



## Fifty Years on the Nebraska National Forest

(Article begins on page 2 below.)

This article is copyrighted by History Nebraska (formerly the Nebraska State Historical Society). You may download it for your personal use.

For permission to re-use materials, or for photo ordering information, see:

<https://history.nebraska.gov/publications/re-use-nshs-materials>

Learn more about *Nebraska History* (and search articles) here:

<https://history.nebraska.gov/publications/nebraska-history-magazine>

History Nebraska members receive four issues of *Nebraska History* annually:

<https://history.nebraska.gov/get-involved/membership>

Full Citation: Raymond J Pool, "Fifty Years on the Nebraska National Forest," *Nebraska History* 34 (1953): 139-179

Article Summary: A presidential proclamation created the Nebraska National Forest in 1902. Against all odds, determined supporters grew a hand-planted forest in the Sandhills. Since the 1920s ranchmen and farmers have been able to order and plant seedlings cultivated there.

### Cataloging Information:

Names: Charles Edwin Bessey, William L Hall, Gifford Pinchot, Charles A Scott, Carl Hartley

Nebraska Place Names: Halsey, Sandhills, Lake Bruner, Swan Lake

Tree Species: Ponderosa pine, Austrian Pine, jack pine, Scotch pine, Ponderosa pine, eastern red cedar, Colorado blue spruce, Douglas fir, Norway pine

Keywords: Nebraska National Forest, Bessey Nursery, grazing, refuges, University of Nebraska Department of Forestry, Clarke-McNary Tree Distribution Act (1924), 4-H Forestry Clubs

Photographs / Images: Charles Edwin Bessey; outline Nebraska map showing the counties of the Nebraska National Forest; view southward from north of Middle Loup River; Jack pine forest, planted 1917; view over the Sandhills looking south from Scott's lookout, 1918; large "blowout" in the Nebraska National Forest, 1918; view eastward down the Middle Loup Valley toward Halsey, 1918; two sections of Bessey Nursery, 1915; tractor-drawn Nebraska tree-planting machine, 1946; forested hills planted in 1903, photographed in 1952



Dr. Charles Edwin Bessey, 1845-1915, professor of botany at the University of Nebraska, 1884-1915. Dr. Bessey was the inspirational leader of the movement that secured a proclamation from President Theodore Roosevelt establishing the Nebraska National Forest. (Photo by Townsend.)

## FIFTY YEARS ON THE NEBRASKA NATIONAL FOREST

BY RAYMOND J. POOL

A NOTEWORTHY celebration was held near Halsey, Thomas County, Nebraska, on September 14, 1952. At that place and time the Golden Anniversary of the Nebraska National Forest was commemorated. A large company of visitors was present on that crisp, colorful, autumn afternoon for a formal program that featured state and federal officials. Special exercises and trips of inspection had marked the four previous days for farmers and ranchers, veteran's organizations, women's clubs, garden clubs, Boy Scouts, Girl Scouts, 4-H Clubs, and FFA Clubs.

Hundreds of people came from far and near for the final day of the celebration. Many came in family groups and other parties and had their picnic lunches on the grounds. The details of the day had been carefully organized by the staff of the Forest. Among the interesting features of the morning were numerous conducted tours that went through the large forest nursery and drove through the forest under the direction of special guides

*Dr. Raymond J. Pool is professor of botany, emeritus, at the University of Nebraska. This paper is an expansion of an address given at the golden anniversary celebration of the Nebraska National Forest, September 14, 1952.*

with loud-speaker equipment. Parking of the large number of cars was efficiently directed by a picturesque corps of local men on horseback. There were also distinctive souvenirs for the crowd, an information booth, and a lunch stand that was operated by local women. One of the most interesting attractions was an exhibit of appropriate elements that had been prepared by the local staffs of the U. S. Forest Service, U. S. Soil Conservation Service, Extension Forester of the College of Agriculture, University of Nebraska, the Nebraska Game, Forestation, and Parks Commission, and the Commercial Nurserymen's Association of Nebraska.

The afternoon program on the final day of the celebration was opened by Mr. Russel K. Smith, Forester in Charge of the Nebraska National Forest, who welcomed the guests and presented a statement of the significance of the occasion. Mr. Smith then introduced Mr. George Round, Director of Public Relations of the University of Nebraska, who served as Master of Ceremonies. The speakers on the formal program were Mr. Charles A. Scott, who was in charge of the Forest at its beginning in 1902, and the first Forest Supervisor, serving through the early years of the Forest; Dr. Raymond J. Pool, professor of botany, emeritus, the University of Nebraska, who had been familiar with the development of the Nebraska National Forest from its inception, and who spoke on the history of the Forest; Mr. Chet Marshall, of the Nebraska Commercial Nurserymen's Association; Mr. Everett Barr, Area Vice-President, Soil Conservation Districts; Mr. Donald E. Clark, Regional Forester, Region 2, U. S. Forest Service, Denver, Colorado; and Dr. Richard E. McArdle, Chief, U. S. Forest Service, Washington, D. C., whose address, entitled, "Fifty Golden Years," was inspired by his visit to the Forest and the examination of a cross-section of one of the pine trees that had grown on the Forest. The official souvenir program of the day was printed on the first and only paper made from Nebraska woodpulp, manufactured by the U. S. Forest Service, Forest Products Laboratory, Madison, Wisconsin, from wood supplied from the Nebraska National Forest. The Golden Anniversary

observance was sponsored by the Nebraska Farm Forestry Committee, Mr. Earl G. Maxwell, Extension Forester, Chairman.

### PIONEER AGITATION AND PROGRESS

The thought of a national forest in Nebraska brings forth many questions from the citizens of our state. The location and the origin and nature of such an area are of great interest to our people here at home and to others, even in distant lands. Such interest is at once greatly intensified when one learns that the forest is in the heart of the Nebraska Sandhills. The casual American, if he thinks he knows anything at all about our state, is likely to understand that the Sandhills region is still a part of that great unclaimed and uncongenial area that was known, years ago, as the "Great American Desert." Such persons visualize the place as being a vast, uninhabited waste of bare, wandering sand dunes, across which the constant winds drive their punishing blasts throughout the year. That trees actually grow there, or that forests could be successfully established there, seem impossible and even quite fantastic to such poorly informed persons.

It is said that the laws of aerodynamics appear to teach that the bumble-bee is unable to fly. The size, the weight, and shape of the bee's body, in relation to the total wing-spread, make flying impossible on the part of that interesting creature, according to such engineering concepts. But, nevertheless, the bumble-bee, being quite ignorant of scientific principles, goes ahead and flies, anyhow, and very successfully. Now, likewise, the principles of biological dynamics shed grave doubt upon the possibilities of tree growth in the sand-dune areas of the world. The dry surface sand, the desiccating atmosphere, the wind, the high temperature of such an environment would seem to bar the trees from invading the Sandhills or succeeding in such areas, even if they were planted. Nevertheless, it is known that certain species of trees, both broadleaf and

needleleaf types, occur quite naturally and widely in the Nebraska Sandhills. The successful, natural growth of such trees within that fascinating region, is, in other words, another challenge to the impossible.

The initial establishment and the continued fruition of the Nebraska National Forest for fifty years is a magnificent testimony of the understanding and farsightedness of certain early students of natural conditions in Nebraska. The relative treelessness of the state was, perhaps, the most striking natural drawback in the view of the early settlers of the western prairie a hundred years ago. Those pioneers came from the forested states of the East and so it was quite natural and necessary that they become ardent boosters for the planting of trees on the prairie uplands of Nebraska. The planting of any kind of trees on the prairie, even the best or most hardy species, far back from the sheltered stream courses, is always uncertain of success. But the hardy newcomers were not to be defeated by mistakes and disappointments. Nebraska soon became known as the "Tree Planters State." Extensive tree planting was widely encouraged by certain "timberclaim" laws of 1873. Arbor Day was soon decreed and at once became a major stimulus in our developing new state. And then there came the "Father" of the Nebraska National Forest.

Professor Charles Edwin Bessey is properly called the "father" and major factor in the interesting activities that eventually led to the establishment of this unique reservation by presidential decree. Dr. Bessey was born in Ohio and studied at Michigan State College at East Lansing, and at Harvard University. He taught at Michigan State, and later (1870-1884) at Iowa State College at Ames. He had seen the pine forests of Michigan growing where the soil was very sandy, and these observations made a lasting impression upon him. He came to the University of Nebraska as professor of botany and horticulture in 1884, and at once began a state-wide investigation of the plant life of the state. He traveled widely throughout the state, always gathering data and bundles of specimens of the grasses, trees, and shrubs that he saw.

Bessey was especially interested in the vegetation of the Sandhills from the very beginning. He soon noted that the sandy soil throughout that great grassy domain was always moist a short distance beneath the surface. He recalled the conditions prevailing in the Michigan forests, wherever the soil was sandy, as in the sandiest places in the Sandhills of Nebraska. It seemed to him "quite likely" that the moist soil of the Sandhills would bear forests, once the trees were planted. Later he discovered a few native Ponderosa pine trees and Red Cedar trees in widely scattered areas in our sand hill region. As he continued his researches and the idea of afforesting the Sandhills became better and better formulated and strengthened by later observations he began to urge the experimental planting of pine trees in the region. He made successive reports and recommendations upon these matters to various interested local groups before 1900. He also urged the U. S. Department of Agriculture to initiate planting experiments in the sand hills, since there was still much federally owned land in the region. His suggestions to Washington were met with indifference, and afforded only disappointment. But Bessey would not give up the "big idea" of reforesting the Sandhills. His persistence reminds one of a similar attitude displayed by the great Herschel, the astronomer, and his sister, who doggedly kept at their telescopes in spite of devastating opposition and discouragement. The attitude is reflected in the Herschel epitaph, "Those of us who have spent so much time with the stars are not afraid of the dark."

Bessey never lost faith or enthusiasm in the firm conviction that pine trees would do well in the Nebraska Sandhills once they were planted. His ideas, even here, were not at all popular. He met local opposition; he thundered against federal coolness. Farmers and ranchmen were opposed to the proposal because they felt that there were already an abundance of forest products to be secured elsewhere, and that trees would never grow, even if planted in the Sandhills. Besides, they wished to preserve the forage supply of the hills for their herds. Politicians and scientists of local and national stature ranked

themselves against any such measures. But Dr. Bessey was not to be stilled by any sort of opposition, whether local and puny or federal and powerful.

The Nebraska National Forest has had, over the years, many extremely active and influential friends and boosters, outside the officials and others directly concerned with its program. We are especially pleased, in this connection, to record the names of the late U. S. Senator George W. Norris, U. S. Senator Hugh Butler, and Dr. George E. Condra, of the University of Nebraska, long actively associated with the conservation movement in the United States. Dr. Condra often contributed his characteristic, vigorous support of the objectives of the Nebraska National Forest at times when such interest was especially effective.

It was probably due to the fact that he continually made so many people miserable about the planting of pine trees in the Sandhills that Bessey's appeal was finally rewarded with a peculiar form of reaction in Washington that, in the end, resulted in the creation of the Nebraska National Forest. The government, perhaps in desperation, finally took the initial steps that, years later, led to the establishment and the success of this great project. Nothing, neither the insidious local chiseling nor the powerful lobby in Washington, could indefinitely postpone the great and unique effort, once initial plantings had proved successful.

The most significant of the early private pine plantations in the sand hills was the one that was established in southwestern Holt County in 1891. This plantation was made under such unusual and peculiar circumstances, and with aid from the federal authorities in Washington, that, as Dr. Bessey said, "would end the long-continued agitation in such a manner as to discourage every further attempt to reforest the Nebraska sand hills." I am happy, at this place, to record the statement of Professor Bessey, in an unpublished manuscript dated June 1, 1912, concerning the origin of the famous Holt County plantation.

In the spring of 1891, the attention of Dr. B. E. Fernow having been called to the matter, he sent me word late in the spring that he was ready to make the experiment of planting pines in the Sandhills, if I would furnish him with



the land for such purposes. I was considerably provoked over the matter as my duties here at the University made it entirely impossible for me to take care of a project like this. I had never owned any sand hill property and did not know where to turn to find a tract which could be turned over to Doctor Fernow's use. I expressed myself rather emphatically as I walked up and down the corridors of Nebraska Hall. Finally I stepped into Professor L. Bruner's office (then in Nebraska Hall) and he promptly said to me that he thought he could furnish the sand hills such as Doctor Fernow required. A little inquiry developed the fact that Professor Bruner and his brothers had taken up some land in southwestern Holt County and it turned out to be right in the sand hill country. Accordingly I was able to answer Doctor Fernow's challenge by saying that if he sent on the trees they would be cared for. He did so rather late in the spring and Professor Bruner's brother took charge of the work under the direction of Doctor Fernow. Several plats were laid out and treated somewhat differently. One of the plats was plowed up in the usual way and the planting made on the plowed land. The other plats were merely furrowed at the time of planting, the trees being planted in the bottom of the narrow furrow made by running a plow through the grass at the time of planting.

At the end of the first year no trees were left on the plat which had been plowed up as the wind blew away the sand and left nothing but a "blow out." On the other plats the Western Yellow Pine and the Jack Pine trees survived and the reports were favorable. After several years, however, the plantation dropped out of public sight and no further reports were made. We supposed, as probably did everybody else who knew of the original planting, that the trees had disappeared and that we had simply one more case of the wreck of tree planting such as were familiar to us in the days of the forest homesteads, known as "tree claims."

Eight or ten years passed and during this time my reports to the state Board of Agriculture and other similar bodies contained reiterations of my suggestions that pines should be planted in the Sandhills. At last, in 1901, Mr. Pinchot, then Chief of the Bureau of Forestry in Washington, sent out a party of foresters to make a careful investigation of forest conditions in Nebraska. The party was under the direction of Mr. William L. Hall and he and his men traveled over the state from the Missouri River to the Wyoming line, examining open land, rough canyon land and also the fringes of forest trees along the streams. They penetrated the Sandhills at different places and in this way obtained a very good notion as to the conditions throughout the state.

During this time Mr. Hall made my office in Nebraska Hall his headquarters and one day he came in and made inquiry about a plantation of pines in Holt County about which he had read in some early reports of the State Horticultural Society. This called to mind the plantation I have spoken of above, and I told him what I knew of the matter but said that I supposed by this time that the whole plantation had disappeared. He made sufficient

inquiry, however, of others including Professor Bruner, to warrant him in determining to visit the spot and to see for himself what had happened there. I confess to have been quite troubled over the fact that Mr. Hall was to visit this plantation as I felt sure that it must have disappeared and its disappearance would be an argument against the possibility of foresting the Sandhills in spite of any carelessness that might have resulted in the failure of the experiment. So I waited for a week or ten days in a more or less troubled state of mind, when one day Mr. Hall walked into my office in a state of great excitement. I called to him and said "What is the matter, Mr. Hall?" When he answered, "Why, I have seen them," I said, "Seen what?" He said, "Those trees," I said, "What trees?" "Oh, those trees planted in Holt County ten years ago," and then he went on and, in much excitement, told me what he had seen. The pine trees were eighteen to twenty feet high. They had formed a dense thicket in which forest conditions had already appeared. The growth was greater than on similar trees planted in the eastern part of Nebraska. Mr. Hall was most enthusiastic in his description of this little plat of pine trees. At last I became somewhat troubled as I feared that through some mistake the trees had been planted on a patch of good soil instead of on Sandhill soil. However, Mr. Hall assured me that that plantation was on "the sandiest of sandhills."

The result of this experiment was to dissipate all doubt as to the possibility of growing pine trees on the Nebraska Sandhills, and, as a consequence, Mr. Hall made the recommendation to Mr. Pinchot that certain tracts of land in the state should be set aside for experimental planting. On Mr. Pinchot's recommendation two forest reserves, one situated between the Dismal River and the Middle Loup River, and the other one in Cherry County be set aside, and, within a short time, work was begun by the United States Forest Service in the experiment to grow pine trees in the Sandhills. This, in short, is the history of the pine tree planting in the Sandhills."

The field "party," to which Dr. Bessey refers in the above quotation was, in the beginning, in charge of Mr. William L. Hall, who was then Chief of the Section of Tree Planting of the Bureau of Forestry, U. S. Department of Agriculture. Mr. Hall was in personal charge of the survey during its travels in the early summer of 1901 in the eastern part of the state. A later reconnaissance party was organized and outfitted at Kearney in July, 1901, in order to cover the entire sand hill region in a more thorough manner.

The leader of this group was Mr. Royal S. Kellogg, of Kansas. Mr. Kellogg is now living in Bradenton, Florida. He has been a prominent leader in the timber and newsprint industry for many years. Another promi-

ment member of the party was Mr. Charles A. Scott, also of Kansas, now living in Denver, Colorado. Mr. Scott was active in forestry for many years. He was the first Forest Supervisor of the Nebraska National Forest, upon its establishment in 1902. He later served on the faculty at Iowa State College, at Ames, Iowa, was State Forester and Horticulturist of Kansas, State Extension Forester of Colorado, Director (in the 1930's) of the Federal Shelter Belt Project of Kansas, and a widely known nurseryman.

Other members of the survey party, now deceased, were Mr. L. C. Miller, of Oklahoma; Mr. Francis Garner Miller, a Yale graduate, and later, the first Professor of Forestry in the University of Nebraska, and still later head of Forestry in the University of Washington, and the University of Idaho; Mr. Hugh P. Baker, later Professor and Dean of Forestry in New York State College of Forestry, at Syracuse University, and later President of the University of Massachusetts; Mr. John H. Hatton, who was for many years a leader in Range and Wild Life Management in the U. S. Forest Service; and Mr. E. P. Bailey, who was active in educational work.

We should record the fact that Mr. John J. Thornber was appointed by the Department of Botany of the University of Nebraska to accompany the above party. Late in the summer Mr. Thornber left the party to become Professor of Botany in the University of Arizona, at Tucson. His place was filled by the appointment of Mr. Emil A. Bostrom, who remained with the party until September 2, 1901. Thornber and Bostrom collected specimens, mostly of herbaceous species, and made notes on the general nature of the native vegetation, while they were with the forest survey party. Mr. Bostrom noted that "the reconnaissance party included," besides the foresters mentioned above, "a supply of provisions, camping equipment, all transported in a wagon drawn by a span of strong mules." The members of the party also had saddle horses on which they made frequent excursions into the country as far as fifty to sixty miles on each side of the camp sites and along the routes followed. They made exhaustive lists of the woody plants seen. They felled trees, made ring counts, and

studied rates of growth of the trees along streams and in plantations wherever they were found.

The principal area of the Sandhills covered by this 1901 survey was, in general, that region north of the Platte River from Kearney to North Platte, then northwestward along the North Platte River to the Wyoming line, thence northward to Pine Ridge, eastward through the Sandhills to Rushville, southward to the Burlington railroad, thence eastward through the Sandhills to Broken Bow in Custer County.

Mr. Hall's survey, previously mentioned, covered the Sandhills of the Holt County area, including the famous, and especially significant, Bruner Brothers plantation near Swan Lake. One who has been over much of the country included in these surveys can fully appreciate the extensiveness and thoroughness with which those parties conducted their investigations.

#### NEBRASKA FOREST RESERVE CREATED

The report of the Sandhill Reconnaissance Survey was forwarded, late in 1901, to Washington, where it was promptly reviewed by the officials of the Bureau of Forestry. It was exceedingly fortunate that two of America's most energetic and far-sighted conservationists were then in charge of such matters in Washington. Theodore Roosevelt had but recently taken over his exalted duties following the martyrdom of President William McKinley, and Mr. Gifford Pinchot was now Chief of the Bureau of Forestry of the U. S. Department of Agriculture. These great leaders were, at that very time, engaged in perfecting a comprehensive and thorough reorganization and expansion of scientific forestry throughout the nation.

The need for carefully organized and protracted experiments in tree planting in Nebraska and elsewhere was thoroughly appreciated by President Roosevelt. The recommendation of the Nebraska reconnaissance party for the creation of two federal forest reserves in the Sandhills of

Nebraska fell, quite naturally, into Mr. Pinchot's plans for the expansion of federal activities in forestry. It was natural also, therefore, that President Theodore Roosevelt should issue the proclamation on April 16, 1902 that established the Nebraska Forest Reserves. The act specified two separate areas, one, "The Dismal River Forest Reserve," lying between the Middle Loup River and the Dismal River in Thomas County west of Halsey. The other, "The Niobrara Forest Reserve," lying between the Niobrara River and the Snake River in north-central Cherry County, south of Nenzel. The designation "Forest Reserves" was used for these two areas as well as for all federally owned tracts of forest throughout the nation until 1907 when the term was changed to "National Forests." A third area, of 347,000 acres, and known as the North Platte Division, located south of Hyannis, was established by presidential proclamation on March 10, 1906. That division was abolished later (1913) and the land opened for homestead entry under the Kinkaid Act of April 28, 1904. The two remaining areas became designated, in later years, as the Bessey Division and the Niobrara Division of the Nebraska National Forest. The approximate area of these two divisions is 96,000 acres and 110,000 acres respectively. The headquarters of the Forest remains on the Bessey Division, with postoffice, Halsey, Nebraska. The village of Halsey is about 138 miles northwest of Grand Island and about 144 miles east of Alliance.

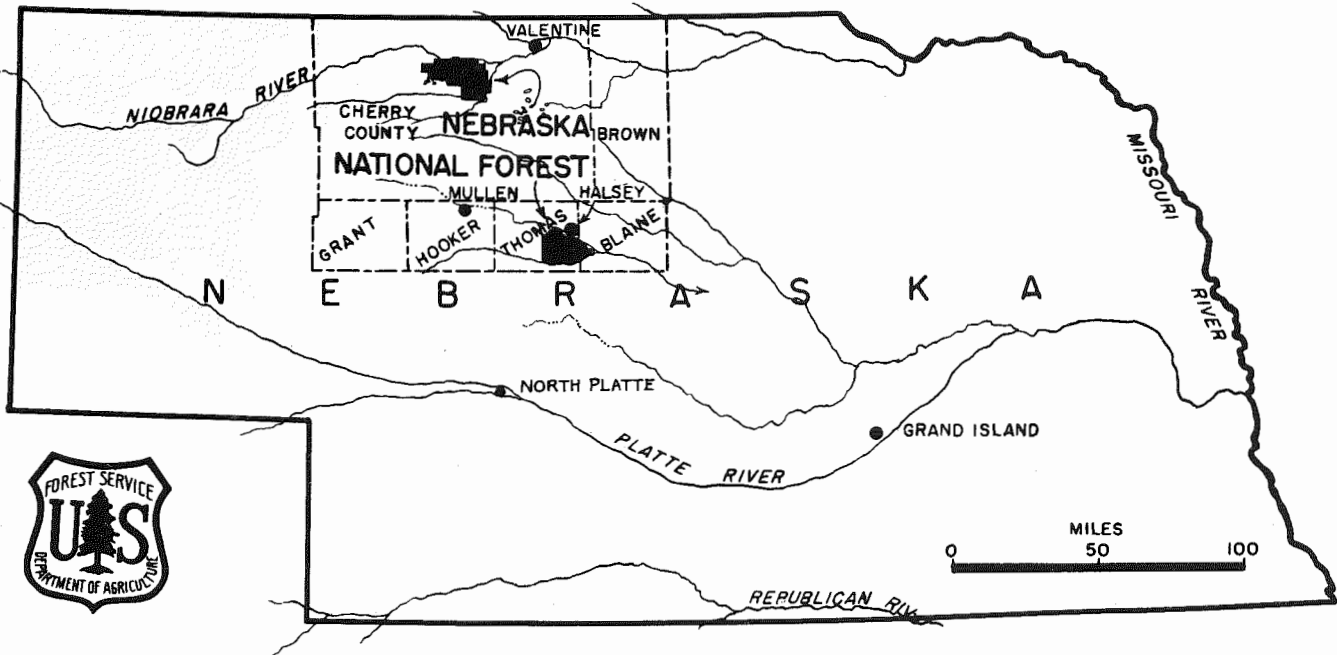
### EARLY YEARS ON THE FOREST

The tree-planting spirit of pioneer Nebraskans and the dogged enthusiasm of Dr. Bessey for two decades had been rewarded by the nation. The Nebraska National Forest was now a reality in so far as legal procedures were concerned. The impressive work of the government's reconnaissance party, the effective support of many Nebraskans, the astounding success of the Bruner Brothers plantation of pines in Holt County, the powerful influence of Gifford

Pinchot, the expanding interest in forestry throughout the nation, and finally the proclamation by the President had brought to glorious fruition the creation of the Nebraska National Forest.

The respective areas were surveyed, a permanent headquarters had now been established west of Halsey on the south bank of the Middle Loup River, and a site for a forest nursery had been chosen. But the project was still in rather scanty swaddling clothes. Would it live and continue to encourage its further growth? After all, there were as yet, no planted trees on the vast stretches of our Sandhill National Forest. The rolling expanses of blow-outs, bunch grass, yucca, and sand cherry, the world renowned Sandhills, in all their primitive silence, awaited the next bold move of our sturdy band of foresters. The baby trees were still to be grown in the yet untilled nursery. The pitifully small trees were yet *to be planted* by the thousands, yes, by the millions, before one could vote the undertaking a success. This was yet to become our most unique national forest. The Nebraska National Forest of 206,000 acres was now enrolled among the 152 far-flung National Forests totaling approximately 180,000,000 acres. Our own national forest was born there in the midst of the Sandhills fifty years ago. It has grown into an amazing accomplishment in a half century. It is truly unique; it is the only *man-made* National Forest in the United States, in that all of the trees growing on the area have been planted.

The objectives back of the agitation for the establishment and maintenance of the Forest Reserves in Nebraska were to learn if trees and forests could be grown in the Sandhills, and if they could be made to supply certain forest products and other values for mankind. It was scarcely hoped that the forest would furnish lumber in any important volume, but other tangible products such as posts and poles were among the projected returns. The well known intangible values of forests in general were also in the distant vision of the enthusiasts. The project had already called for a high measure of lasting interest on the part of stout-hearted men. Now the place was available and the objectives were now to be definitely pro-



grammed. No similar plans anywhere could suggest methods or procedures. Here was a virgin opportunity. The time was at hand, in the spring of 1902, to set forth with high hope on the first carefully planned experiments in tree culture, under the quite primitive and distinctive environmental conditions of the Nebraska Sandhills. In less than half a century these efforts were to attract the attention of foresters throughout the world, and to receive the plaudits of homefolks alike.

The boundary lines of the Forest were yet to be verified. Headquarters buildings and homes for the staff must now be erected. Nursery sites must be surveyed and cleared, and successful nursery techniques must be evolved under especially difficult conditions.

Vast numbers of baby trees, of numerous kinds, were yet to be grown and planted in virgin sand hill sites that were now available. The delicate seedlings in the nursery must be guarded against the ravages of fungus diseases and insect pests. Methods must be tried and perfected to set the nursery stock in the permanent plantations and the latter must be guarded against the ever-present threat of fires sweeping across the grassy hills. General success in these gigantic undertakings was to mark a very definite crusade that is unique in the annals of world forestry. But much was yet to be demanded, however, from the numerous strong-willed men who were to make the Nebraska National Forest an amazing reality for all men to see and praise. And all this in a land that was but recently the domain of the dusky men of Red Cloud, Crazy Horse, and Sitting Bull.

The significance of the Bruner plantation of pines near Swan Lake, Holt County, has been stressed because of its importance over the years that led to the establishment of the Nebraska National Forest. The influence of that plantation in firing the enthusiasm for the Forest can scarcely be overemphasized. The success of those trees during the early decades (1891-1911) was truly amazing. The progress of the famous planting during its middle and later years has been, unfortunately, quite disappointing. Our brief record of the principal features of the Nebraska National Forest would not be complete without at least a



summary of the unfavorable aspects of the Bruner plantation.

Foresters and others who visit the place today or in the future will be surprised in what they see. Instead of an unbroken stand of sturdy trees with a closed canopy, as they might expect after sixty or more years, they will find only a few widely scattered groups of trees and straggling individuals to mark the spot. The appearance of the plantation at this time (August 1953) is as unfavorable as its early aspects were amazing and prophetic.

The reasons for the decline in the noted plantation are numerous and complicated. At this late date one may merely summarize what appear to be some of the factors that led to the almost complete destruction of the planting whose earlier years were so promising. In the light of what is now known about tree planting in the Nebraska Sandhills (after fifty years of research at Halsey) it would seem that mistakes were made in the spacing of the trees and in other phases of the management (or lack of management) of the plantings.

The species involved were: Ponderosa, Austrian, Scotch, and Jack Pine. These were planted (1891) in rows two feet apart and with a spacing of the trees in each row of two feet. The Jack Pines were set in rows alternating with the rows of the other species. Thus, the arrangement of the species in rows was as follows: Ponderosa Pine, Jack Pine, Austrian Pine, Jack Pine, Scotch Pine, Jack Pine, all rows two feet apart and the trees two feet apart in each row. The plan seems to have been to allow the Jack Pines to serve as "nurse trees" until the other, slower-growing trees had time to establish themselves after which the Jack Pines would be cut out. But the latter were never cut, they grew so fast that they eventually over-crowded the other species. This behavior resulted in the survival of but few Ponderosa and Austrian Pines, larger numbers of Scotch Pines, and in the development of a stand of Jack Pines in the alternating rows now with a spacing of four feet between the rows. The results of the interspecific competition, while favoring the Jack Pine, eventually also became unfavorable to that species too, as the trees became

older and much larger, and the intraspecific competition became greater.

Foresters reported in the early 1920's that about 80 percent or more of the Jack Pines (then spaced 2 by 4) were living, and that the stand was becoming dense. During later years of severe drought, especially in the 1930's, the over-crowded stand of Jack Pine which resulted from the above behavior was severely damaged, in fact the most of the remaining Jack Pines were killed. Thus today (1953) only small groups and scattered individuals of Scotch Pine, a very few Ponderosa Pines, and Austrian Pines, and broken rows of Jack Pines more or less poorly mark the old plantation. The original spacing can still be noted by the stumps of trees seen here and there over the hills and ridges. A few isolated, round-topped Scotch and Ponderosa Pines are conspicuous as one approaches the site from the southwest. Thickets of Black Locust have invaded the site in many places. The whole area has obviously been damaged and tattered for many years by livestock. One notes a few large, fallen, dead trees here and there which add to the dilapidated and unkempt situation.

The largest remaining lot of trees on the site are Scotch Pines at the tops and sides of the hills and ridges in the northwest portion of the site. Some of those trees are now sixteen or more inches in diameter and forty to fifty feet tall. Others, still only two feet apart, are slimmer and taller. Several trees show extreme crooks and other deformities toward the upper portion of the crown, thus indicating damage due to heavy snow and wind. In spite of the terrible punishment that the plantation has taken throughout its life the better individual trees of Scotch and Austrian Pine have made good diameter growth during the past two decades.

The present appearance of the Bruner Plantation is an extremely poor testimonial as to the possibilities of tree planting in the Nebraska Sandhills. Standing today (August 20, 1953), amidst the wreckage of a once proud planting, one can scarcely visualize its state when it was the leading, living example in the chain of events and

evidence that culminated in the establishment of the Nebraska National Forest sixty-two years ago.

### THE BESSEY NURSERY

The boundaries of the two divisions of the Nebraska National Forest were finally established and posted by July, 1902. During that summer also the site was cleared and broken for the first seed beds in the forest nursery near the headquarters on the south side of the Middle Loup River about a mile and one-half west of the village of Halsey, Thomas County. The Billings Line of the Burlington Railroad and State Highway 2 run past the site on the north side of the river. The nursery site is on a flat, sandy, flood plain that is 200 to 300 yards wide lying between the river and the first abrupt and rugged Sandhills to the south. The river flows by the nursery with great constancy of volume throughout the year.

Mr. Charles A. Scott, the first Forest Supervisor of the Forest, and the other men of the staff lived at the nursery site in tents during these earliest activities. The first permanent building was completed on the new site and the men moved in from their tents in December, 1902. This site has remained as the general headquarters for the entire Forest and its varied activities.

The clearing of the land for the nursery on the river flat and the preparation of the seed beds in the sandy soil was a Herculean task, when one remembers the tools and the other facilities that were then available for such purposes. The land was covered with a dense thicket of wild plum, hawthorn, green ash, wild rose, and indigo, all more or less bound together by wild grape, Virginia creeper, and poison ivy. The task of clearing and preparation progressed so that early in the autumn of 1902 the first seed beds had been laid out and the soil prepared for the new forest nursery. The first beds were sowed that fall with Ponderosa Pine seed that had been gathered in the Pine

Ridge area of Nebraska, and in the Black Hills of South Dakota.

The preparation of the soil for the first seed beds in the nursery and the sowing of the first coniferous seed therein marked a momentous accomplishment in the early history of the man-made National Forest. Little could the most optimistic and astute young men who were in charge and who did the active work on the ground sense of the many uncertain problems that they would face in the years immediately ahead. But the start had at last been made in the growing of planting stock on the Forest. So, Mr. Scott and his able assistant, Mr. William H. Mast, plunged into the project with renewed vigor and with the infectious spirit that seems to accompany every great, worthwhile pioneering movement in America. They tackled the complex physical and biological problems that were involved with an originality and devotion that was to characterize the place throughout its first fifty years. We are very happy that both Mr. Scott and Mr. Mast have lived to see and enjoy the amazing returns of the tireless labor that they bestowed upon the Forest during those exacting and uncertain early days.

The fine mineral sand of the nursery was far from the best type of soil for a forest nursery. It lacked physical stability and its original fertility was low. Fertilizers, both inorganic and organic, were thoroughly mixed with the soil. Wind guards were erected to protect the delicate seedlings. An irrigation system was installed in order to provide a constant supply of water for favorable growth conditions in the seed beds. The long beds of seedlings were shaded, in the beginning, by a canopy of wooden slats that was stretched over a framework attached to cedar posts about seven feet high. This canopy afforded the necessary half shade for the seedlings and it was high enough to enable the workmen to move about with ease beneath its slatted top.

Discouraging and depressing results dogged the early efforts to produce large quantities of planting stock in the newly prepared forest nursery. Tens of thousands of beautiful young pine seedlings, a scant two inches high,

would promptly grace the expanses of well-kept seed beds, only to be stricken in a few hours by deadly "damping-off" fungi. The delicate ground-level tissues of each tiny seedling were caused to wilt and collapse by the swiftly acting parasite. Each doomed baby tree was left as a collapsed and lifeless victim, lying flat on the ground. It seemed that the whole project might fail, in the face of such wholesale destruction that threatened, in a night as it were, to defeat this essential feature of the over-all program for the Nebraska National Forest. But, thanks to their realistic and indomitable spirit, the young foresters in charge of developing this unique nursery, were not dismayed unto defeat. They promptly sought advice and technical aid in this early dilemma.

It so happened that a young man, a native Nebraskan, Dr. Carl Hartley, was at the time engaged as a forest pathologist in the research study of just such tree diseases as had popped up so unexpectedly on the budding Nebraska National Forest. Dr. Hartley was assigned by the Bureau of Plant Industry of the U. S. Department of Agriculture, in which he was employed, to this new and vital phase of the work on the young Forest. Hartley worked for many months on the intensive study of the complex problems that were involved in the situation just mentioned. He developed a technique of seed bed sanitation and a chemical treatment of the soil that solved the problem of control of the damping-off diseases of pine seedlings. Thus was smoothed the way for the successful operation of the forest nursery and on a greatly enlarged scale in the years that were to follow. We should record the fact that the essential methods devised by Dr. Hartley in the Bessey Nursery in the Nebraska Sandhills have long since come into world-wide application under similar and related situations. Dr. Hartley labored on to become known throughout the world as an authority on the diseases of forest trees. He continues his researches in the laboratories of the Federal Office of Forest Pathology in Washington.

The forest nursery on the Nebraska Forest has been expanded and methods improved from time to time, as demands for planting stock increased. At the present

time the nursery covers an area of about 30 acres, and it has an annual capacity of 5,000,000 seedlings. Bessey Nursery, coupled with the other features of the general headquarters is one of the most beautiful spots in the whole state. Other men besides Scott, Mast, and Hartley who were intimately associated with the management and operation for the first 25 years of the nursery and the Forest were H. R. Shockley, H. E. French, Fred R. Johnson, Jay Higgins, and Roy G. Pierce.

One is inspired by the unforgettable scene that one may view today as he stands atop a high, sandy hill toward the west end of Bessey Nursery and traces the landscape along the forested slope of the hills to the right, over the vast and orderly greenness of the now famous nursery, and far down the winding Loup toward the village of Halsey. That landscape, now perfected after a half-century by the vision and arduous labor of devoted men, is a living, thrilling testimonial of the guiding dreams of the earlier workers for and on the Nebraska National Forest. Foresters, other technical workers, and many important people in various walks of life throughout the world have stopped there for a call or a longer visit to look further into the natural and man made conditions of the most unusual place.

#### THE PLANTATIONS ARE STARTED

The first little pine trees that were planted in the Sandhills above and southward from the nursery were set out in the spring of 1903. These were Jack Pine seedlings, about 70,000 of them that had been dug in the native forests of Minnesota. These trees were planted on the slopes of the first hills immediately south of the nursery. Fifteen to twenty per cent of these original pines were living three years later. After fifty years some of them are still there and they are now about 60 feet tall and some are 20 inches in diameter. Another planting of 30,000 trees was made at the same time, but all of these failed to gain a foothold in the sandy soil. These were

Ponderosa Pine seedlings that were brought from the Black Hills. The first efforts to start trees in the hills by the broadcasting of the seed of Ponderosa Pine, Jack Pine, Eastern Red Cedar, and Colorado Blue Spruce also failed. Such earliest tests seemed to indicate that the successful development of plantations of trees in the Sandhills could be expected only if the well-grown but still quite young trees were to be planted individually. These experiences led to the early practice of growing the seedlings and young transplants for the plantations in the newly established nursery on the Forest. The year-old seedlings were transplanted from the seedbeds to the "transplant" beds where they were grown for another year or two before they were moved to their permanent places back in the hills. The earliest plantings of local nursery-grown Ponderosa Pine trees were set out in 1904. These were fairly successful in a variety of different sites in spite of the small size of the trees. The one-year-old Ponderosas that were planted on the north slopes of the hills in 1905 were even more successful, after an initial period of difficult adjustment.

As early as 1906 it was obvious that Ponderosa Pine and Jack Pine gave much promise of success in the hill plantations. Such species as Douglas Fir and Blue Spruce from the Rocky Mountains were sown in the nursery and planted in the field, but these gave little hope of satisfaction for general upland planting. Several other species of pine, spruce, and fir were tried out over the years, in the nursery and in the hill plantings but with little encouraging success. A 24-acre plantation of Scotch Pine, a native of Europe, was made in 1910, and this showed a survival of 75 per cent. But, all things being considered, this species did not seem favorable for extensive planting. Likewise, the Austrian Pine (also European), first planted in 1909, gave initial promise to the critical eye of the foresters, but it, too, did not seem quite fit for general sand hill planting. A widely distributed species of the sandy soils of the Lake States, the Norway Pine, was also tried out in the plantations of 1909 and 1910 with considerable success.

The Red Cedar, a native Nebraska tree, was included among the earliest species tried out on the Forest. These attempts seemed, however, to be permanently uncertain because of technical difficulties involved in the germination of the seed and the production of planting stock in the nursery. This disappointment was relieved in later years when further research made it possible to produce great quantities of Red Cedar suitable for hill plantations. The species has proved to be very successful in the plantings made during the second quarter century of operations on the Forest.

The varied experience during the first twenty-five years of intensive research with all the species tried out on the Forest gradually pointed to the conclusion that Jack Pine, Ponderosa Pine, and Red Cedar gave the most promise of success over long periods of time and in the various planting sites in the hills. The Norway Pine which was planted rather extensively after 1910 seemed well adapted to wide use. An insect pest did severe damage to this species in the earlier years and this severely stunted the height growth of these trees. The ravages of the insect became less severe after several years and then the damaged trees resumed their normal growth until, at this time (1953) the 1910 plantation of Norway Pine is one of the most impressive of those on the Forest.

The period of the "great drought" of the 1930's was a terribly severe test for all of the trees that had been tried out on the Forest. The promising Jack Pine particularly suffered, and many of the trees in the older, well-established plats of that species died during the prolonged dry period. This catastrophe was a very severe blow to the foresters in charge of the work and to many others who had been enthusiastic for the whole project. Serious questions arose as to the wisdom of continuing the efforts in the face of the destruction caused by the drought. The heavy mortality in the Jack Pine plantations during that time did finally lead to the discontinuation of that species as a permanent element in the over-all plan for the future.

The failure of the Jack Pine, after so many promising years in the nursery and in the hill plantations, left only



two species of all the many that had been so painstakingly tried out. These two, the Ponderosa Pine and the Red Cedar, have become the only coniferous species that are now included in the regular planting program for the Nebraska National Forest. Other species are, of course, still the objects of experimental research in the nursery and in the various sites back in the hills.

Nebraskans can, perhaps, take a bit of justified pride in the fact that the Ponderosa Pine, one of our two native species of pine, and the Red Cedar, also a native Nebraska tree, are the final winners in the long and intensive contest for supremacy on the Bessey Forest. That pride will most certainly well up in every Nebraskan's chest who climbs to the top of Scott's Lookout Tower to survey the 26,000 acres of pine plantations of various ages. The undulating forest spreads over the rolling hills of the Bessey Forest from the Loup to the Dismal! Kneeling under the trees of the older plats one finds a six-inch layer of fallen needles and other forest refuse in various stages of decomposition. This normal accumulation over the forest floor leads downward to the primeval base of moist, fine, white dune sand. The native grasses, shrubs, cactuses, and other associated species that constituted the original prairie vegetation in such sites have long since been crowded out. Native species of toadstools and mushrooms are seen here and there. One looks upward to note that many of those pine trees are now producing the cones and seeds of the species. A little closer scrutiny, as one crawls on hands and knees over that springy forest floor, will reveal the presence of tiny, saucy, bold, needle-leaved seedlings, all growing from seed that were formed upon the very boughs that tower over one's head. There, after fifty dramatic years, one finds the climax of the closing chapter of a glorious struggle to make the Nebraska National Forest a reality. There, over those sand hill slopes and crests, rolls the unique, the man made Nebraska National Forest, in all the early completeness that marks the progress of all of our great natural coniferous forests.

## NEW MACHINES AND METHODS

The boldness and the consummate courage of the foresters who fashioned the early procedures that created the real Nebraska National Forest will be obvious only to one who intimately knows the vast rolling Sandhills of Nebraska in all their intimacy and variety of beauty, quiet, terror, and peril. Those men started, indeed, from scratch.

The evolution and perfection of successful nursery techniques and planting practices have been among the most important and distinctive contributions of the varied program of research on the Forest. Little useful help could be found in similar undertakings elsewhere. To prepare the virgin sandy soil of the nursery; to maintain the proper balance of soil fertility and water content in the expanding seed beds there on the river flat; to successfully guard the millions of seedlings in the nursery and the trees in the hills against the ravages of hungry insects and microscopic fungi; to secure the properly trained labor and the specially designed tools and machines on such a large scale and under the highly distinctive environment at hand; all this called for an originality of plans and procedures of a type and scale that had not yet been undertaken by American foresters.

Bessey Nursery became the site of an unparalleled example of intensive specialized gardening on an unusually large scale and under such uncommon conditions that was soon to attract the attention of forest nurserymen and foresters from distant places. Workers in foreign lands have been greatly interested in this work. The special techniques and even certain types of equipment that were perfected in Bessey Nursery have been adopted in far-flung forest nursery management.

Mention may be made of seeding practices and the system of transplanting the seedlings in the nursery. The protection of the seedlings against fungous diseases has already been described. The development of successful methods and machinery for transplanting the seedlings in the nursery was a very important feature of the general

operations. The one-year-old seedlings were dug up and then set out in carefully spaced rows in other beds where the individual trees were also accurately spaced in the rows. This method provided each little tree with much more space, both in soil and air, to develop a more vigorous root system and more shapely crown. After one or two years in the transplant beds the trees were thus much better equipped to successfully adapt themselves when placed in the permanent plats in the hills. Special, simple, but unique types of tools and other equipment were designed for efficient and economical use in these phases of the operations. One must keep in mind the fact that the men were dealing with millions of trees in order to appreciate the significance and value of these methods.

The real *magnum opus*, about which the whole idea involved in the Nebraska National Forest rotated, if it was to succeed or fail, was, of course, the successful establishment of the trees on a large scale and over a long period of years back in the hills. This again demanded an originality of attack and a persistence of effort that was to mark the second major achievement of this amazing venture. The method of "trial and error" was again invoked with vigor in this gigantic enterprise. And, once more, the fertile brain and the undaunted zeal of the American forester was rewarded with astounding success.

The first trees were planted in the raw, unploughed hills, in the early spring of 1903 by the simple "spade and slit" method. It has already been noted that these trees came from the forests of Minnesota. This simple method involved only the use of a spade to make a deep slit in the sandy soil (which is usually moist beneath the surface) and opened by the worker by moving the handle back and forth until a wedge-shaped slit was made in the sand to a depth of 8-10 inches. The blade was then withdrawn and the young tree inserted by hand into the slit and held upright while the sand is firmed about the root by the foot. Another method was for one man to dig a square hole one foot deep and seven inches wide and lay the soil aside. A second man came along, placed a tree in the hole, held it at proper height, and then filled in the soil and firmed it

about the roots with hands and feet. This method was succeeded by the shaping of a cone of sand in a hole about which the roots of the tree were spread and then the hole was filled with moist sand. These three methods of tree planting were rather slow and expensive, but quite successful.

The above laborious and expensive methods were eventually replaced by the "trencher" method. The "trencher" was a specially constructed plow to be drawn by four horses. This implement opened a continuous, V-shaped slit 10-12 inches deep in the bottom of a furrow that had been previously run. The roots of the trees were slapped into the trench at regular intervals and the sandy soil then firmly caved in and firmed by the foot of the planter. The trencher method was successful, faster than the other methods, and it was used in the planting of hundreds of acres for several of the early years of the Forest.

The mechanization of American agriculture was making rapid progress during these earlier years of pioneering on the Nebraska National Forest. The adaptable farm tractor, with its great power, finally led to the evolution and perfection of tree-planting machines. Such implements, drawn by caterpillar tractors, led to the development of mechanical tree planting on the Forest that replaced the earlier primitive operations. Henceforth the trees have been successfully planted on a large scale and with a minimum use of manpower and at very favorable costs. The Nebraska tree planting machine is another worthwhile contribution from the Nebraska National Forest.

Numerous valuable lessons have been worked out and perfected, over the years, in regard to the many problems that faced the successful establishment of the sand hill plantings. Such questions as to the proper spacing of the trees in the row and the proper distance apart of the rows had to be determined by experience. The proper utilization of the various planting sites, such as tops of hills and ridges, south slopes, north slopes, and bottoms of depressions have called for carefully planned research over long periods of years. A graduate of the Nebraska Forest Department at the University, Mr. Carlos G. Bates, Silvi-

culturist of the Forest Service, was a leader in this research. The greatest success has come from the plantations on the ridges and north slopes. Present and future plantings are confined to those sites. The grassy acres of the south slopes and bottoms provide excellent forage for use in the established grazing management program of the Forest. This management also calls for the perpetuation of "grazing strips" of unforested land extending through the plantations. These strips are kept closely grazed and in that way the irregular strips provide added protection against the ever-present menace of fire.

As a result of the many years of intensive research and labor there are now about 26,000 acres included in the permanently planted area on the Bessey Division at Halsey. Foresters have estimated that there remain about 33,000 acres available for planting on that Division, after deducting the acreage involved in the south slopes and bottom sites, and the empty lanes for fire protection. There are also about 60,000 acres on the Niobrara Division that are thought to be satisfactory sites for future planting.

#### FORAGE AND WILD LIFE ON THE FOREST

Many people are surprised to learn that foresters are interested in the grasses and other forage plants of the forest and in livestock production on the national forests. However, it takes only an introductory acquaintance with American forestry to impress one with the fact that there are extensive forage and livestock interests in such areas. The complete utilization of our national forests has come, therefore, to include a vast and varied program of forage research. Millions of head of livestock are now pastured, during the summer months, on the national forests. It is quite natural, then, that the over-all management of the Nebraska National Forest, all within one of the world's most famous natural grassland areas, should include the utilization of its natural grazing values.

The natural vegetation on the Nebraska National Forest

consists of certain types of characteristic mixed prairie grassland. These features are widely represented throughout the whole 20,000 square mile area of the sand hill region of the state. The more abundant native grasses are the Bunch-grass Bluestem, Sandreed, Sand Love grass, Hall's Bluestem, Redfield's Blow-out grass, Sand Drop-seed grass, Side Oats grama, Hairy grama, Needle grass, and Sand Muhly grass. The Big Bluestem grass occurs on the lower, moister slopes and near the streams. The very valuable Blue grama and the peerless Buffalo grass are fairly common on the firmer soils of the bottoms and valley floors. Redfield's Blow-out grass is noteworthy in that it is commonly seen as one of the first invaders of active blowouts and other areas of bare sand, and so paves the way for the incoming of later species. There are also various species of wild legumes in the sandhill grasslands. These include Wild Sweet Pea, Lance-leaved Psoralea, Milk Vetch, and Prairie Clover. Certain bushy species of willow are common on the north slopes. Other typical sand hill shrubs are the Wild Rose, New Jersey Tea, Prairie Shoe-string, and Bessey's Sand Cherry. Various combinations of these plants and many others make up the wide expanses of the millions of acres that are so amazingly characteristic of the Nebraska Sandhills as a whole. Large areas of this grassland are mowed each year for wild hay. This supplies an invaluable source of winter feed for the herds of fine cattle that have come to be one of the real "sights" of the present-day landscapes of those far-flung Sandhills.

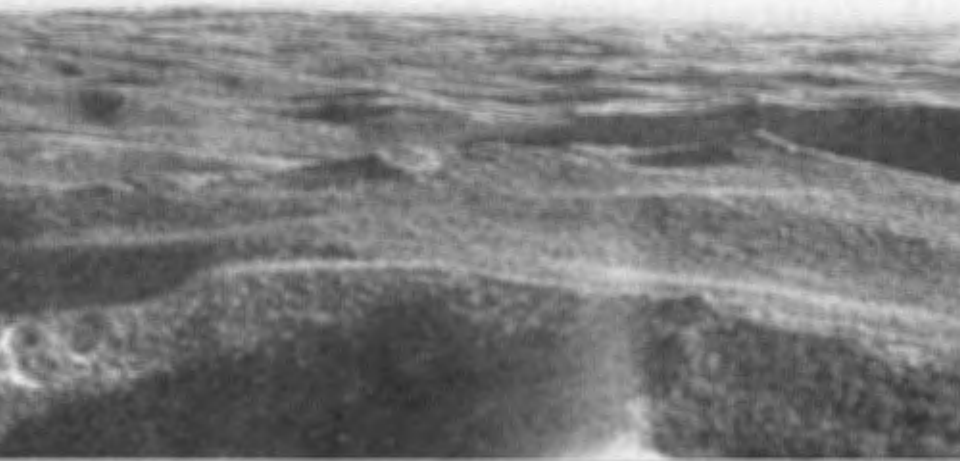
The presence of this sea of grasses on the Nebraska National Forest, into which the trees were to be planted, presented many serious problems to the earlier men in charge of the work on the Forest. The probability of severe and extensive prairie fires was one of the major eventualities that had to be faced. Such a hazard was exemplified a few years (1910) after the planting of trees had begun in the hills when a fire that started sixty-five miles west of the young forest swept eastward into the forest and burned several hundred acres killing nearly all the trees in the young plantations. About one hundred

acres, mostly just south of the nursery, escaped. The plowing and careful maintenance of effective, broad "fire lanes" was promptly introduced and has been continued through the succeeding years.

Opportunities for important research in native pasture and range problems are afforded by the mile-wide strips of native vegetation which stretch across the Forest upon which no tree planting has been or will be done. The principal function of such "strip pastures" is to serve as major fire guards to protect the various plantations. This role is best secured if the grasses of the strip pastures are adequately utilized by herds of cattle operating under careful management. The grazing intensity is so governed that the vegetation is kept from becoming so rank as to furnish or increase the fire hazard. At the same time care is taken so that the pasture is not so thinned as to open up the sandy soil to excessive wind erosion and thus reduce the forage value in the strips.

Valuable information is secured from such studies that note and follow the changes that occur in the plant life of these permanent pastures over the years. Such data suggest methods for the best utilization of the forage values that are involved and at the same time secure the maximum protection from fire. To these ends many permanent plats were marked out in one of the strip pastures in 1926 in order to follow the changes in the plant life that may occur there during the years. The degree of control and protection over the pasture, including the number of cattle used, the grazing periods, the placement of watering tanks, and changes in the vegetation are among the studies under way. Similar studies could now be extended to the south slopes and bottoms throughout the Forest which have not been and are not to be planted to trees in the following years.

The effect of the competition of the native grasses with the newly planted trees was another great unknown and unmeasured condition that only the years ahead could reveal. These and many other fundamental field problems that were inseparable from the sandy, grassy nature of the land had to be worked out in the school of trial and error.



Above: View over the Sandhills looking south from Scott's Lookout, August, 1918. Much of this area has now been planted with trees. (Photo by Raymond J. Pool.)

Below: Large "blowout" on the Nebraska National Forest; inside rim of a similar blowout in the foreground. This site is now covered with pine forest. (Photo by Raymond J. Pool, August, 1918.)







Above: View southward from north of Middle Loup River with belt of native hardwoods in center and old Jack Pine plantings over hills in background. Scott's Lookout is indicated by arrow. (Photo by Jay Higgins, June, 1952.)

Below: Jack Pine forest, planted 1917, thirty-six years old. (Photo by Jay Higgins, 1953.)





Above: View eastward down the Middle Loup Valley toward Halsey from Lone Cedar Hill, showing a portion of the Bessey Nursery, August, 1918. (Photo by Raymond J. Pool.)

Below: Two sections of Bessey Nursery showing slat covers over seed beds. Middle Loup River in background. (Photo by Raymond J. Pool, 1915.)





Above: Tractor-drawn Nebraska tree planting machine, capable of planting 20,000 trees per day. (Photo by Jay Higgins, 1946.)

Below: The forested hills in the background, planted in 1903, are immediately south of the oldest portion of the Bessey Nursery. Many of the trees exceed fifty feet in height. (Photo by Jay Higgins, June, 1952.)



Slowly, the foresters came to understand that controlled grazing must be considered as a complement to tree planting in the sand hills. An effective scheme of fire protection and grazing management was evolved along with the progress of tree planting.

The well-sodded valleys, bottoms, and the south exposures have now been abandoned as planting sites. The open spaces in the Forest, with their abundant forage flora, are now especially valuable for winter grazing because of the shelter that is provided the stock by the forest. The cattle that were in the forest plantations during the fierce blizzard of 1949 suffered little loss and came through the winter in good condition. This was in marked contrast to the severe losses that occurred in the open ranges of Nebraska during that extended stormy period. Worthy of note, too, incidentally, is the fact that the men and equipment of the Nebraska National Forest performed emergency relief work of high order during that blizzard as it raged across Thomas, Blaine, and Cherry counties in January and February, 1949. The Secretary of Agriculture awarded the Forest a citation and bronze plaque in recognition of the meritorious service under those severe winter conditions.

The introduction and management of grazing on the Nebraska National Forest has not only served the cattle growers and favored the Forest, but it has been a paying proposition. An average of more than 12,000 head of cattle have been grazed annually on the Forest for the past ten years. These animals were owned by sixty-two different ranchmen. A modest fee per head of stock has been charged the cattle owners since 1906. The average fee for cattle grazed on the Forest in 1952 was \$6.84 for a six-month period. Receipts from the sale of forest values have yielded to the Forest about \$58,000 each year over the last five years. The major part of this has come from grazing fees. Twenty-five per cent of these receipts are returned to the three counties in which the Forest is located, and this goes to the school and road fund. The total receipts of the Forest from all sources for the fiscal year 1952 was \$84,257.87. These are noteworthy facts when one remem-

bers that the Nebraska National Forest was established not for grazing but for tree planting. Thus we find that returns that were not even considered in the early plans for the project have now become regular and significant features of the over-all management of the Nebraska National Forest.

### WILD LIFE AND RECREATION

The millions of Americans who visit the national forests outside Nebraska every summer are familiar with the unusual, interesting, and often fantastic wild life of such reservations. The varied, wholesome and healthful out-of-door recreational features of the spacious national forests are major concerns of one of our most exemplary federal agencies, the U. S. Forest Service, of the U. S. Department of Agriculture. One of the more impressive evidences of the success of the Nebraska National Forest is the fact that the Forest has become a home for wild life species of great interest and a place of recreation for thousands of visitors every year. This attainment is an astounding feature of this whole unique project, attained in a half-century and under conditions never before undertaken on such scale by man.

The two divisions of the Forest have been official game and bird refuges since 1921. Ornithologists have reported 200 or more species and sub-species of birds for the Forest. Of these about 100 species nest within the area. The Lark Sparrow is the most common species, but the Western Wood Thrush and the Scarlet Tanager are more commonly seen there than anywhere within a range of fifty miles. One of the most striking birds that is often seen in and along such streams as the Middle Loup, Dismal, Snake, and Niobrara rivers is the ungainly but stately Great Blue Heron. This bird regularly nests in large numbers on the Forest, usually in remotely isolated thickets of native hackberry trees. These nesting grounds are used each year and are commonly known as "heronries." The large bird

population of the Forest contributes a major satisfaction to the nature student who roams through the widely rolling plantations of varying ages. And, moreover, it is expected that the birds will eventually convey a directly valuable return in the matter of helping to keep the insect pests of the Forest under control.

The expanding area and increasing density of the Forest now presents, also, an attractive refuge for numerous mammals. The Mule Deer had made its home in the Forest so successfully that a herd of some 800 head had developed there over the years. These beautiful, gentle, wild creatures began to do considerable damage to the plantations and to the young trees in the nursery. It was impossible to keep them out in spite of the installation of "deer-proof" fences. The Nebraska State Game, Forestation, and Parks Commission was authorized to declare an open season on deer on the Forest in November of 1945. The deer slayers claimed 365 head, and the damage caused by the browsing animals was so lessened that no further open season has been necessary on the Forest. It is now thought that the present deer population of about 450 can be maintained without serious injury to the plantations or nursery.

Thousands of people drive to the Forest every summer for picnics and recreation. These visitors enjoy the neat, garden-like nursery, the lovely picnic grounds, and the swimming pool. Whole families often drive from distant places to enjoy the pleasant grounds, to note the variety of birds, and, perhaps, to get a glimpse of a doe and fawn or antlered buck, as they drive slowly along the narrow clay-gravel or grass-topped roads that wind through the Forest. As many as 2,000 visitors have been on the Forest on a single day, which is quite remarkable when one recalls the relative remoteness of the place. Churches, clubs, lodges, of a wide variety often go there in large numbers for an outing. There were more than 32,000 visitors on the Forest in 1951. Many of these people are thrilled as they are shown through the carefully tended seed beds of the large nursery where millions of tiny pines and cedars are being prepared for future plantings. Others climb to the top of Scott's lookout tower, on the crest of one of the

highest hills on the Bessey Division to catch the lasting thrill that comes from the broad view over the thousands of planted acres of trees that stretch outward in every direction.

### SOME RELATED PROJECTS

Two significant forestry activities in our state owe their inception to the spirit and success that culminated in the Nebraska National Forest. These are the University of Nebraska Department of Forestry and the Clarke-McNary Tree Distribution project.

It was quite natural that the enthusiasm for forestry that had culminated in the creation of the Nebraska National Forest should lead to a demand for organized instruction in forestry in the University. A carefully planned, four-year collegiate course in "Technical Forestry" was established at the University in September, 1903. Students were granted the degree of Bachelor of Science in Forestry on the completion of this professional training. The first head of the Department of Forestry was Professor Francis Garner Miller, who was a graduate of the Yale School of Forestry. Professor Miller had been a member of the reconnaissance party that made the field survey which resulted in the creation of the Nebraska National Forest. He enjoyed the close cooperation and enthusiastic inspiration of Professor Bessey and the U. S. Forest Service as he laid down the course of study in the new department of forestry.

Other men who served on the faculty of the Department of Forestry in the University during its 12-year duration were Frank J. Phillips (whose life was abruptly and tragically ended in Lincoln), Dr. O. L. Sponsler, W. W. Morris, W. J. Duppert, W. J. Morrill, and Neal T. Childs. These were all men of high professional background and successful accomplishment in the field of forestry. That the original program of the department was well planned by the quiet, soft-spoken Miller, and the subsequent train-

ing well done, were soon to be demonstrated by the fine success of its earliest and later graduates.

Young men trained in our Nebraska school entered upon their careers as professional foresters in the U. S. Forest Service after the usual Civil Service examinations and competition. Many of the men had had practical experience on the growing Nebraska National Forest during their collegiate years in Lincoln. Several of them later served on the technical and administrative staff of the Forest. Many others went on to careers of distinguished service as leaders in the various phases of scientific and applied forestry on federal and state levels.

Since the University of Nebraska Department of Forestry was abolished in June, 1915, it is appropriate, from the historical point of view, to record in this place brief references to the activities of our forestry alumni. Some of the men, after several years of very successful service in the U. S. Forest Service, were called into important positions in the educational field of other prominent forestry schools. Here we may mention Dr. Clarence F. Korstian, Dean of the School of Forestry, Duke University, Durham, N. C.; Dr. Arthur W. Sampson, Professor of Forestry, University of California, Berkeley, California; Dr. Gilmore B. MacDonald, who became head of the Department of Forestry in Iowa State College in 1910, and served there for many years, Ames, Iowa; Dr. John T. Boyce, Professor of Forest Pathology in Yale University; and the late Professor Enoch W. Nelson, Department of Range Management, Colorado State College, Ft. Collins, Colorado.

Likewise many Nebraska forestry graduates have been outstanding men in the industrial and administrative fields. Mr. O. T. Swan and Mr. S. V. Fullaway have been leaders in certain nationally prominent lumberman's organizations. Mr. Jay Higgins served for many years as Forest Supervisor of the Nebraska National Forest; Mr. Roy G. Pierce as Deputy Supervisor; and Mr. Theodore Krueger served as Planting and Technical Assistant on the same forest for several years.

Numerous Nebraska-trained foresters have devoted the



most of their professional years to research and administrative work in the U. S. Forest Service. Here we may mention the following as among the outstandingly successful men: Mr. G. A. Pearson, a world authority on Ponderosa Pine; Mr. Carlos G. Bates, a silviculturist of real stature; Mr. Arthur T. Upson, Mr. Robert R. Hill, Mr. Rigley Chapline, and Mr. Clarence Forsling, all "high-up" men in those phases of forestry that are included under range management. Mr. E. O. Siecke devoted many of his professional years to service as State Forester of Texas. Mr. Fred W. Morrell was nationally known as a major forest administrator, and Mr. Maurice Benedict, a great athlete at N. U., was for many years Supervisor of the Sequoia National Forest in California. The very important national project known as the "Forest Census" of the U. S. Forest Service, has been directed for many years by Mr. Raymond Garver, another Nebraska forester. Other men, whose forestry school was the University of Nebraska, and who have served in a very creditable manner are: C. R. Tillotson, A. G. Hamel, Leon Hurt, Richard Philips, L. L. Bishop, L. H. Douglas, and Karl L. Janouch.

Probably the greatest national honor achieved by American foresters is election to the grade of "Fellow" in the professional Society of American Foresters. The requirements and qualifications for such fellowships are of the very highest order, and the total number of such Fellows is small. The following Nebraska forestry graduates have been honored in this manner: Carlos G. Bates, E. O. Siecke, G. A. Pearson, Fred W. Morrell, Clarence F. Korstian, and Gilmore B. MacDonald. We should also mention the fact that Professor C. E. Bessey and Professor F. G. Miller were Honorary Fellows of this famous Society of American Foresters. We may, most enthusiastically and appreciatively hail Nebraska Foresters as having done "right well" by the Alma Mater that started them on their respective careers.

## COOPERATIVE TREE PLANTING

The early success of the extensive program on the Nebraska National Forest served to stimulate a widespread revival of tree planting enthusiasm in the state. This resurgence of the well known pioneer spirit was most timely. The interest in forestry that was a marked feature of early Nebraska had waned to almost complete disappearance among the farmers and ranchmen at the change in the centuries. The rebirth of interest in such activities was marked by a number of notable efforts.

Congressman Moses P. Kinkaid secured the passage of a federal homestead law on April 28, 1904, that provided, in accordance with another Act, for the free distribution of trees that were supplied by the U. S. Forest Service to the farmers and ranchmen who lived west of the 100th meridian. The area involved in this plan for Nebraska included that part of the state lying west of the west boundaries of Red Willow, Frontier, Dawson, Sherman, Boone, Antelope and Knox counties. The success of the plantings under these laws was by no means uniformly good. The number of trees per person was limited and the plantings were not carefully supervised. However, it is reported that about 1,877,445 trees were furnished by the Bessey Nursery at Halsey between 1912 and 1924 for these plantings. The number of applicants for these trees during that period was 9,298.

Much wider interest and far better success were achieved in the revival of tree planting in Nebraska that followed the passage of the Clarke-McNary Act of 1924. This federal law authorized and directed the Secretary of Agriculture to cooperate with the appropriate officials of the various states to encourage tree planting, forest protection, forest fire prevention, and certain other objectives of scientific and applied forestry. Financial aid was provided from the U. S. Department of Agriculture to the states that qualified under this Act. This law was most timely and it stimulated a very active, widely spread, and efficient treeplanting movement in many states.

Soon after the passage of the Clarke-McNary Act the governor of Nebraska, Mr. Adam McMullen, called a meeting of various state officials interested in the matter, together with the representatives of certain commercial nurseries, to organize for the implementation of the program for the state. The Extension Service of the University of Nebraska, College of Agriculture, was at once authorized to comply with the appropriate provisions of the new law and to begin operations as provided by the act. These activities were soon directed toward the procurement and distribution of trees for planting in windbreaks, shelter belts, and farm woodlots.

The state committee which organized the program of tree planting under the Clarke-McNary Act early agreed to secure the coniferous planting stock from the Bessey Nursery on the Nebraska National Forest. The agreement also directed that the planting stock of broadleaf (hardwoods) species be secured from various local private nurseries. These arrangements have prevailed throughout the program to date and have proved to be quite successful.

The first plantings under this new Act were made in the spring of 1926, when 33,900 trees were distributed to 96 cooperators in 44 counties. This initial activity was directed by the Department of Horticulture, of the College of Agriculture, Dr. C. C. Wiggans, Chairman, in cooperation with the Extension Service. An Extension Forester, Mr. Clayton W. Watkins, was employed in the autumn of 1926 to direct the further tree distribution under the Clarke-McNary Act and the educational program in forestry in the local Extension Service. Mr. Watkins served in the above capacity until 1940, with the exception of two years, 1935-1936, when he was the State Director of the Federal Prairie-Plains States Shelter Belt Project. Mr. Watkins left Nebraska in 1940 to enter private business, and Mr. Earl G. Maxwell became Extension Forester in charge of the Clarke-McNary operations at the same time. Mr. Maxwell retired in 1953 and was replaced by Mr. Karl A. Loerch, who is now the Extension Forester, in charge of all Clarke-McNary work in the state.

The capable and enthusiastic leadership of Mr. Watkins

and Mr. Maxwell soon revived interest in forestry and tree planting in the Extension program of many counties. The county agricultural agents splendidly responded so that trees have been sent each year to practically every county in the state. Farmers and ranchmen, as cooperators, welcomed the assistance rendered and they applied in rapidly increasing numbers for trees to plant for windbreaks and for other purposes. The number of cooperators soon reached 1,000 and after 1927 there never have been less than 2,000 cooperators per year, and in 1938 the number was 6,125. As many as 1,686,275 trees were distributed to these cooperators in a single year, 1948. For the 25-year period, from 1926 to 1950, the total number of trees planted was 24,527,351, of which 14,250,056 were broad-leaf species, and 10,277,295 were coniferous species. The total number of planting cooperators per year during the same period ranged from 96 in 1926, to as high as 6,125 in 1938, of which, of course, many individuals were repeaters for various years.

The ranchmen and farmers of several counties have ordered large numbers of trees each year. In Cherry County these cooperators have ordered as many as 1,100,000 trees during the 25-year period. Holt County is a close second with a few under one million. Custer, Lincoln, Scotts Bluff, Rock, Brown, and Lancaster counties have each received more than one-half million trees during the same period. Certain individuals have ordered Clarke-McNary trees for several years in succession. Mr. Joe Koenig, of Keya Paha County, for example, ordered trees for the first time in 1928, and since then he has been sent 21,500 trees. Thousands of trees have been planted by the ranch owners in the Sandhill region. The Arnold Cattle Company, of Cherry County, received 75,000 trees during the last five years of the above 25-year period.

Evergreen and broadleaf transplants and seedlings have been used for planting each year under the Clarke-McNary provisions. There has been considerable variation in the species that were available from year to year. Such species as American Elm, Green Ash, Black Locust, Box-elder, Caragana, Chinese Elm, Cottonwood, Hackberry, Honey

Locust, Russian Mulberry, Russian Olive, Soft Maple, and Wild Plum have been among the broadleaf species widely used. The principal evergreen (coniferous) trees used are Ponderosa Pine, Austrian Pine, Jack Pine, Scotch Pine, and Red Cedar. The latter species has become the most popular evergreen, and the Ponderosa and Austrian Pines have also been used with success in very large numbers during recent years.

An interesting and valuable movement that was closely related to the Clarke-McNary operations and to the Nebraska National Forest was the 4-H forestry project which Mr. Maxwell outlined and prepared material for in 1935. Thirty-six Nebraska 4-H forestry clubs were organized under this plan in 1936 in twenty-nine counties, with a total membership of 373. These club members planted about 40,000 trees in 1936. The total number of such 4-H Forestry Clubs and club members varied from year to year over the period from 1936 to 1950, but the number of clubs ran as high as 226 and the total membership as high as 2,653 in 1939. It has been estimated that a total of 450,000 trees were planted by these 4-H Club members since 1936.

The success of the operations under the Clarke-McNary Act in Nebraska has been outstanding among all the states of the prairie-plains region that have participated. The wide-spread and successful plantings by the citizens of this state have attracted the attention of workers in similar lines in other areas. It is a source of great satisfaction to note the increasingly impressive, state-wide accomplishments of the Clarke-McNary movement in Nebraska as one travels in all parts of the state today. The various important tangible and intangible values that have been received from the first quarter-century application of this program in our state certainly call for the continuation of these activities throughout future years.

## IN CONCLUSION

The successful struggle to secure the presidential proclamation that created the Nebraska National Forest was one of the most noteworthy accomplishments of forestry in Nebraska during the first half-century of our history. The men who participated in the movement will long be remembered by a grateful state and nation.

The actual creation and astounding success of the man-made forest out there in the midst of the Sandhills gave us another valiant group of men whose courage and grim determination to succeed in that unique project has scarcely been matched in the many pioneering activities to which Nebraskans have given themselves. These men, likewise, are now accorded honored places among those spirited ones who so boldly labored for the state during the second half-century in those grassy Sandhills to make their dreams come true.

So, too, must we honor the man who wisely planned and carried to such glorious fruition our Nebraska Forest School, and the Clarke-McNary tree-planting project. These two activities, likewise unusual types of endeavor for Nebraskans, were always stimulated by the glowing successes of the Nebraska National Forest. They represent other abiding victories of those whose interests in forestry have indelibly marked the first century of Nebraska's history.

## ACKNOWLEDGMENT

The author deeply appreciates the interest taken in the preparation of the foregoing sketch by Mr. Jay Higgins, Mr. Charles A. Scott, and Mr. Fred R. Johnson, all formerly associated with the Nebraska National Forest. These men carefully read the manuscript and each made suggestions and corrections that have greatly improved the article. Mr. Earl G. Maxwell, formerly Forester for the Agricul-

tural Extension Service of the College of Agriculture, also read the manuscript and made valuable suggestions which we appreciate. Several of the figures used in this article have been made from photographs furnished by Mr. Jay Higgins and by the Forest Service of the U. S. Department of Agriculture. These are indicated in the respective legends. We are pleased that we have been given permission to use these valuable figures.

#### USEFUL LITERATURE

The following references contain much pertinent material, facts and figures, relative to the first half-century of the Nebraska National Forest, as well as to the interests and activities that preceded the formal establishment of the Forest. The author has freely utilized these sources in the preparation of the manuscript for the foregoing article. He, hereby, expresses his deep appreciation of these values in assembling this summary.

- Bates, C. G., "Experiments in Sandhill Planting," Society American Foresters, *Proceedings*, Vol. 5, No. 1. 1910.
- , and Pierce, R. G., *Forestation of the Sand Hills of Nebraska and Kansas*. U. S. Department of Agriculture, Forest Service, Bulletin 121, 1913.
- Bessey, C. E., "Report of the Botanist," Nebraska State Board of Agriculture, *Annual Report*, 1892, 1893, 1894, 1895, 1900.
- , *Vegetation of the Sandhills*. Nebraska State Board of Agriculture, *Annual Report*, 1900.
- , Unpublished Manuscript, dated, Lincoln, June 1, 1912.
- Bostrom, E., Unpublished Manuscript, dated Lincoln, November 19, 1901.
- Bruner, L., "Evergreen Planting in the Sand Hills," Nebraska State Horticultural Society, *Annual Report*, 1893.
- Fine, Homer, "Nebraska's Man-made Oasis," *American Forests*, Vol. 58, No. 9, September, 1952.
- Johnson, F. R. and Cobb, F. E., *Tree Planting in the Great Plains Region*, U. S. Department of Agriculture, Farmer's Bulletin 1312, 1923.
- , and Higgins, J., *Nebraska National Forest*, Special Bulletin, U. S. Department of Agriculture, Forest Service, September, 1952.
- Maxwell, E. G., *Twenty-five Years of Clarke-McNary Tree Distribution*, University of Nebraska College of Agriculture Extension Service, Extension Circular No. 1728, 1951.
- Pinchot, G., *Forest Planting in the Sand-hill Region of Nebraska*, U. S. Department of Agriculture, Forest Service, Circular 37, No date.

- Pool, R. J., "A Brief Sketch of the Life and Work of Charles Edwin Bessey," *American Journal of Botany*, II 1915, 429-504.
- , "Dean Charles E. Bessey," *University of Nebraska Semi-Centennial Anniversary Book*, 1919.
- , "A Study of the Vegetation of the Sand Hills of Nebraska," *University of Minnesota Botanical Studies*, Vol. 4, No. 3, 1914.
- Pound, R., and Clements, F. E., "The Vegetation Regions of the Prairie Province," *Botanical Gazette*, XXV, 1898.
- , *The Phytogeography of Nebraska*, Lincoln, 1898.
- Randle, C. E., and Heisley, M. F., *Our Forests: What They Are and What They Mean to Us*, U. S. Department of Agriculture Information Bulletin No. 72, 1952.
- Rydberg, P. A., "Flora of the Sand Hill Region of Nebraska," *Contributions U. S. National Herbarium*, Vol. III, No. 3, 1895.
- Smith, J. G., and Pound, R., "Flora of the Sandhills of Sheridan and Cherry Counties," *Botanical Survey of Nebraska*, II, 1892.
- Smith, S. D., "Forestation a Success in the Sand Hills of Nebraska," *Society of American Foresters, Proceedings* 9, 1914, 388-395.
- U. S. Department of Agriculture, *Tree Distribution Under the Kin-kaid Act of 1911*, U. S. Department of Agriculture Miscellaneous Circular No. 16, 1925.
- , *Possibilities of Shelterbelt Planting in the Plains Region*, U. S. Department of Agriculture, Forest Service, 1935.
- , Official Program, Golden Anniversary, Nebraska National Forest, Halsey, Nebraska, Special Folder, U. S. Forest Service, September 14, 1952.
- Zimmer, J. T., "Birds of the Thomas County Forest Reserve," *Nebraska Ornithologists Union, Proceedings*, Vol. V, Pt. 5, 1913, 51-104.