (*Morus rubra* L.), and ash *(Fraxinus* spp. L.).

Altogether, Nebraska has approximately 3 million acres (1.2 million hectares) of treed land, including forest land and nonforest land with trees, conservation plantings, and community forests (figure 4).

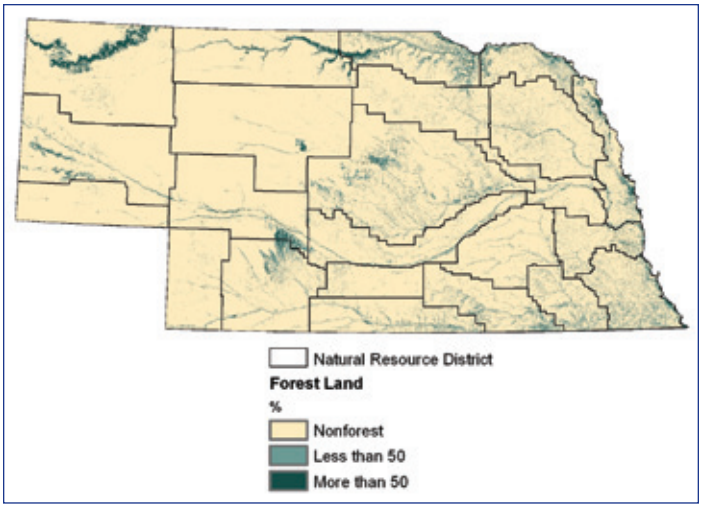

Figure 3. Nebraska's 1.5 million acres of forest land contain nearly 394 million trees. In addition, 1.5 million acres of nonforest land in the State have approximately 119 million trees, with the greatest tree density along the Missouri and Niobrara Rivers and in the Pine Ridge in the Nebraska Panhandle. (Map source: Meneguzzo and others, 2011).

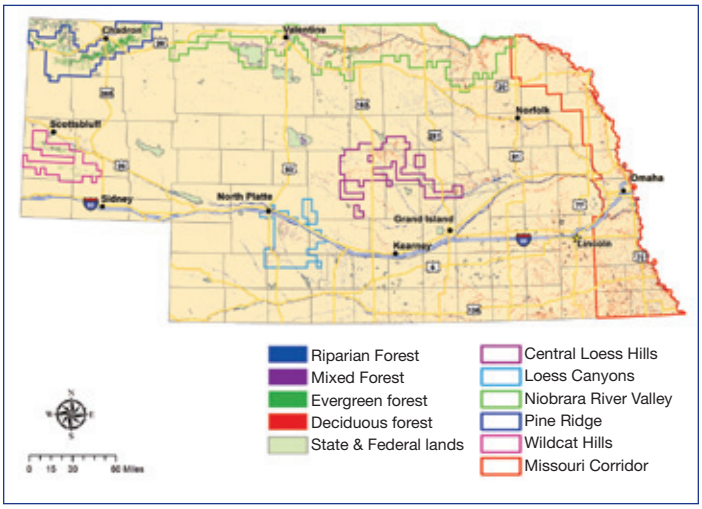

Figure 4. Nebraska's forests and woodland areas extend statewide, from the Pine Ridge in the Panhandle to the Missouri River, which forms the State's eastern border. (Map source: Joe Stansberry, NFS, 2012).

Coniferous Forests

Nebraska's coniferous forests are composed largely of three species: ponderosa pine, eastern redcedar, and Rocky Mountain juniper (*Juniperus scopulorum* Sarg.).

Ponderosa pine is found in the Pine Ridge, eastward along the Niobrara and Snake Rivers, and in other scattered pockets in western Nebraska, such as the Wildcat Hills south of Scottsbluff. North America's easternmost extensions of ponderosa pine occur in Nebraska, with potentially unique genetic adaptations that may be of value in a changing climate. Rocky Mountain juniper (in western Nebraska) and eastern redcedar (in central Nebraska) are common components of ponderosa pine forests.

Eastern redcedar is abundant in Nebraska. It is the predominant species in some forested areas and is a common understory tree in conifer and mixed hardwood forests. Between 1994 and 2005, the area of timberland with eastern redcedar as a dominant species more than tripled to 172,000 acres (69,600 hectares) (Meneguzzo and others 2005).

Transitional Mixed Forests

Nebraska's transitional mixed forests are found along the Niobrara River in the northern part of the State and in the Central Loess Hills in central Nebraska. Six major ecosystems converge in the Niobrara River Valley: northern boreal forest,

ponderosa pine forest, eastern deciduous forest, tallgrass prairie, mixed-grass prairie, and shortgrass prairie. More than 225,000 acres (91,050 hectares) of timberland are in the area, including 83,000 acres (33,600 hectares) of pine forest, 46,000 acres (18,600 hectares) of eastern redcedar, and 96,000 acres (38,850 hectares) of mixed forests (NLCD 2006)—making the Niobrara Valley unlike any other forested area in Nebraska (figure 5).

The Central Loess Hills are a patchwork of eastern redcedar forest, comprising isolated stands of relic ponderosa pines, mixed grass prairie, and cropland. Forest land in the hills includes deciduous, coniferous, mixed, and riparian forests.

Riparian Forests

Nebraska has more than 12,000 miles (19,300 km) of river, more than any other State. The riparian forests along the rivers provide critical habitat and travel corridors for wildlife and protect water by filtering sediment and agricultural runoff, moderating water temperature, stabilizing stream banks, slowing flooding, and contributing to recreational opportunities.

Composed primarily of ash, cottonwood, elm (*Ulmus* spp. L.), red mulberry, hackberry, boxelder (*Acer negundo* L.), sycamore (*Plantanus occidentalis* L.), willow (*Salix* spp. L.), black walnut (*Juglans nigra* L.), and increasingly redcedar, more than 824,000 acres (333,460 hectares) of riparian forests are located in Nebraska (NLCD 2006), a vital component of Nebraska's forest resources. Nearly two-thirds of Nebraska's forest land is adjacent to streams and rivers.

An additional 171,000 acres (69,200 hectares) of narrow, nonforest treed land are situated along riparian areas. These narrow but critically important water buffers separate the riparian and water resources from direct agricultural activities and are the first line of defense against sediment and contaminants entering the water. Nebraska has more than one-half of the total acreage of these nonforest, treed riparian areas across the four-State region of Nebraska, Kansas, North Dakota, and South Dakota. (NFS 2010a).

Community Forests

Nebraska has approximately 470,000 acres (190,200 hectares) of community forests (NFS 2010a). A large and diverse number of tree species are found in the community forests, with the typical forest resource dominated by hackberry, red mulberry, Siberian elm, juniper (*Juniperus* spp.), elm, ash, mixed hardwood, and evergreen species (figure 6). In Lincoln and Omaha, the State's two largest cities, the most common species are Siberian elm, hackberry, eastern redcedar, ash, red mulberry, Scotch pine (*Pinus sylvestris* L.), and mixed hardwood species.

In 2010, Nebraska Forest Service (NFS) inventories and calculations using UFORE (Urban Forest Effects Model) estimated that approximately 13.3 million trees were in Nebraska communities. Collectively, Nebraska's community forests have an average tree cover of 11.3 percent, with a total value of environmental, social, and economic benefits to the State of $9.7 billion.

State Forestry Agency and Properties

The NFS is part of the University of Nebraska system and is administratively located at the University's Institute of Agriculture and Natural Resources. NFS's mission is to provide

Figure 5. The Niobrara River Valley contains 83,000 acres of ponderosa pine, 46,000 acres of eastern redcedar, and 96,000 acres of mixed forests, making it unlike any other forested area in Nebraska. (Photo from NFS, circa 2009).

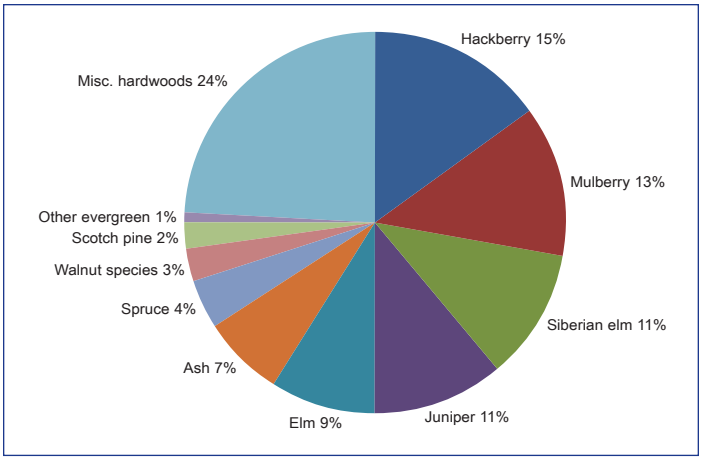

Figure 6. Statewide community forest species in Nebraska. A large and diverse number of tree species are found in Nebraska communities, with the typical forest resource being dominated by hackberry, red mulberry, Siberian elm, and juniper. (Data source: NFS, 2010c).

services and education to the people of Nebraska for the protection, use, and enhancement of the State's tree, forest, and other natural resources.

NFS provides education and services in four core areas: rural forestry, community forestry, forest health, and rural fire protection. The 45 NFS employees at 6 statewide district offices work with partners across the State and nationally to implement a diverse portfolio of programs to sustainably manage Nebraska's trees and forests, to connect people to trees and forests, and to engage them in environmental stewardship.

NFS owns three properties—Horning Farm State Demonstration Forest, Timmas Farm Ecological Forest Reserve (both located in southeast Nebraska), and Cedar Canyon State Demonstration Forest in southwest Nebraska.

The 240-acre (97.1-hectare) Horning Farm is a beautiful mosaic of grass fields, native forests, and former research tree plantations that is being transformed into a regional woodland owner education center. The center will serve forest landowners, acreage owners, and agricultural producers in a four-State area by demonstrating management practices, including high-value timber and specialty forest product production, oak (*Quercus* spp.) regeneration, wildlife habitat, and animal damage management. Portions of the property will be converted to oak savanna, as well as a commercially viable nut and woody floral agroforestry production system. The site also is testing new cultivars of highly productive, disease-resistant hybrid hazelnuts, an emerging perennial nut crop for food, animal feed, oils, and biofuel.

The newly acquired Timmas Farm is 120 acres (48.6 hectares) of natural forest land located in bluffs adjacent to the Missouri River. The farm will serve as a natural area and be used for horticultural research involving genetics and plant breeding programs at the University of Nebraska–Lincoln.

Cedar Canyon State Demonstration Forest, Nebraska's only State forest, is 640 acres (259 hectares) of western rangeland containing forested canyons and steep uplands with green ash, hackberry, cottonwood, and eastern redcedar trees, along with 100 acres (40.5 hectares) of cropland. The forestry objectives and demonstration interests at Cedar Canyon focus on management strategies for forested rangeland and the benefits of windbreaks on crop production and soil conservation.

Challenges to Nebraska's Trees and Forests

Nebraska's forests face wide-ranging threats—from wildland fire to destructive invasive insects and diseases to climate change and increasing urbanization.

Fire

Catastrophic wildland fire is perhaps the greatest threat to Nebraska's coniferous forests and is an emerging threat in riparian areas succeeding to Russian olive (*Elaeagnus angustifolia* L.) and eastern redcedar (which form a dense, fire-prone understory). Several trends combine to intensify the already severe conditions—increasing forest fuel loads, expansion of housing into wildland forest areas, increasing temperatures, drier conditions, and longer fire seasons.

For years, low-intensity wildfires burned across Nebraska's forest landscape, cleaning up the forest floor and removing much of the brush and litter than can fuel a fire. These fires were mostly surface fires and didn't spread into tree canopies. But in recent years, as more people move into rural, forested areas in western Nebraska, most fires have been suppressed and fuel loads have increased to unnatural levels. Debris has accumulated on forest floors, and brush and small-diameter trees have become established in forest understories, creating "ladder fuels" that serve as pathways for ground fires to become dangerous, highly destructive crown fires. The result has been high-intensity, stand-replacing fires in the Pine Ridge, with more than 126,000 acres (51,000 hectares) of forest (about 50 percent) converted to grassland since 1973.

The NFS has provided more than $4 million in cost-share funds to reduce fuel loads in the Pine Ridge. In 2009, NFS secured a $50,000 Arbor Day Foundation grant to plant 61,000 trees in Chadron after a fire that destroyed the native ponderosa pine forest near Chadron State College. Most of the trees were machine planted, but 35 Chadron community groups hand-planted about 12,000 trees in the effort. Participants said it was an important step in recovering from the devastating fire that took a heavy toll on the town.

Invasive Insects and Diseases

Nebraska's forests face a potential barrage of insect, disease and invasive and aggressive native plants that, if left unmanaged, will cause widespread damage to trees and forests.

EAB—Emerald ash borer (EAB) is a significant emerging threat to Nebraska's trees. Although EAB has not yet been found in the State, it is within 75 miles (121 km) of the border. When it arrives, EAB is expected to kill Nebraska's 42 million ash trees (about 20 percent of the trees in the State) and cost billions of dollars in removals and replantings.

Thousand Cankers Disease—Thousand cankers disease of black walnut has caused widespread tree mortality in Western States. The NFS is conducting street-side surveys in an effort

to prevent introduction of thousand cankers. Outreach projects have been conducted within the State and more are underway with foresters from Colorado and Kansas. A statewide quarantine on walnut is in place.

A pest-detector program engages citizen volunteers and professionals in efforts to detect EAB and thousand cankers disease. Since its inception, trained volunteers have surveyed 363 sites in 35 counties. These surveys have greatly expanded the ability to monitor for pests while increasing awareness of the serious threats these pests pose to rural and community trees.

Pine Wilt—Pine wilt is causing Scotch pine, a popular tree for ornamental plantings, windbreaks, and Christmas tree farms, to disappear from Nebraska's landscape. The disease is common in the southeastern part of the State, but is spreading west and north.

Diplodia Blight and Mountain Pine Beetle—Two additional threats to pine in Nebraska are diplodia blight and mountain pine beetle. Diplodia blight has killed thousands of planted Austrian pine (*Pinus nigra* Arnold) and ponderosa pine trees in eastern Nebraska and native ponderosa pines in the Pine Ridge and Niobrara River Valley.

Small, scattered pockets of trees infested with mountain pine beetle are found in the Pine Ridge and Wildcat Hills in western Nebraska. Planted pines in windbreaks and communities also are affected. With more than 250,000 acres (101,200 hectares) of ponderosa pine in the State, mountain pine beetle poses a substantial and deadly threat to Nebraska's forests.

Invasive Plants and Aggressive Native Plants

Invasive plants and aggressive native plant species threaten to dramatically alter native ecosystems by outcompeting more desirable species. Purple loosestrife (*Lythrum salicaria* L.), saltcedar (*Tamarix ramosissima* Ledeb. and *T. parviflora* DC), and phragmites (*Phragmites australis* spp. Australis) all threaten the integrity of Nebraska riparian ecosystems.

Other invasive species that are becoming serious threats to the ecological stability of hardwood forests in eastern Nebraska are honeysuckle (*Lonicera* spp. L.), buckthorn (*Rhamnus* spp. L.), and Japanese barberry (*Berberis thunbergii* DC).

Of particular concern are Russian olive and eastern redcedar. Both are valued as conservation plantings, but they multiply profusely and can quickly overtake pastureland, forest land, and riparian areas.

To protect at-risk forests, NFS is using geospatial technology to identify areas that are overly dense with invasive and aggressive native species that would benefit from proactive management. Thus far, analyses have been conducted in the Niobrara Valley, Pine Ridge, and Platte River Valley.

Climate Change

With hot summers, cold winters, late spring and early fall freezes, fluctuating rainfall, frequent severe winds, and ice storms, Nebraska is a tough place for trees to survive. Scientists project that temperatures will continue to increase this century, with summer climate changes predicted to be larger than winter changes (Christensen and others 2007). The anticipated effects of climate change on trees in Nebraska are reduced productivity; greater risk of wildland fire; and irregular flows along riparian systems, which will alter water availability. These could lead to changes in agricultural systems, alteration of habitats, and proliferation of some invasive species. (Karl and others 2009).

Deer

The Nebraska Game and Parks Commission estimates that Nebraska's whitetail deer population grew from 11,200 in 1959 to 288,000 in 2008, due largely to hunting restrictions. High deer populations are affecting forest regeneration. Trees protected either by thorns (honeylocust [*Gleditsia triacanthos* L.], Osage-orange [*Maclura pomifera* Raf. C.K. Schneid.], Russian olive) or an undesirable taste (cedar, Siberian elm), have become established in areas with large numbers of deer. Regeneration of other, more desirable species, is rare or absent in these areas.

Urbanization

In 2007, the U.S. Census Bureau estimated Nebraska's population to be slightly more than 1.75 million, making it the 38th largest State. More than one-half of Nebraska's people live in three eastern counties.

Long-term growth trends show increasing urban populations and continued decline in many rural counties in central and western Nebraska. Growing urban populations are creating the need for sustainable community forestry programs and implementation of green infrastructure into community planning practices. Declining rural populations are expected to lead to reduced budgets in rural communities, which could translate to cuts in local forestry programs.

Perception of the Value of Trees and Forests

In rural areas, increasing crop and agricultural land prices and drought negatively affect people's perception of the value of forest resources. As crop prices increase, conservation plantings (e.g., windbreaks and riparian buffers) often are removed to increase acres in crop production. Drought often leads to producers in stricken areas removing trees to eliminate the perceived competition for water between trees and crops.

Since 1984, the number of trees planted in conservation practices has declined from 3.5 million annually to slightly more than 1 million annually.

Charles E. Bessey Nursery

In 1902, the Charles E. Bessey Nursery was established in north central Nebraska as part of the Dismal River Forest Reserve to provide tree seedlings for the USDA Forest Service's Bessey Ranger District near Halsey. Named for Charles E. Bessey, a horticulture professor at the University of Nebraska whose vision of a forest growing in the Nebraska Sandhills prompted its creation, Charles E. Bessey is the longest continuously operating USDA Forest Service nursery in the Nation and is on the National Register of Historic Places. Until fire destroyed 40 percent of it in the mid-1960s, Nebraska had one of the largest planted forests in the country, some 32,000 acres (12,950 hectares) near Halsey. Charles E. Bessey Nursery and the forest surrounding it are part of the Nebraska National Forest.

Today, the Charles E. Bessey Nursery comprises 46 irrigated acres of bareroot crops and five greenhouses for container crops (figure 7). All of the Charles E. Bessey Nursery stock is used to supply USDA Forest Service forests, including Bighorn National Forest in Wyoming and Arapaho-Roosevelt National Forest in Colorado. Annual production at the Charles E. Bessey Nursery is 2.5 to 3.0 million seedlings, including conifers (spruces [*Picea* spp.], pines, redcedar, and Rocky Mountain juniper), broadleafs (maples [*Acer* spp.], oaks, black cherry [*Prunus serotina* Ehrh.], walnut, cottonwoods, hackberry, Harbin pear [*Pyrus ussuriensis* Maxim.], honeylocust, ash, lilac [*Syringa vulgaris* L.], crabapple [*Malus* spp.], and Kentucky coffeetree [*Gymnocladus dioicus* L.K. Koch]), and shrubs (American plum [*Prunus americana* Marsh.], chokecherry [*Prunus virginiana* L.], redosier dogwood [*Cornus stolonifera* Michx.], willow, viburnums [*Viburnum* spp.], black elderberry [*Sambucus nigra* L.], golden currant [*Ribes aureum* Pursh], sandcherry [*Prunus pumila* L.], serviceberry [*Amelanchier* spp.], sumac [*Rhus glabra* L.], and snowberry [*Symphoricarpos albus* (L.) S.F. Blake]).

Figure 7. Charles E. Bessey Nursery, the Nation's oldest Federal tree nursery, distributes about 3 million seedlings annually. (Photo from NFS, 2005).

Restoration and Tree Planting Programs

Conservation and Agroforestry Plantings

Trees have long been an important component of Nebraska agriculture. Windbreaks increase crop yields, reduce soil erosion, protect livestock from weather extremes, and protect rural homes (figure 8). Riparian forest buffers filter agricultural runoff and sediment, thereby protecting water quality. Farmers who incorporate conservation plantings into traditional row-crop systems benefit from increased crop yields and reduced soil erosion. Furthermore, conservation trees enhance the quality of life and add beauty and value to farm homes and the rural landscape.

Figure 8. Nebraska's 423,098 acres of windbreaks and planted riparian forests generate millions of dollars in economic benefits annually by fostering higher crop yields, improved vigor during spring calving, and reduced energy consumption on farms and acreages. (Photo by Dan Ogle, USDA Natural Resources Conservation Service [NRCS], 1992).

From 1926 through 2002, the NFS administered the State's conservation tree seedling distribution program (figure 9). Since 2002, seedling distribution has been coordinated by the Nebraska Association of Resources Districts with each Natural Resource District (NRD) administering its local tree program. Approximately 1 million conservation tree and shrub seedlings are distributed by Nebraska's 23 NRDs each year.

The Nebraska program is unique because no State or private nurseries provide conservation seedlings. The primary source of conservation seedlings for Nebraska is the USDA Forest Service's Charles E. Bessey Nursery.

The NFS's Rural Forestry (Forest Stewardship) Program plays a central role in helping landowners plant and manage trees for conservation purposes. Since 1991, NFS foresters have developed 936 forest stewardship plans placing 123,887 acres of private forest lands under management (NFS 2010b).

In 2010, NFS identified high-priority forest landscapes based on geospatial analyses, relevant and important nongeospatial data characterizing the value of the particular forest landscape, and the seriousness and complexity of issues affecting the area.

By identifying and then concentrating resources and programming in priority landscapes, NFS will help achieve landscape-level conservation, improving the natural resource base and the lives of people who depend on these resources. Geographic concentration helps to ensure that scarce resources are focused on targeted areas (figure 10).

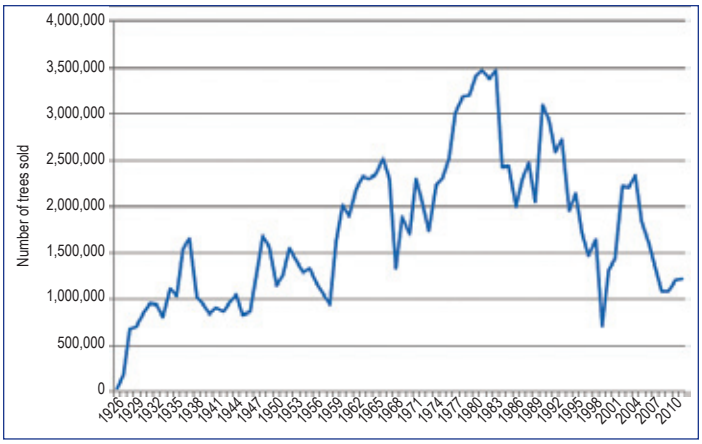

Figure 9. Number of trees sold annually through Nebraska's conservation tree seedling distribution program. Nearly three decades ago, the program sold 3.0 to 3.5 million trees annually for windbreaks, wildlife habitat, water-quality protection, and soil-erosion control. Since 2005, the number has dropped to about 1 million trees sold annually. (Data source: NRCS Progress Reporting System 2011, unpublished).

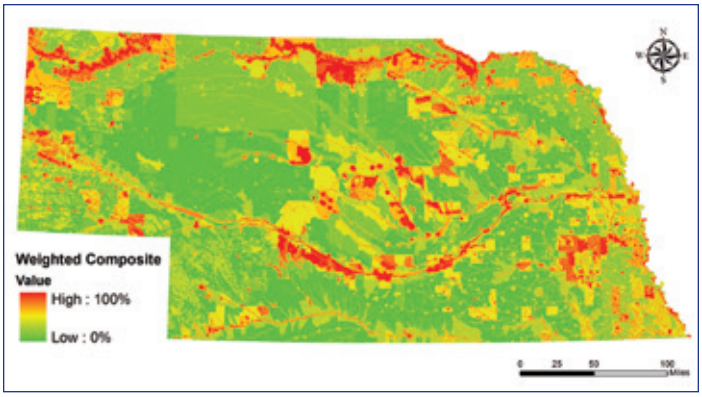

Figure 10. Nebraska Priority Forest Landscapes identified in 2010 for concentration of resources and programming to targeted areas. (Map source: NFS, 2010c).

ReTree Nebraska

Nebraska has lost nearly one-half of its community forests in the past three decades because of severe weather, drought, poor planting practices or species selection, insect and disease pests, and an aging tree population. To reverse this decline, NFS created ReTree Nebraska, a cooperative initiative to properly plant and maintain 1 million community trees by 2017 (figures 11 and 12). Raising awareness of the substantial value of trees and forests is an integral part of ReTree Nebraska's efforts. Nearly 300 volunteer ambassadors in 112 Nebraska communities work tirelessly to coordinate tree planting and educate citizens about the economic, environmental, social, psychological, and physical value of trees.

In collaboration with more than 20 participating nurseries across Nebraska, ReTree promotes the importance of diversity in the landscape by developing a list of underplanted species (figure 13). Among the current list, "12 for 2012," are bald-cypress, (*Taxodium distichum* L. Rich.*)*, northern catalpa (*Catalpa speciosa* [Warder] Warder ex Engelm.), Kentucky

Figure 11. ReTree Nebraska is a 10-year initiative by the Nebraska Forest Service to plant 1 million trees across the State. The group in this photo, which includes Nebraska's First Lady Sally Ganem (right of the banner), planted a maple tree on the State Capitol grounds on Arbor Day 2012. (Photo from Nancy Evans, NFS, 2012).

Figure 12. This tree, planted in Gering, NE, on Arbor Day 2012, will be counted toward ReTree Nebraska's 1-million-tree goal. (Photo from NFS, 2012).

coffeetree, chinkapin oak (*Quercus muehlenbergii* Engelm.), bur oak (*Q. macrocarpa* Michx.), English oak (*Q. robur* L.), Shantung maple (*Acer truncatum*), and Miyabe maple (*A. miyabei* Maxim.).

ReTree Nebraska Week is celebrated during the final full week of September to raise awareness of the opportunity to plant trees during the fall. Tree plantings and workshops are held statewide in conjunction with Nebraska Statewide Arboretum tours.

Greener Nebraska Towns

Started in 2011, the goal of Greener Nebraska Towns is to significantly improve the green infrastructure in communities across Nebraska. For the first phase, 8 communities were targeted to receive funding and technical assistance to plant 300 trees, implement waterwise landscaping, and conduct targeted education over the next 3 years.

Trees for Nebraska Towns

Trees for Nebraska Towns (TNT), funded by the Nebraska Environmental Trust, was developed to address tree loss; restore forest canopy; and improve overall health, sustainability, and species diversity of Nebraska's community trees. Coordinated by the NFS on behalf of the Nebraska Statewide Arboretum, it is part of ReTree Nebraska's efforts to plant 1 million trees in the State. In 2011, more than $250,000 was awarded to 36 projects in 25 communities. Over the past 5 years, TNT has awarded more than $1.1 million and planted more than 7,000 large-growing shade trees and appropriate companion plants across Nebraska.

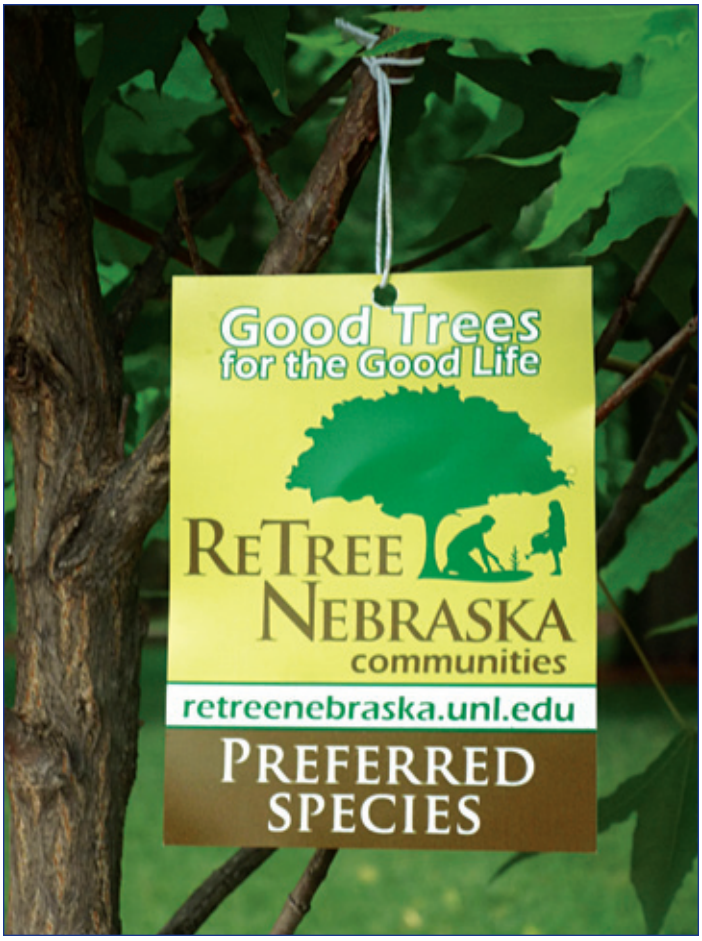

Figure 13. Tree species listed on ReTree Nebraska's "12 for 2012" recommended list of underplanted species are identified in nurseries by this hang tag. (Photo by Jessica Kelling, NFS, 2008).

Combined, these and other tree-planting programs result in 6,300 to 10,000 trees being planted in Nebraska's Tree City USA communities each year.

Community Enhancement Program

The Nebraska Community Enhancement Program (CEP), a collaborative program among NFS, the Nebraska Department of Transportation, and the Nebraska Statewide Arboretum, was a highly successful tree-planting program funded by Federal transportation dollars between 1994 and 2010, when it ended as a result of Federal program priority changes.

CEP funded more than 572 projects that resulted in thousands of trees being planted in 214 Nebraska communities. By planting large-maturing trees like oaks and elm hybrids and landscape accents of shrubs, perennials, and native grasses, the program made long-term effects on public property along transportation corridors including roadways, streets, parking lots, community entryways, and nonloop trails.

Cottonwood Restoration

NFS, along with The Nature Conservancy and other partners, is beginning work to restore cottonwood gallery forests along the Missouri River. Years of human alteration of the river have eliminated or degraded much of the cottonwood ecosystem, which at one time was the dominant species in the Missouri watershed. Existing cottonwood stands are largely over-mature and declining trees, and natural regeneration has essentially ceased.

NFS will restore 300 acres (120 hectares) of cottonwood forests as a demonstration project funded by the USDA Forest Service. The sites will showcase restoration methods and costs, economic analysis, and educational outreach for landowners and resource professionals. The hope is that this project will catalyze similar efforts on thousands of acres of cottonwood forests along the Missouri River.

Outlook

Nebraska has a rich tree-planting heritage, but the State's trees and forests are experiencing significant challenges—tree mortality is increasing as a result of disease and invasive pests, wildfires are increasing in size and severity, ecosystems are struggling to adapt to climate change, rural economies are declining, and forest land is being permanently converted to nonforest use.

An array of diverse agencies (among them NFS, the USDA Natural Resources Conservation Service, and Natural Resources Districts in Nebraska) are growing increasingly concerned about the continuing and accelerating losses of conservation trees and the relatively low level of tree planting. With a growing consortium of high-level support among key agencies, opportunities are emerging for multiagency collaborative action that would change public policies that support deforestation, design and launch public education programs focusing on the value and benefits of conservation plantings, and seek external dollars to support additional conservation tree planting.

Tree and forest advocates across Nebraska continue working to educate citizens about the economic, environmental, social, psychological, and physical value of trees to continue the State's tree-planting legacy for current and future generations.

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