WILDFLOWERS AND THE OKLAHOMA DEPARTMENT OF TRANSPORTATION

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PREFACE

Eight years ago I was faced with the choice of moving to Oklahoma or staying in beautiful northern Alabama. As a young adult I had spent every Christmas traveling from out of state to my parents home in Stillwater. That time of year was often grey skies and brown, somber landscapes. My perception of Oklahoma was one of a dreary, dry state in which I did not relish the thought of residing. The time came for a final decision to be made and I set out for Oklahoma in early June. Not long after entering eastern Oklahoma on Interstate 40 I began to pass fields of yellow flowers. They continued for miles and miles, both in the highway right-of-way and in adjacent fields. It was a clear, crisp morning with vivid blue skies and white fluffy clouds. My spirits rose immediately and a difficult choice became easier to make.

Four years later I was delighted to become directly involved in the Oklahoma Department of Transportation ("ODOT") efforts to develop a wildflower program that will include the re-establishment of wildflowers along our highways. Hired as the first, and only technical expert for the program I have been in on the current program from the beginning. This has meant that most of the policy, proce-

dures, and daily workings of the program have been developed by me. I have also purchased the equipment, trained the personnel and directly supervised the planting of the vast majority of the wildflower plots for the last four years. As I am still the only technical person (landscape specialist) the program is still very much 'my baby'.

I wish to express my gratitude to the individuals who assisted me in this project and during the years of my coursework at Oklahoma State University. In particular, I wish to thank my major adviser, Dr. Charles Leider, and also Professor Paul Mitchell who both have consistently helped me during the last seven years. Professor Mitchell was one of the first people to help me at Oklahoma State University, he provided a job and helped secure scholarships for me. He was also always willing to lend an 'ear' when needed. Dr. Leider has given me invaluable advice over the years and cheerfully helped many times overcome problems with the 'system'. Most importantly, he helped me get my job with the Department of Transportation which is the source of this Thesis.

I would also like to thank my supervisor, Joanne Orr who is the Coordinator of the Beautification Office. She shares my enthusiasm and interest in the wildflower program and is always willing to try new things in an effort to improve the program. She has been wonderful in giving me the freedom to try my own ideas and procedures in setting up

and developing the wildflower program.

My appreciation and love is extended to my family without whom my career change would not have been possible. Even though my parents were very skeptical initially of my becoming a landscape architect, they never withdrew their support. Physical and financial help were always available. My sons, Owen and Matthew, have been very tolerant and understanding over the years about my need to study and do 'homework'. They have helped in whatever way needed, including studying for tests, proofreading papers, and leaving me alone. The last two years they have provided constant encouragement in the form of "Mom, work on your thesis, NOW!"

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NOMENCLATURE

AAH	Adopt-a-Highway
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
AHTD	Arkansas State Highway and Transportation Department
FHWA	Federal Highway Administration
LRTF	Living Roadway Trust Fund
MnDOT	Minnesota Department of Transportation
NEPA	National Environmental Protection Act
NRVMA	National Roadside Vegetation Management Association
NWRC	National Wildflower Research Center
OCB	Oklahoma City Beautiful
ODOT	Oklahoma Department of Transportation
PLS	Pure live seed
ROW	Right-of-way
STURAA	Surface Transportation and Uniform Relocation Assistance Act of 1987
TSDHPT	Texas State Department of Highways and Public Transportation

Figure 1. Indian Blanket; the Oklahoma State Wildflower

CHAPTER I

INTRODUCTION

There are many reasons why a wildflower program is important to the people of Oklahoma. Wildflowers have special meanings for most of us. Besides providing spiritual enrichment, they improve the environment which surrounds us. These plants which offer so much beauty can also provide economic and environmental benefits to our nation. Wildflowers have practical advantages that make them useful for landscaping and their use as a landscaping tool is on the upswing. Their unique combination of beauty and self-sufficiency make them especially appropriate for highway usage. Wildflowers actually seem to prefer soils of low fertility, and many species are drought tolerant. They do not present a safety hazard to motorists as more traditional trees and shrubs might. This makes them a logical choice for use by highway departments that don't have budgets to support high maintenance landscapes. Their use could save water and millions of dollars in maintenance costs and upkeep of public spaces and roadways. Recent federal legislation requires that state highway departments plant wildflowers if they plan to use federal funding for highway

construction.

While the above reasons explain why numerous states have wildflower programs for their highways there is another underlying reason. There is a growing interest in incorporating the best of the natural environment into our lives. Protecting and preserving our environment including our plant heritage has become a social issue. The concept in landscaping of low-maintenance, natural landscaping that is more in keeping with the indigenous flora of North America seems to be a trend that is here to stay.

Oklahoma initiated a wildflower program for its highways in 1973. Concurrently, budget cuts reduced the number of mowings per year so that many of the naturally occurring flowers were able to thrive once again. Motorists were able to enjoy the yellow Plains Coreopsis of eastern and central Oklahoma. Tickseed, a perennial coreopsis, grew in the rocky road cuts of the Arbuckle Mountains. The vivid orange spikes of Indian Paintbrush carpeted the medians and roadsides from Henryetta to Duncan. Indian Blanket splashed bright masses of burnt orange from the panhandle to Oklahoma City (for scientific names see Appendix C). Numerous other species were common from spring to fall, among them were Daisy Fleabane, Black-eyed Susan, Showy Primrose, Queen Anne's Lace, Kansas Gayfeather, Goldenrod, Snow-on-the-Mountain, Maxmillian Sunflower and almost 2,600 other species. According to Professor Ron Tyrl of Oklahoma State

University, Oklahoma is third in the nation in the number of plant species within its borders. (Stillwater, 89)

It wasn't long until a change in administration and a shift of priorities sidelined this program. An herbicide program was introduced in an effort to reduce the increasingly expensive mowing of the right-of-way (ROW). Roadside wildflowers began to disappear at an alarming rate. However, with another change in administration, the wildflower program was reinitiated in 1987.

Located in central United States, Oklahoma is a crossroads for large numbers of vacationers. Interstate 35 is a major north/south thoroughfare and intersects a major east/west highway (I-40) in the center of the state. The Oklahoma Tourism and Recreation Department has called tourism our number three industry. Whatever its ranking, there are many state officials who feel that improving the national image of Oklahoma should be a high priority. Wildflowers would be one possible, and relatively inexpensive, method of improving the state's image.

Unfortunately, there are several obstacles to be overcome in the implementation of a successful wildflower program. Wildflowers are hardy survivors, but little is known about how best to propagate and grow them. According to Lady Bird Johnson, founder of the National Wildflower Research Center, only 200 of more than 20,000 North American species have been studied in depth. (Pennisi, 90)

Even finding an adequate definition of what qualifies as a wildflower is not easy. Literally, a wildflower is "the flower of a plant not in cultivation." However, one man's flower may be another person's weed. A weed is defined as a plant out of place. Bermuda is a valued plant when used as a lawn grass, but when it spreads and chokes out the accompanying flower garden, it is a weed. Goldenrods are prized garden plants in England but it would take a lot to convince many American that they are anything but allergy causing weeds.

There is also a great deal of confusion about the terms, native, naturalized, and introduced species. Natives are those plants which have existed in a particular landscape for a long time. Naturalized species are those which did not originate in a particular landscape but have either escaped cultivation or been introduced and have adapted so that they survive without assistance. Introduced or exotic species are usually even more recent additions to a landscape and have not yet either naturalized or succumbed to an environment for which they are not suited. Generally they require cultivation to survive.

Some of our most common roadside wildflowers are not native to America. Oxeye Daisy, Queen Anne's Lace, Chicory and Yarrow all come from other continents. Other roadside 'wildflowers' frequently used have not even naturalized. Bachelor Buttons, Scarlet Flax and Corn Poppy are all

exotics often used by highway departments in their wildflower programs. For the purpose of this paper the term wildflower refers to anything that blooms that is planted on highway right-of-way and expected to survive and perform with little or no further maintenance. Later the advantages and disadvantages of each type will be evaluated in depth.

When one considers the number of acres (7.6 million) in highway ROW nationally, it becomes apparent that the work of the state highway departments is very important to this nation's appearance. Also many roadsides have not been plowed, cultivated or grazed and are the last remaining intact habitat for the native vegetation of a region. The policies of the highway department directly effect the ecology and vegetative stability of that area.

The reasons for planting wildflowers and native vegetation on highway ROW are many. The purpose of this paper is to relate the Oklahoma Department of Transportation's efforts to establish a wildflower program, to evaluate its ongoing plantings and to draw conclusions about them so that establishing wildflowers on highway ROW can become a fact and not just a dream for Oklahomans.

Figure 2. Black-eyed Susan, Oklahoma City Wildflower Plot

CHAPTER II

HISTORY OF WILDFLOWERS AND HIGHWAY RIGHT-OF-WAY

Introduction

The first recorded hard-surfaced roads were built in the Middle East soon after the discovery of the wheel in about 3500 B.C. Much later the Roman Empire was bound together by an extensive system of roads that served both commercial and military needs. This network of paved roads was constructed around 300 B.C., probably without the benefit of research in geometrics, materials, construction, or concrete. Some of these pavements are still in place.

Road building became a lost art during the Middle Ages. The revival of the feudal system in England at about 1000 A.D. saw a return to road building. These unpaved roads often were more than 100 feet wide to provide alternate routes to wagons and pack trains.

After the Norman Conquest in 1066, a "Kings Highway" became a sacred thing, not to be encroached upon. During this period the foundations of English, and ultimately, our own highway law, were being laid, much of which is still applied today in this country. Early Saxon laws also

imposed on all private landowners a public obligation to repair the roads and bridges adjacent to or running through the property. (Wooten, 88)

Statutes dating to the early 13th century required abutting property owners to drain the road, clip any bordering hedges and not to fence, plow or plant trees, bushes or shrubs within a specified distance from the center of the carriageways. In 1825 a statute decreed a setback of 200 feet on each side of the road. This area was to be free of bushes, small trees, and dikes, not for beautification purposes, but to discourage ambush. This was functional landscaping with no thought given to roadside aesthetics.

In the United States the first public road financed by the Federal Government was built in 1806. The Old National Pike and Cumberland Road went from Cumberland, Maryland to Wheeling, West Virginia and finally to St. Louis, Missouri. It boasted a 20 ft. gravel surface and was toll-free. But with the advent of the railroad, regular road-building took second place. By 1900, roads were still largely plain earth surfaces and almost impassable in wet weather. (Wooten, 88)

During the early 1900s, cars and trucks arrived and a dependable network of roads became imperative. State highway departments began extensive building programs. (Wooten, 88) The Oklahoma Department of Highways was founded in 1911. Between 1912 and 1990, 12,000 miles of highway were

paved in Oklahoma. In 1956 the Federal Interstate Highway System was established. With hundreds of millions of dollars being spent, research to improve materials, design, operations, and aesthetics became important.

Early attempts at roadside management included the planting of trees just outside the drainage ditches. But the resulting shade kept narrow roads too wet, tree roots softened the base, and snow accumulated on the road in winter. In addition, the trees proved a serious safety hazard to any automobile unfortunate enough to leave the roadway. By 1921, Massachusetts, Michigan and Pennsylvania had undertaken "beautification" programs. Roadside parks were introduced in Michigan in 1922 along county highways. Later the park concept was incorporated into highway planning. (Wooten, 88)

In 1931, a California highway commissioner advocated the new practice of planting native materials. Despite these pioneering efforts, changes in roadside management have come slowly. A major milestone in roadside design and practice came in 1932 with a policy statement from the American Association of State Highway Officials (AASHO). It stated "roadside development must conserve, enhance and effectively display the beauty of the landscape through which the highway passes". Several states began to hire landscape architects on their engineering staffs, and greater emphasis was placed on aesthetics in what had been

largely a functional roadside environment. The addition of this specialty to highway staffing saw a slow but steady increase in research activity. (Wooten, 88)

Many of the current research topics such as erosion control and rest areas, have been traditional since roadside development came into being. Others such as herbicides and plant growth regulators are relatively new concepts. The newest topic for study is planned growth of wildflowers to add interest and color to the travel corridor.

Until recent years, little research had been conducted on the propagation and establishment of wildflowers on highway right-of-way. Much of the recent research is still in progress and little has yet been published.

Fortunately for Oklahoma, the pioneer in the use of wildflowers for highway landscaping is their neighbor, Texas. Not only did Texas start using wildflowers in highway landscaping as early as 1929, but due to Lady Bird Johnson's interest and efforts, Texas is still the leader in wildflower landscaping. (Johnson, 81) With the establishment of the National Wildflower Research Center (NWRC) in Austin in 1982, serious research on wildflowers in ROW has begun. (Pennisi, 90)

At least partly because of the Texas influence, Oklahoma began its wildflower efforts in 1973. While their early efforts fizzled at home, The Tulsa Garden Clubs and

the Oklahoma Garden Clubs, Inc. were directly responsible for the development of Operation Wildflower. This federal highway beautification program encourages state highway departments to plant roadside wildflowers with indirect funding and assistance. Many states have been introduced to wildflower landscaping through Operation Wildflower. There are now 46 states with some type of active roadside wildflower program. (Evans, 87)

As regional neighbors, Texas, Missouri and Arkansas face many of the same problems as Oklahoma when dealing with roadside vegetation management. Texas in particular is a valuable resource for Oklahoma. Minnesota, Louisiana and Nebraska are other prairie states with active roadside wildflower programs that have interesting and possibly applicable experiences for the Oklahoma program. The Oklahoma wildflower program itself will be discussed in Chapter III.

Texas

In Texas the highway system crosses ten different major vegetational areas and encompasses more than one million acres of ROW. The state is endowed with over 5,000 native species of plants, many of which are wildflowers. They begin blooming in February and in some places the show isn't over until the first frost.

Lady Bird Johnson has stated that in spring she likes to look "Upon the wonders of the Lord, and help provided by

the Texas Highway Department. They made peace years ago." (Johnson, 81) This partnership has been developing for the last 60 years. Organized in 1917, the Texas Highway Department soon noticed that the first vegetation to reappear on land disturbed by highway construction was wildflowers. Besides their attractive appearance, they helped with erosion control and thus the use of native vegetation was incorporated into Texas roadside management almost from the very beginning.

The Texas Highway Beautification Program began in 1929 when a member of the highway commission called for landscaped roadsides with construction planned to retain natural beauty. The state highway Engineer took up this project and set the tone for preservation. He encouraged the individual maintenance engineers to preserve all the trees and plants they could when they were laying out the highways. He saw that the department encouraged the neighboring ranchers and farmers to give an extra acre to establish turnouts for little roadside parks. He asked that the workers not mow until the wildflowers had gone to seed. Initially, there was no budget, no monetary incentives for such a program.

In 1932, the first landscape architect was hired to make highway personnel, as well as the public, aware of landscape needs. Mr. Gubbels instilled pride in, and convinced all those concerned that highway landscaping could

be useful, aesthetically pleasing, and above all, practical.

Between 1930-1940, over 1/2 million pounds of wildflower seed was spread along Texas highways. (Evans, 87) Because wildflower seeds were not commercially available in large quantities, two methods were used to plant wildflowers. Prominent wildflower areas were located either on highway right-of-way or neighboring ranches. Then either the flower area was cut with a sickle mower after it had gone to seed or a thin layer of soil containing the wildflower seed was bladed up. The flower hay or soil was transported to the desired location and spread on the ground. The soil was the more successful of the two methods. Enough seed was left in the original flower areas to allow it to recover.

Both of these methods are still in use occasionally today. However seed is now available commercially and can be planted by a drill seeder. Approximately 50,000 pounds of purchased seed is planted yearly, but each maintenance district is free to purchase more or to use one of the two original methods to spread wildflowers in their region. (Hughes, 90)

Three policy directives had evolved by 1934:
1. Delay all mowing of the ROW, except mowing to maintain clear sight lines until the spring and early summer flower seasons were over; 2) Salvage all topsoil, especially that in wildflower habitats during maintenance and construction

activities. Upon completion of work, respread the soil which contains dormant wildflower seeds to provide future wildflower stands; 3) Initiate procedures to gather wildflower seeds from prominent wildflower areas for use along the highways. (Evans, 87)

Current Program

In 1970, the first highway beautification award was presented by Lady Bird Johnson to the highway worker who had done the most to preserve or enhance the beauty of the Texas roadsides in his district. This award ceremony has occurred every year since and has grown to include a number of other awards all aimed at saluting the person who has actually done the work of highway beautification. (Johnson, 81)

The early 1970s also brought inflation and economic hard times. Rapidly rising mowing costs coupled with personnel reductions caused a closer examination of maintenance procedures. A new vegetation management system was introduced by Department Landscape Architects in 1982 with three goals: 1) Reduce the cost of maintenance and labor; 2) Create a sound native vegetation community on highway right-of-ways that is aesthetically pleasing, and 3) establish an unannounced right-of-way, one that blends rather than contrasts to its surroundings.

Because of Texas' size, diverse climate, soil and vegetative conditions, a vegetation manager was put in each

of the state's 24 maintenance districts. His job was to study, implement, and track the new mowing and herbicide policies. During departmental and public reviews of the new policies, the questions, "why are you mowing?" and "why are you spraying?" were repeatedly asked. It became clear that the reasons given, visibility and vehicle control recovery space for highway safety, did not require mowing of the entire ROW. The reduced mowing policy required only safety mowing and a fall clean-up mow. (Evans, 87)

In 1983 the policy was tested in one county in each of the 24 districts. The management policy reduced maintenance costs 23.1% that year. The reduced mowing also meant that many of the native grasses and forbs could flourish. Although mowing is timed for the Bluebonnet and other spring bloomers, the later mowing meant that many summer and fall wildflowers could also produce a show. The department now has lists of suitable vegetation for each district that is adapted for that region. For instance, Silver Bluestem, considered a noxious weed by many ODOT maintenance personnel, is on the desirable list of grasses for some Texas districts.

A diverse plant community is encouraged as being much more ecologically stable therefore much cheaper and easier to maintain than a single species community (Bermuda Grass). Besides being self-sustaining a diverse community is also more interesting and aesthetically pleasing, and better able

to resist invasions of undesirable species such as Johnson Grass. Spot spraying and mowing are used for safety reasons such as around guardrails, signs, etc. and to help eliminate such noxious species as Johnson Grass, Bind Weed, and African Rue. However, the definition of noxious varies for each vegetation zone. For instance, Sage Brush is considered noxious in some districts and not in others, depending on its aggressiveness in the local climate. (Smith, 90)

In 1986, 8 million dollars was saved when the department implemented the new management system statewide. Besides reducing maintenance costs, the wildflowers have proven to be a major tourist attraction. It is estimated that approximately 40% of the spring visitors to Texas are there to view the wildflowers and attend one or more of the approximately 50 wildflower festivities celebrated in communities across the state. (Steffens, 90)

The last few years have seen more changes in the Texas State Department of Highways and Public Transportation (TSDHPT). Recent legislature requires that at least 25% of all maintenance work be contracted out. Because mowing is one of the simpler maintenance functions, it is one that is most likely to be contracted. Unfortunately, the more a contractor mows the more he gets paid. It is difficult to provide close enough supervision to enforce the mowing part of the vegetation management system. As in Oklahoma, poli-

tical pressures also affect maintenance procedures. New top management is in favor of more frequent mowings but the wildflowers are such an institution in Texas that there is probably little real danger to them. (Steffens, 90)

TSDHPT is also in the process of submitting all of their maintenance practices and materials to the scrutiny of environmental assessment as established by the National Environmental Protection Act (NEPA). This includes their fleet of 175 state-of-the-art herbicide spray units. TSDHPT felt that sooner or later environmental assessment will be required by the federal government. (Steffens, 90)

In summary, the objectives of the SDHPT are to preserve, select, establish, and maintain vegetation on the highway right-of-way which will produce a ROW that is aesthetically pleasing while blending into its surroundings, minimize maintenance costs, and provide a safe, scenic ROW for the public. (Texas, 88) To quote Roy Smith, TSDHPT Vegetation Manager, "A weed is not a weed if it blooms in Texas, it is a wildflower." (Smith, 90) In fact, TSDHPT even has a telephone number for the public to use to discover the best locations and times to follow the wild bloomers across the state: (512) 832-7125.

Operation Wildflower

As mentioned earlier, Operation Wildflower was started by Oklahoma Garden Clubs, Inc. Their efforts with

the Oklahoma Department of Transportation were lauded by the National Council of State Garden Clubs. In late 1973, the National Council met with officials of the Department of Transportation's Federal Highway Administration (FHWA), to discuss a national cooperative project to encourage the establishment of wildflowers along the nation's highways. On December 27, 1973, the FHWA announced the creation of the national Operation Wildflower program. This voluntary project is a partnership of the National Council of State Garden Clubs, state highway agencies, and FHWA. The National Garden Council or participating state garden clubs provide seed, or the money for seed, and the state highway departments provide the land, labor, maintenance, and partial funding for planting and maintenance of the wildflowers. (Roads, 81) Although the program was optional for State highway departments, participation was encouraged.

By 1986, a FHWA survey showed that all but four states have some type of formal wildflower program. Seven states had established regulations concerning the use of wildflowers in highway landscaping and roadside management. According to this survey approximately 1,000 seeding and planting projects were a result of this program. Of these, 249 involved Federal highway funds. Although federal funding has been curtailed, the program is still active. (Evans, 87)

A national directory of resources about wildflower

propagation was published in 1981. (Sullivan, 81) The purpose of this directory is to identify people who are studying the propagation and establishment of native wildflowers. A list of recommendations follows:

1. Plants used should be native to the local area.
2. Seeds should be selected which originate from the local area since they are best adapted to the local climate. This also eliminates the problems involved in introducing a new gene pool
3. Vegetative propagation techniques are appropriate in some cases.
4. Propagation by seeds is highly preferable to transplanting of wild plants since transplanting could destroy the source material.
5. New seeding techniques are to be encouraged because they can speed establishment, reduce cost, and decrease the loss of topsoil.
6. Typical mowing practices and the use of herbicides must be modified if native roadside plantings are to be successful.

National Legislation

Inspired by Lady Bird Johnson's efforts in Texas and in the establishment of the National Wildflower Research Center, Senator Lloyd Bentson of Texas proposed national legislation in 1986. This legislation states that at least one-quarter of one percent of funds expended on a landscaping project be used to plant native wildflower seeds or seedlings, or both, on that project. A waiver of this requirement can be granted when a state certifies that native wildflowers cannot be grown satisfactorily, planting

areas are limited or the available planting areas are used for agricultural purposes. The Surface Transportation and Uniform Relocation Assistance Act (STURAA) is not meant to replace Operation Wildflower. Separate funding for the program was not established but plantings must be funded from the state's regular apportionment.

A landscaping project is defined as, "any action taken as part of a highway construction project or as a separate action to enhance the aesthetics of a highway through the placement of plant materials consistent with a landscape design plan." Seeding, temporary or permanent, undertaken for erosion control purposes does not count as a landscaping project. Similarly, planting vegetation to screen certain areas or activities from view does not constitute a landscaping project. (U.S., 88)

FHWA has published a guidance report with information on regional seed sources, information sources, a discussion of proper planting and maintenance procedures, and some samples of information from the National Wildflower Research Center. A survey taken by FHWA in 1988 found that 27 states had completed the development of a formal plan to implement the requirements of STURAA and five were still in the process of developing a plan. Many of the remaining states already had wildflower programs, usually in conjunction with Operation Wildflower. (U.S., 88)

When the survey was taken in 1988, Oklahoma was not

one of the states with such a plan. Since that time there has been only one highway landscaping project that involved federal funding. The Centennial Expressway in Oklahoma City was finished in July of 1990 and included $2,000,000 worth of landscaping. This meant that $5,000.00 was spent on planting wildflowers. The landscaping was contracted and subcontracted to various landscapers. The contractor that did the wildflower planting had no experience in planting wildflowers. He proceeded to thoroughly till and prepare six plots. The seeds that germinated were heavily infested by weeds.

The Beautification Act of 1986 is a good start on promoting highway wildflower planting, but for many state highway departments the know-how needs to catch up with the intent.

National Wildflower Research Center

Determined to help highway departments gain the knowledge needed to plant and establish wildflowers on their ROW, Lady Bird Johnson has probably accomplished more than any other individual to forward that cause. Raised in Texas, she has always been a lover and ardent supporter of the Texas wildflowers. Fascinated with why "some would grow in some spots and not in others and with why some were easy to start in a home garden and others almost impossible," she decided to do something to help find the answers to her

questions. So on her 70th birthday in 1982, as "my birthday present to the people of this land," she donated 60 acres near her Texas home (Austin) and $125,000 to get the National Wildflower Research Center off to a good start. In the years since its birth, the National Wildflower Research Center has grown from a three-person operation in a one-bedroom cinder-block farmhouse to a staff of 20 with its own ranch-style office building (with plans to move to a bigger one) and some 17,000 members throughout the country. (Pennisi, 90)

The Center's goals are to encourage the conservation and use of native plants in North American landscapes and to provide vital and reliable information that moves those efforts ahead. Through research and education, the Center works to bring about a full understanding of the aesthetic, ecological and economic reasons why conserving and using native plants can ensure the continued habitation of the land.

The Center's research staff conducts greenhouse and field studies on topics such as seed germination, growth and propagation, the culture of species with commercial potential, inter- and intra- species competition, and large scale planting. There are approximately 20,000 species of flowering plants, with nearly 3,000 in danger of extinction, in North America. Fewer than 200 species have been adequately studied and the center staff has found very little existing

information about how to grow the plants. A branch has recently been established in Minnesota to study the species and establishment procedures for the northern United States.

One of the major functions of the center is to act as a clearinghouse for wildflower information. They have an extensive slide collection of wildflowers, a computerized database of sources for native plants, and fact sheets on planting guidelines, recommended native species and resource people.

The Center is trying to accomplish Lady Bird Johnson's goals. "The world in which many wildflowers grew and flourished is disappearing," she says. "We can, however, plant to keep some of nature's bounty in suitable places, if we have the knowledge and foresight." (Pennisi, 90)

Arkansas

The Arkansas State Highway and Transportation Department (AHTD) has a program that parallels ODOTs in many ways. AHTD has more than 100,000 acres of ROW and is divided into 10 districts statewide. Before their formal wildflower program was launched, planting wildflowers had been left up to each individual district to coordinate and plan with local garden clubs and municipalities. There were few, if any, lasting success stories.

Then in 1987 Dr. Hampton Roy, an opthalmologist, approached one of the highway commissioners concerning the preservation and planting of wildflowers along state highways. A formal written policy was proposed and accepted by the Department and is still in effect today. While no budget was allocated for wildflower seed, a Wildseeder (drill seeder) was purchased and Wendy Welch, a biologist in the environmental department was appointed to supervise the program. (Welch, 87)

The AHTD Wildflower Program was designed to preserve existing populations of wildflower plantings. This program was meant to work in conjunction with the existing mowing and herbicide programs although some revisions were made in existing maintenance practices to insure viability of the wildflowers.

Wildflower routes were selected and classified into Scenic and Preserved routes. Those classified as Preservation Wildflower routes receive no herbicide treatments except for handspraying in problem spots. They are mowed less frequently, usually once a year. The Scenic routes receive an integrated program of maintenance, spray and mowing as needed. By 1991, there were approximately 450 miles of wildflower routes. The general objectives of the program are:

1. To establish a policy and method with which to plant wildflowers donated by the public by use of a no-till drill type planter.

2. To establish a policy and method to preserve native populations of wildflowers along Arkansas highways.

3. To reduce the maintenance budget along selected routes and therefore the total budget.

Like the Oklahoma wildflower program, all wildflower seed is donated and the Department plants it with a drill seeder at no charge to the donor. An interested group notifies their District Engineer who contacts the Environmental Department (Ms. Welch) who then coordinates the whole process. The District Engineer has the ultimate approval of the location of plantings. Usually they are planted on backslopes although in 1990 some were planted in medians. Ms. Welch discusses species and quantities with the donor and the donor purchases the seed. Native perennials are preferred but naturalized species such as Oxeye Daisy and Yarrow are also planted plus colorful, reliable annuals for early show. The seed is normally planted between September and November although Ms. Welch is finding that later in the season seems to have a better success rate.

AHTD's drill seeder (a J-THOM Wildseeder) is moved from district to district with each district providing a tractor. AHTD has encountered many of the same problems with the drill seeder as has Oklahoma. These will be discussed in Chapter IV.

One difference from the Oklahoma program is that Arkansas requires the donor group to sign a permit/release form before they plant their seed. The form summarizes the

program and releases the state from any responsibility if the flowers do not grow or bloom, or if for some reason they need to be mowed.

Gradually over the last few years the philosophy of AHTD has changed towards an acceptance of the preservation of the existing wildflowers.

Besides the numerous wildflower routes, AHTD planted 50 acres of wildflower seed in 1990 for a total of about 100 acres statewide. All groups are encouraged to purchase enough seed to plant several acres at least as Ms. Welch is discovering that there is not enough time to plant numerous small plots. (Welch, 91)

AHTD hopes to streamline its program and to incorporate some wildlife habitats into their wildflower plantings. Weeds and not enough water at the right times are problems with the Arkansas program as they are in other states.

Although the attitude of many within the department is slowly changing to an acceptance and, in some cases, enthusiasm for the wildflower program, as in Oklahoma, approval is not universal. The policy is clear and well written but not always followed. (Welch, 91)

Missouri

While Texas is far ahead of Oklahoma in wildflower planting experience and Arkansas is on a par with Oklahoma,

the third regional state to be discussed is just getting started with their wildflower program. Missouri has more than 385,000 acres of ROW and is divided into 10 districts statewide. They started their wildflower program formally in 1988 and have not yet established any plantings.

However they started extensive highway landscaping earlier and already have a revised maintenance policy that will be beneficial to a wildflower program. Mowing has been drastically reduced to only what is a bare necessity (safety reasons). Usually they mow only once a year unless it is an agricultural area where weeds are a problem. Two million dollars have been saved in the first year.

A wildflower task force was formed and in 1989 wildflower research was started. Dr. Pam Bordon of Southwestern Missouri State University was signed to two contracts. She does research on wildflowers for Missouri highways and she acts as a consultant for any actual highway wildflower plantings.

The first year $100,000 was budgeted just for wildflower seed statewide. Each district was given $10,000. The budget for the next year allowed each district $25,000 for just seed. Each district has a vegetation manager with landscape architects in the metropolitan areas. Missouri is in the process of deciding what type of drill seeder to purchase for their program. (Muri, 91)

Missouri has published a brochure for the public on their mowing policy. One of the major concerns of many of the ODOT maintenance people is that the public will be upset about the 'shaggy' look of the wildflower plots before and after bloom season. Or that if a new limited and delayed mowing policy were implemented that there would be lots of public complaint. This is not an idle concern. Many Oklahomans do seem to prefer the close-mowed golf course-type look. Texas found that when their mowing policy was first implemented complaint calls arrived at the rate of 7 to 1 in favor of more frequent mowing. Both states have found that education is important and with a little time the public acceptance is high. (Steffens, 90)

The Missouri brochure states the problem clearly. "The department spends more than $10 million annually on mowing, the most spent on any single maintenance operation. Mowing is done for safety, vegetation control and improved drainage, but mostly for aesthetic reasons. And there's no agreement on what is aesthetically pleasing.....The department hopes this program will benefit all and provide a savings to taxpayers." (Missouri, 90)

Nebraska

Nebraska is another state that has policies and procedures that would be applicable for Oklahoma. Although much further north (with a colder climate) than Oklahoma,

Nebraska is a prairie state with many of the same native grasses and native forbs as Oklahoma. It also experiences a wide range of rainfall, from 32" in the eastern part of the state to 14" in the west. With about 85,000 acres of ROW, it is only slightly smaller than ODOT. (Gray, 88)

In 1962 the governor had the highway department add a Roadside Development Office to the agency. This office is responsible for all landscaping and seeding projects on both new construction and for maintenance projects. There were four specialists originally, a Landscape Architect, two Agronomists, and an Horticulturist. Over the years, the office has ranged in size from four to nine people, depending on budget and politics. (Gray, 88)

In 1964 this office wrote a mowing policy that was fully implemented in 1968. It has not changed substantially since that time and examplifies the long term results of limited mowing. (Gray, 88) At the same time seeding mixtures were revised and have been used consistently since that time.

A research project was initiated at this time with the University of Nebraska and the Federal Highway Administration. In 1972 the U.S. Soil Conservation Service joined the effort. Objectives of the project are:

1. To develop superior types of wildflowers through plant exploration, selection, and evaluation.
2. To determine what cultural methods could be successfully used for establishing wildflowers on highway rights-of-way at minimal costs.

3. To determine if promising species of wildflowers could be grown and mechanically harvested for commercial seed production.

In 1978, a booklet, "Wildflowers for Nebraska Landscapes" was published. It related some of the program results but was mostly a compilation of wildflower species. Most of these wildflowers include Oklahoma in their range. This color publication includes descriptions (and pictures) of approximately 32 species. Their cultural requirements and associated plant community descriptions are also helpful. However, many of the species are not for sale commercially or they are late summer and fall bloomers which Oklahoma is not yet planting.

Highway shoulders in Nebraska are mowed for safety reasons (10-15') about three times a year. All other areas are mowed once every 3-4 years, with the western, droughty part of the state only mowed once every 5-6 years. Their sand hills are never mowed. If there is a brush problem, herbicides are used. (Nebraska, 63)

When the program was first initiated, there were numerous public complaints, mostly from ranchers. There had been no public explanations for the new mowing and vegetation policies. All complaints were answered by a letter of explanation. After the first year, public acceptance has been high. (Gray, 91)

Wildflowers have been a part of all seed planted since 1968. The seed is planted on new construction (99% of

the time) and approximately 2,000 acres are seeded every year. Pasture drills are used to plant the seed 95% of the time and hydroseeding is used for the rest of the planting. The seed mixes vary depending on the rainfall of the region but usually there are two standard mixes. (Gray, 91)

On the shoulders where short grass is desired, a mixture of Western Wheat, Buffalo Grass, Blue Grama, and K31 Fescue is planted. Normally, Birdsfoot Trefoil and Crimson Clover are included in this mix. Deep roots and drought tolerance are characteristics of this mix.

The foreslope, ditch and backslope mix consists of Big Bluestem, Little Bluestem, Indian Grass, and Switch Grass. Wildflowers are varied but planned for all season bloom. Common ones are Rudbeckia, Hesperus matronalis, Petalsotemum purpurea, Ratibida, Helianthus maximiliani, and Liatris. In times of drought these backslopes act as a hay bank for threatened ranchers. (Gray, 91)

Noxious weeds in Nebraska consist of Thistles and Leafy Spurge (there are only four noxious weeds). Bind weed and Johnson Grass are not classified as noxious, but are not considered desirable.

In areas where snow drifting is a problem then an additional safety mow pass (15') will be performed in the fall. (Nebraska, 68)

Nebraska is currently in an administration where landscaping is not considered a priority. Over the years,

landscaping budget has been as high as $900,000 but in the present administration there is no budget for landscaping. However, their seed mixes are not included in the budget but are purchased as part of a new construction project (including wildflowers). (Gray, 91)

Nebraska's mowing and vegetative policy has proven to be stable, environmentally sound, economic and attractive. Only one special wildflower project has been conducted since 1970 (through Operation Wildflower) because there has been only one request. The wildflowers are already there. (Gray, 88)

Minnesota

Minnesota is another prairie state that has been encouraging its native wildflowers for many years. In early 1964, reduced funding limited the mowing operations on the 250,000 acres of Minnesota's ROW. With the oil embargo of the 1970s, reductions were increased. From a high of 6-7 mowings a year of the ROW now only about 40,000 acres are mowed regularly. In rural areas only the shoulder is regularly mowed. At first public reaction to the reduced mowing was negative but now native vegetation is what the public expects. In 1984 a law was passed requiring mowing reductions in conjunction with a soil conservency law, a pesticide control law and a noxious weed control law. Except for the shoulder, the only time the ROW can be mowed is in

August. Many districts mow only for brush control every 3-4 years.

Although there had been some largely unsuccessful wildflower plantings in conjunction with Operation Wildflower in the 1970s, it wasn't until Lt. Governor Marlene Johnson, in 1987, appointed a Wildflower Task Force that the Minnesota DOT wildflower program became focused. (Harper, 88) The 13 member Task Force presented their recommendations to the Lt. Governor and to Governor Rudy Perpich in the fall of 1988. This resulted in 1989 legislative initiative in three areas: wildflower preservation, restoration, and education. The first of three proposals would help new wildflower seed producers become established so that MnDOT would be able to purchase locally grown and adapted native seed. The second called for the establishment of a branch office of the National Wildflower Research Center in Minnesota. The last recommended additional personnel to accomplish all of the additional tasks required in the new policy. (Harper, 89)

The new policy was announced in 1989. It stated that all quality native vegetation would be protected where it exists and that it would be restored where appropriate. These preservation and restoration efforts would be successful only if public awareness and support were solicited so education was a primary goal. (Minnesota Task Force, 88)

Preservation

1. Conduct vegetation surveys to locate remnants in need of protection
2. Designate these corridors as wildflower routes
3. Manage these corridors to protect existing wildflowers
4. Complete an interagency computer data base of locations
5. Define an integrated statewide management plan (planting records to be incorporated)

Restoration

1. Purchase $110,000 of wildflower/grass seed for 1989
2. Plant 300 acres in four different regions
3. Rewrite special provisions for better contract communication
4. Design seed mixes to match natural regions of state
5. Research new mixes and implementation techniques

Education

1. Produce brochures, displays, press releases, videos
2. Encourage public participation
3. Aid the Minnesota Wildflower Council to further public awareness on wildflower issues
4. Forward legislation to aid growers, fund community projects, further research, etc.

Currently, MnDOT is accomplishing many of their objectives. Although not all of the legislation passed,

their intent is being observed. A branch of the NWRC has been set up in Chanhassen, Minnesota at the University of Minnesota arboretum. The specifications for regional, native seeds are being met by local producers even though the legislation to help producers get established did not pass. Staffing has not increased but existing personnel are accomplishing their goals. (Jacobson, 90)

About 1,000 acres were planted last year using a $150,000 budget for seed. This does not include the funding available for seeding on new construction. Eight different seed mixes are recommended for Minnesota highways. All include 4-6 grass species. Four of these mixes include only natives and a new mix of shorter natives is being tested on the shoulders. Wildflowers are never planted alone but always in a native grass seed mix. Contract planting has been tried but MnDOT was not satisfied with the results so has returned to in-house planting using four Truax drill seeders. (Jacobson, 90)

MnDOT efforts to integrate roadside maintenance practices are meeting with success. The district can choose to participate or not and as successful results are becoming evident most are becoming enthusiastic about the programs. Their standard grass, Brome, will usually persist on ROW only about 10 years so the native grasses are becoming more and more popular. In conjunction with the reduced mowing, the mower heights are supposed to be set at 12". No broad-

cast herbicides are sprayed and in 1989 a law was passed severely limiting the use of pesticides in an effort to prevent ground water contamination. Spot spraying is used to treat bridges, guardrails, etc. Infestations of Canadian Thistle are also treated this way and some brush control is performed with herbicides. Approximately 5% of the ROW is treated annually with herbicides. (Jacobson, 90)

There has been an active public education program. A 4-week mall display of native vegetation was set up and visited by approximately 200,000 people. Juried artists drew native plants in front of every store and the pictures were sold at silent auctions later. Brochures were given to the public promoting Minnesota's prairie heritage and explaining the MnDOT native vegetation program. (MnDOT, 89) (Appendix F)

With a new administration the push has slowed down but none of the programs have been cut. The expense for establishing the natives is similar to that for other grasses so money has not become an issue. The prairie reestablishment has been so successful that it seems to be entrenched. Even the state parks have recently started prairie restoration. (Jacobson, 90)

Other Programs

Of the 46 states with some type of highway wildflower program several have unique aspects to their programs or

have policies that might be of interest to the Oklahoma program.

Another prairie state that has recently become very active in roadside landscaping is Iowa. The Iowa legislature in 1989 established The Living Roadway Trust Fund (LRTF). The goal is to implement integrated roadside vegetation management by preserving, protecting and improving the roadway environment. During the 1990 fiscal year over $400,000 was allocated for various projects by the LRTF. These projects included a wildflower brochure and display, several gateway planting projects, various pieces of special equipment (drill seeders), roadside research projects and seed purchases. The LRTF office participated in wildflower plantings in the rest areas. The current fiscal year has $750,000 to allocate. This funding comes from the Road Use Tax Fund from two agencies, fees obtained from utility easements along divided access controlled highways and the Resources Enhancement and Protection funds. Applications for the projects have come from counties, cities, universities and the State of Iowa. A LRTF newsletter is also being published periodically and will serve as one of the ways to distribute information about LRTF. (Iowa, 91) It was announced at the 1990 National Roadside and Vegetation Management in Albuquerque, New Mexico that the legislature voted to discontinue the use of all 'residual' herbicides. The attorney general then deter-

mined that meant all herbicides.

In 1987 Louisiana became very active in the preservation and restoration of roadside wildflowers. A corporation was formed as a non-profit organization called Louisiana Project wildflower. It is composed of members of garden clubs, governmental officials, biology professionals and many other individuals who appreciate Louisiana's native heritage. One of their purposes is to recommend to highway personnel the best methods to plant and maintain highway wildflowers and native or naturalized plants, thus reducing maintenance costs and increasing beautification. They have since co-sponsored a number of wildflower plantings with the Louisiana Transportation Department on highway ROW.

Illinois, still another prairie state, had approximately 2,400 acres of their roadside seeded to prairie grasses and flowers as of August, 1988. They restrict herbicides and limit mowing in their native acres. (Stainton, 88)

North Carolina has an interesting funding source for their landscaping projects. Three-fourths of 1% of the total construction budget is to be devoted to landscaping with $400,000 spent on landscaping in 1988. Their funding is increasing with some of the money coming from the sale of car license tags. Each of the transportation districts has a landscape department and landscaping is included in long range planning. Wildflowers are used extensively for gate-

range planning. Wildflowers are used extensively for gateway enhancement and highway 'splashes' of color. Red flowers (non-native) are used frequently. (Cornegay, 89)

A state that has been active in highway landscaping for the last 50 years is California. They had over 21,000 acres of landscaping in their ROW and had a maintenance cost of about $40 million annually. In 1987 in-house landscaping was drastically reduced in an effort to reduce maintenance costs. A $16,000 per acre spending cap was put on any landscaping. At the same time an Adopt-a-Highway landscaping program was initiated to try and solicit volunteer funding and labor. However one of the requirements is that a group must agree to be responsible for the maintenance for twenty years which effectively eliminates most volunteers. Those wishing to sow wildflowers must agree to plant at least three acres worth of seed. (California, 88)

Georgia is one of the states that got involved with highway wildflowers through Operation Wildflower. They have been promoting wildflowers since 1973 and like Texas they have a formal awards program for their highway maintenance workers. (Georgia, 89) Many other states were involved through Operation Wildflower but because of budget problems, a lack of commitment or lack of success programs of most were either allowed to lapse or used only sporadically.

Summary

With the renewed interest in the environment nationally and the new federal legislation most states are once again sponsoring formal wildflower planting programs on their highway ROW.

The amount of variety found among the various state wildflower programs is amazing. However, the more successful ones have specific points in common.

1. The most important seems to be commitment to the program. Establishment of the wildflowers can take years. Overnight success is rare.

2. A sound horticultural basis of knowledge and planting techniques. Proper planting methods are important, as are proper maintenance and site selection. Existing maintenance methods must be meshed with the new program.

3. Funding support. Many of the more recent programs involve legislative action and funding support which will allow the programs time to become established. Public support is the usual basis for these programs.

Figure 3. Natural Indian Blanket and Horsemint in the Oklahoma Panhandle

CHAPTER III

THE WILDFLOWER PROGRAM OF THE OKLAHOMA DEPARTMENT OF TRANSPORTATION

Introduction

The myth of the Great American Desert was born just south of Oklahoma City in 1820. President James Monroe sent an expedition led by Major Stephen Harriman Long to explore and report on the southern portion of the Louisiana Purchase. By the time Long reach the Canadian River (he thought it was the Red) in August of 1820 he felt that he didn't have much to show for three months in the saddle. In his report to the president he tried to convey just how unpleasant his journey had been. "In regard to this extensive section of the country, I do not hesitate in giving the opinion that it is almost wholly unfit for cultivation, and of course uninhabitable by a people depending upon agriculture for subsistence... It is calculated to serve as a barrier to prevent too great an expansion of our population westward." Thereafter, the words, "Great American Desert" labeled maps of lands west of the Mississippi. (Bilger, 91) It was 60 years before farmers began to appear in numbers. When the dust bowl day scenes of the 1930s are added to this

original perception of our Oklahoma prairies it can be seen why many people today still think of Oklahoma as a dry, desertlike state.

The truth is quite different. Edwin James was the official botanist of the Long expedition and was kept busy collecting wildflower seeds. He identified more than 700 species in his notes and wrote while passing through Blaine County in southwest Oklahoma: "The soil is growing more fertile and the game is very abundant. Today we have killed two bear, three deer, and one turkey. The number of bear and turkeys is astonishingly great." (Bilger, 91) He was describing the rich, teeming plains.

Other early visitors describe Oklahoma in their journals, some glowingly and some disparagingly, depending upon the season. Washington Irving toured eastern Oklahoma in 1832 and described it as a land "of flowery plains and sloping uplands, diversified by groves and clumps of trees, and long screens of woodland; the whole wearing the aspect of complete, and even ornamental cultivation instead of native wildness." There were numerous entries in the personal journals kept during the land rush days in 1889. According to W.A. Swiler, "We started off across a prairie that looked as inviting as a desert. A few scrawny trees struggled to exist along ravines that possibly carried water at times. The rest of the land was bare, except for a heavy crop of buffalo grass. As we rode along, Lowry pointed out

all the beauties of the country, which I would not see. There was plenty of grass, and I suppose this was wonderful ranch country. It should have stayed that way." (Cunningham, 69) John H. Barnes described central Oklahoma thusly, "Just as the sun was going down the clouds rolled back and brilliant sunshine flooded the Still Water valley. I do not remember ever seeing a more beautiful nor more welcome sight. It was the promised land, grass and trees were green, wildflowers springing up everywhere." (Cunningham, 69)

One of the early botanical explorers in the region was Thomas Nuttall. In April of 1819 he describes a journey up the Pottoe River: "The whole expanse of forest, hill and dale, was now richly enamelled with a profusion of beautiful and curious flowers." A month later he records his impressions of the Red River Valley. "Nothing could at this season exceed the beauty of these plains, enamelled with such an uncommon variety of flowers of vivid tints, possessing all the brilliancy of tropical production." (Johnson, 88)

Of course the Oklahoma landscape today is in many places vastly difference from that found by early explorers and settlers. Many of the introduced wildflowers that are familiar today did not exist on this continent before European settlers arrived. They cleared the woodlands, plowed up the prairies, and planted their own grasses and

flowers. Yet in many places, including some roadsides, large patches of the original Oklahoma landscape still exist.

Unfortunately, many Oklahomans of today are still unaware of the richness of their prairie heritage. They are busily and often futilely trying to plant European and eastern American plants to replicate a more lush climate. Instead of appreciating the rolling hills with their infinite shades of ambers, golden browns, mauves, and blue-greens caused by the native grasses and other native vegetation during winter, they want more evergreens to provide "color". The vivid colors of spring and early summer caused by the sunny blue skies and masses of wildflowers in the fields and roadsides are often not noticed or acknowledged. Instead prodigious amounts of water are being used to keep Bermuda lawns green and cultivated gardens growing all summer.

An interesting dichotomy is that if a plant grows naturally, it is not desirable, but if it is planted then no expense is spared to save it. This attitude is one reason for the nature of ODOTs wildflower program. The emphasis is on planting wildflowers instead of preserving the existing ones. Hopefully with the reestablishment of some wildflowers in ROW and the education of the public (and ODOT personnel) emphasis will gradually shift to preservation.

Of course many Oklahomans do appreciate their heritage and actively attempt to preserve or restore it. The subject of this thesis is a program that is the result of such people. The main problem addressed in this work, "How to re-establish wildflowers on Oklahoma highway right-of-way," was first addressed by the Tulsa Garden Club in 1973.

History

The July, 1973 Oklahoma Highway Commission meeting was attended by a delegation of the Oklahoma State Garden Clubs, Inc. The spokeswomen, Mrs. Aileen Carter and Mrs. Charles Conners, both of Tulsa Garden Club, asked the highway department to delay their spring mowing and to participate in a planting program if the garden clubs would furnish the wildflower seed. (Amer. Hwy. & Trans. Monthly, 74) The nation was in the middle of an energy crisis and the possibility of lowering fuel costs was appealing to the commissioners. In 1973, $1.7 million dollars had been spent on mowing costs. (Orr, 75) Another factor was the unfavorable comparison of Oklahoma roadsides with those of Texas. Texas had been implementing a landscaping and wild-flower program for almost 40 years with impressive results.

A working relationship was established and Joanne Orr, at that time Manager of Public Information, was appointed the department liaison. The first publicity was a

January, 1974 mailing to all garden clubs with instructions, seed sources, and a list of maintenance foremen. (Appendix B) Extensive publicity was also generated throughout the state. (Orr, 75)

The basic workings of the program were the same then as now. The Department of Transportation planted all of the seed donated by individuals or groups. Civic groups, garden clubs, boy scouts, corporations and chambers of commerce have all donated seed. Working together sites were selected, then planted (at that time by hand), and marked with signs by the department. Delayed mowing was an important part of the program. (Orr, 75)

Due to the limited availability of commercially grown or harvested seed, much of the seed planted in the early years had to be hand harvested. While there were many enthusiastic harvesters in 1974 and 1975, harvesting by hand can only produce a limited amount of seed. An Oklahoma City boy scout troop harvested two pounds of Tickseed in an afternoon. (Orr, 76) Considering that it takes 10 pounds of Tickseed to plant one acre, this is a slow method for producing the quantities needed for the highway ROW. The Tulsa garden clubs were especially active and planted over 100 acres of wildflowers in Tulsa County. Spots along highways leading to 50 cities were planted. (Orr, 76) However, much of the seed wasn't planted until January and February of 1975 and the spring results were disappointing.

At the same time, though, the results of the delayed mowing policy were beginning to show and natural stands of wildflowers were extensive. There was a tremendous amount of state and national publicity and interest in the program and the public was very tolerant of the 'shaggy' look of their highways. (Orr, 75) Letters arrived from all sorts of officials and organizations all over the county. (Appendix B) 'Operation Wildflower' begun by the Tulsa Garden Council and performed by ODOT went national and is still active today. The National Council of Garden Clubs awarded the Oklahoma Garden Club Inc., with the Environmental Action Leadership Medal in 1975 for their participation. (Orr, 91)

It quickly became evident that establishment and maintenance knowledge of wildflowers on a large scale was sadly lacking. A committee of horticulturists and expert hobbyists from around the state was invited to work out guidelines for planting and harvesting. The committee included Dr. Ron Tyrl, Stillwater; Mr. Mitchell Oliphant, Oklahoma City; Mr. Paul Goodwin, Kingfisher; Mrs. Vera Taylor, Tishomingo; Mr. Paul Mitchell, Stillwater; Dr. Harriet Barclay, Tulsa; Mr. Paul Nighswonger, Alva; Dr. T. A. Milby, Norman; Mr. Russell Studebaker, Tulsa; Mrs. Aileen Carter, Tulsa; Mrs. Charles D. Thomas, Tulsa; Dr. George Goodman, Norman; Mr. Lyle Byfield, Wakita; Anne Long, Tulsa; and Joanne Orr representing the highway department. (Orr, 91)

The committee met in Oklahoma City at their own expense. Test and research plots were planned and started. Anne Long had a test plot in Tulsa of 40 species. Dr. G. Goodman had a plot at the University of Oklahoma in Norman and the Tulsa Division 8 ODOT engineer also established some highway test plots. Results were disappointing and inconclusive. (Orr, 91)

One interesting planting attempt involved 25,000 drug capsules. It started with the purchase of one pound of Coreopsis seed by the Tulsa County Pharmacy Auxiliary. A request to a drug firm for some capsules brought the large gift. Several 4th grade science classes, scouts and Campfire Girls, filled each one-inch capsule with soil, peat and four seeds. The capsules were planted on Tulsa expressways, some on steep slopes in the hope that the capsules would prevent washing away and encourage growth. Again, results were disappointing. (Orr, 76)

Three other highway projects have had lasting results. Jack Keeling, a maintenance employee in the Muskogee Division of ODOT, relates that in 1970 he was driving through Muskogee and spotted a hay truck that had been left parked outside during a rainstorm. Red flowers were sprouting from the hay. He took a sample of the flowers to a local seed company and they sent it off to be analyzed. Crimson Clover is not a wildflower, but he bought 1,000 pounds of seed the first year and planted approxi-

mately 100 acres. A cyclone seeder was used to plant the seed by hand that fall. No special preparation was given the sites. Mr. Keeling and his crews have planted seed every fall since then. The clover will usually reseed but some years it will die in places and need to be reseeded. Mr. Keeling said there are currently at least 800 roadside acres of Crimson Clover in his region. (Figure 14, Division 1) The clover blooms in mid-April through May (3-6 weeks of bloom). He has concluded that it will grow well only on better soil. It is planted where the Bermuda is doing well. The clover also needs plenty of moisture and the Department has yet to determine its western limit. Crimson Clover is an inexpensive way to brighten the roadsides and is beneficial to the soil. (Keeling, 89)

The second wildflower project continuing today is the State Wildflower Workshop co-sponsored by ODOT, the State Garden Council, and usually a local sponsor or two. The Native Plant Society has recently become a permanent co-sponsor. 250 people attended the first one which was held in Tulsa in 1974. Seven big busloads attended the first field trip northwest of Tulsa. This annual workshop is still quite active. The tour rotates to a different location each year. The lectures are offered on Friday with the field trip on Saturday. Funding for the establishment of the Native Plant Society came from the proceeds of these early workshops. (Orr, 91)

15th Annual
WILDFLOWER WORKSHOP
9303 S Broadway
Oklahoma City, OK 73139

LAWTON MOTELS

Holiday Inn 3134 NW Cache Road	(405) 353-1682 Rate $35 00
Hospitality Inn 1125 East Lee Boulevard	(405) 355-9765 Rate $33 50
Howard Johnson 1125 East Gore Boulevard	(405) 353-0200 Rate $40 00
Sandpiper Inn 2202 NW Highway 277	(405) 353-0310 Rate $35 00
Ramada Inn 601 NW 2nd Street	(405) 355-7155 . . Rate $35 00

Note-Tax per room is additional $5 00 per unit.

PHOTOGRAPHY CONTEST

Contest features Oklahoma native plants in four categories - beginners, amateur close-up, advanced close up, photos not close-ups. (Maximum print size is 5 x 7 inches) Awards will be presented at the Wildflower Workshop. Contestants may enter a maximum of three prints. Write to Oklahoma NPS Photo Contest; 2435 South Peoria; Tulsa, OK, 74114 Entry deadline is April 15, 1992

DISPLAYS

There will be a display of books useful in identifying wildflowers, trees and shrubs. Also, wildflower specimens, a photo exhibit, and a special book sale

ASK AN EXPERT

If you have a plant you would like identified, bring it with you to the workshop The specimen should include flowers or fruits, leaves, stems, and roots if possible Keep the specimen fresh and moist in a plastic bag

SPONSORS

Oklahoma Department of Transportation
Oklahoma Garden Clubs
Lawton Garden Council (6 clubs)
Oklahoma Native Plant Society
Cameron University

15th ANNUAL WILDFLOWER WORKSHOP

Shepler Center - Cameron University
Lawton, Oklahoma

FRIDAY, MAY 1, 1992

8 30	**Registration,** Shepler Center
9 15	**Welcome**
9 30	**Native Grasses as Ornamentals,** Robert Ziegler, Assistant Professor of Biological Sciences, Cameron University
10 00	**Controlled Burning of Prairies,** Glen Wampler Fort Sill Fish and Wildlife Administrator
10 30	**Break**
11 00	**Plant Lore Learned from My Elders as a Member of the Comanche Tribe,** Weckeah Bradley, Granddaughter of Chief Quanah Parker
12 00	**Lunch**
1 15	**Ecogeography of Oklahoma** Where the Corn is Not as High as an Elephant's Eye Dr Ronald J Tyrl, Professor of Botany Oklahoma State University
1 45	**Prairie Preservation,** Arnold G Davis, Past President, Texas Prairie Association Fort Worth
2.15	**345 Acres of Wildflowers** A Roadside Partnership, Laurie Stillings, Landscape Specialist, Oklahoma Department of Transportation
2 45	**Break**
3 15	**Ecology of the Wichita Mountains,** Dr Paul Buck, Emeritus Professor of Botany University of Tulsa
4 00	**Optional Visits:** Maps provided transportation on your own, Herbarium at Museum of the Great Plains, free unless visiting museum too, Guided tour of Old Post at Fort Sill (free)

(continued)

Figure 4. 1992 Wildflower Workshop Brochure

Another lasting project was initiated by Mrs. Bess Snodgrass of the Ardmore Garden Club. She planted Tickseed along SH77 in the Arbuckles in the early 1960s. Mrs. Snodgrass and a yardman personally planted more seed along I-35 when it was opened and the birds, wind, and mowing have spread the seed until it covers the area that is seen today. (Burris, 88)

At the 1991 Wildflower Workshop held in Ardmore, the Bess Snodgrass Memorial was established. The first recipient was Tinnie Zumwalt, a long time advocate for planting native Oklahoma wildflowers. The $400 yearly award is to be used to buy wildflower seed to plant on state highway ROW. The winner chooses the planting location.

Although the ODOT Wildflower Program was allowed to lapse before lasting results could be obtained, a number of things were learned from the effort. Benefits included a mowing cost reduction from $1.7 million in fiscal year 1973 to an estimated $800,000 in fiscal year 1975. This is in spite of inflation. Because of the reduced mowing, the natural stands of wildflowers were able to flourish. A major media campaign was launched to convince and educate the public and the Department that the 'natural look' was beneficial and, judging from all the interest, seemed to be having a great deal of success. Another advantage was the boost of ODOT's image with the public. The Wildflower program resulted in great public relations for ODOT. (Orr, 75)

The wildflower program seemed to be riding a wave of public enthusiasm without a solid foundation of organizational and scientific knowledge. Goals and objectives were not established at the beginning although they were formalized later. Many of the problems were unavoidable. No information was available on how to establish wildflowers on the roadside and very little information on their cultural requirements. Reliable seed sources and proper planting equipment were not available. The garden club structure and Department structure were fragmented which made organization of the whole project a logistics nightmare. Many of the highway personnel were skeptical of or downright negative about roadside wildflowers. Lack of initial support within the Department was definitely a handicap.

The goals eventually formulated by ODOT were: 1) To establish and improve the ODOT relationship with environmentalists and those concerned with beautification; 2) To beautify roads via an economical landscaping method and thereby improve the Department's image; and 3) To effect fuel and monetary savings via a reduced mowing policy made palatable by conservation of wildflowers.

Although the program was never formally abolished, it became inactive. Little seed was planted after 1975. Public speeches and slide shows were continued for several years. Garden clubs that wanted to plant seed on the roadsides made arrangements with their local highway main-

tenance yard but these efforts were mostly unsuccessful. (Orr, 91)

Current Wildflower Program

More than 10 years later, with a new state administration and a new Departmental administration interest was rekindled in improving the appearance of Oklahoma's roadsides. In 1987 the Beautification Office was established. Later the Beautification Office was placed within the Maintenance Division of ODOT. Joanne Orr was appointed the Beautification Coordinator and using the proposals she had written in 1986 as guidelines, an adopt-a-highway (AAH) program, a volunteer litter pick-up project, was off to a flying start. As of April 1st, 1992, AAH has 1,500 volunteer groups cleaning up trash on highway ROW. The wildflower program was a little slower getting started. A No-Till seeder, designed especially for planting wildflowers, was purchased from Wildseed, Inc. of Eagle Lake, Texas. John Thomas, the founder of Wildseed Inc., supervised the initial Oklahoma wildflower plantings. Seed money was donated by the Oklahoma State Garden Club, Inc., Oklahoma City Beautiful, Oklahoma Tourism and Recreation Department, and two other local Garden Clubs. The first six or seven acres were planted in rest areas and in the Oklahoma City area. The 1988 spring results were disappointing. (Orr, 91) However, two of these plots, both in

rest areas, and both consisting of Indian Blanket, have improved every year and are doing well.

A Landscape Specialist, Laurie Stillings, was hired the summer of 1988 to finish setting up and to supervise the wildflower program and to perform other ODOT landscaping projects. Another drill seeder was purchased and a year later the third one was acquired. From a planting of six acres the first year the program has grown to a total of 350 active acres in 156 different sites statewide.

One of the first steps in developing the current wildflower program was to determine how best to coordinate with existing ODOT maintenance practices. The Oklahoma Department of Transportation is divided into eight maintenance field divisions statewide. (Figure 14) While centralized policy is formulated, in practice each division has a great deal of autonomy in what policies are emphasized and enforced. Frequently each division will develop its own "personality" that reflects the opinions and personality of its top management.

The Department has a mowing guide that was printed in 1976 and is currently being revised. The common sense, practical manual emphasizes a "good neighbor policy". Land owners adjacent to the highway often have a great deal of input on how their section should look.

The manual also stresses blending the ROW with the surrounding land use. If a rural area, don't mow to the

fence line more than once every year or more. If an urban area, mow much more often. In all cases a closely mowed safety strip (15' minimum) will be maintained on the shoulders. Drainage is also a priority and must be kept clear of obstructions. (ODOT, 76)

While the advice is good, it leaves a lot of room for the individual preferences of the maintenance management. If they like a closed mowed "golf course" appearance and if their budget will allow they can mow as often as possible. If, for whatever reason, they don't feel like frequent mowing is necessary, then they are free to mow less often. Both are subject to public and legislative opinions which are not uniform and often change. The manual doesn't address any environmental issues. It also neglects to solve the problem of how to care for slopes that are difficult to mow. In other words, anything goes as long as safety is maintained, the public doesn't complain, and the budget allows.

In conjunction with mowing is one of the more active herbicide programs in the United States. The Department has had an herbicide research project in conjunction with Oklahoma State University for over 20 years. (Orr, 91) One of its primary goals has been to develop a Bermuda release program that will eliminate weedy competition and reduce the number of mowings per year by retarding the growth of the Bermuda. Currently most of the Divisions apply a pre-

emergent in late winter (in past years this has usually been Atrazine [Aatrex]). Then in early summer a Glyphosate (Roundup)/Methylz (Oust) mixture is sprayed. This is not a uniform procedure statewide and other chemicals have been tried over the years. Spot spraying is used on bridges, guardrails, signs and other hard to reach spots.

A number of variables control the effectiveness of the herbicide program and have an effect on the wildflower program. The chemicals only work correctly for a particular set of conditions. Weather, soil type, existing species, and vegetative growth stage all affect the treatment. Each chemical has different optimum conditions. The spray trucks used by ODOT have very limited capabilities. They have a spray width of approximately 20'-25' that cannot be adjusted for a larger or a smaller pattern during use. Thus, the wildflowers cannot be planted closer than 25'-30' to the pavement. The wind can accidentally extend the width of the spray pattern. Another major factor in the herbicide program are the abilities of the men using the equipment. They have formal training, but, of course, some are more capable and responsible than others. Because of this and because of the limited capabilities of ODOT equipment, operator errors are not uncommon.

The use of chemicals by highway departments is tempting. They seem to be a relatively simple, quick solution to the problem of increasingly expensive mowing (labor costs).

The problem is that they are not really that simple to use correctly and are also becoming increasingly expensive. Chemicals are potentially dangerous to the public and especially to the men applying the herbicides. They can be a public relations nightmare. Mistakes are sometimes evident in miles of browned-out Bermuda. Also ranchers with sick livestock or dying trees are always quick to blame it on the highway herbicide program. Long term effects to the environment have not been thoroughly studied for many of the chemicals. Of course mowing is also dangerous to the public (thrown objects), but that is not as obvious or controversial.

As far as the wildflowers are concerned, mowing and herbicides have both beneficial and detrimental applications. While mowing can be hard on wildflowers and will eliminate some species, if timed properly, it can actually encourage the spread of some native wildflower species. Species will evolve in a few generations that will accommodate a regular schedule of mowing. By mowing after the wildflowers have set seed and before the undesirable weeds set their seed, in a very short period there can be a dramatic improvement in ROW appearance. However due to a lack of personnel, training, and equipment, and the variable Oklahoma weather, scheduling could be difficult if not impossible.

Herbicide use can have an immediate, devastating

impact on existing wildflowers. A pre-emergent will eliminate them. If accidentally sprayed, they do not recover the way they sometimes can if accidentally mowed. However, weed competition is a major problem in the establishment of wildflower plots. Spraying a plot prior to planting may be a solution to this problem. There are also herbicides such as Sethoxyolim (Poast) that work on grasses but would not harm the broad-leaf plants. If Johnson Grass is a problem, this might be one answer.

At the present time ODOT does not have a policy concerning the preservation of natural stands of wildflowers. In areas where there is an herbicide program, the wildflowers have often been eliminated. Of course, wildflowers planted by the Department are supposed to be exempt from the normal maintenance practices. In practice, this is proving hard to enforce. Sites have been accidentally sprayed and/or mowed. In theory, spraying is supposed to be stopped adjacent to the wildflower plots and mowing is supposed to be delayed until the flowers have set seed.

The current wildflower program was set up like the original 1973 program with the differences already mentioned; adequate equipment, commercially available seed, personnel to monitor the program. The basic premise is still the same. All seed is donated and planted by the Department on state highway ROW. In the current program, the Oklahoma Garden Club, Inc. is not involved except as

Donor and the ODOT organization is more centralized. The Beautification Office is part of the Maintenance Division and as such enjoys a much closer working relationship with the field maintenance divisions who do the actual planting of the seed.

As in the first attempt, formal objectives and goals have not been stated but informally understood. Since ODOT is a government agency and subject to political pressures some of the goals and objectives will change during different administrations and people. However, the following goal is permanent with the objectives that follow varying in priority.

GOAL: Establish and preserve native wildflowers in Oklahoma highway ROW.

OBJECTIVES:

1. Improve the public image of the Oklahoma Department of Transportation.
2. Promote and encourage Oklahoma Tourism through the beautification of Oklahoma highways.
3. Establish an environmentally sound vegetation policy that would also be economically beneficial to the state.
4. Preserve Oklahoma heritage.
5. Beautify Oklahoma's 'front yard' for its residents.

In Oklahoma, wildflower seed is normally planted in the fall. Groups or organizations wishing to participate are encouraged to contact the Beautification Office as early as possible, sometimes almost a year in advance of the planting season. Frequently money will need to be raised by

the group, the site chosen and, if there is time, sprayed for weedy competition, wildflower species chosen and purchased. In order to be placed on the fall planting schedule, a group should notify the office by August 1st. The seed is usually planted between mid-September and Thanksgiving, although experimental exceptions have been made to this rule.

The drill seeders are shipped from Division to Division (Figure 14) starting in the northern part of the state and usually finishing in the south central portion. Local ODOT crews and tractors are used to plant the seed. Supervision is normally provided by the Beautification Office. From the time it is planted the seed is at the mercy of the weather. If all goes well, it germinates in the fall and winter and blooms the next spring or in the case of the perennials, it blooms two springs later. Details of these procedures will be discussed in Chapter IV.

Summary

The Bellmon administration was interested in the appearance of their state and were knowledgeable concerning plant materials and the environment. They were also aware of the public relations potential of a visible wildflower program. When the flowers are in bloom, everyone loves them. The Bellmons supported and promoted the program. The new state administration is not enthusiastic about a

wildflower program and expansion of the program is discouraged. However, no direct cuts have yet been made although the severe Department-wide personnel cuts may impact the program.

Because of ODOT's experiences with a wildflower program in 1974-1976, ODOT was able to get the current program organized much more quickly and to avoid some of the previous problems. The program has expanded rapidly with very little promotion. A variety of planting methods have been tried so that it should soon be possible to draw conclusions about the best way to establish wildflowers on Oklahoma ROW. A broad base of information is being established that should enable ODOT to have a viable and lasting wildflower program.

Figure 5. Purple Coneflower, Talimena Drive

CHAPTER IV

OKLAHOMA DEPARTMENT OF TRANSPORTATION PLANTING POLICY AND PROCEDURE

The highway right-of-way is a very harsh environment for any kind of vegetation. Temperature extremes are accentuated as there is no shelter from the sun or wind. All top soil is usually removed during construction and the subsoil is normally compacted by highway construction equipment and often left with a great deal of construction debris incorporated into it. The ROW is also polluted by car byproducts and by salt runoff in winter. Normal drainage patterns are usually disturbed or changed. ROW vegetation is totally dependent upon rainfall for moisture.

In Oklahoma, these sometimes desertlike conditions vary with each part of the state further complicating the issue of what species will grow where. Oklahoma vegetation zones include cypress swamps, mountain pine forests, tallgrass prairie, shortgrass prairie, mesquite plains, cactus, and more. The diversity is caused partly by the altitude changes from 300' in the southeast to 4,793' in the panhandle making that part of the state usually cooler. But the major reason for the diverse vegetation zones is the

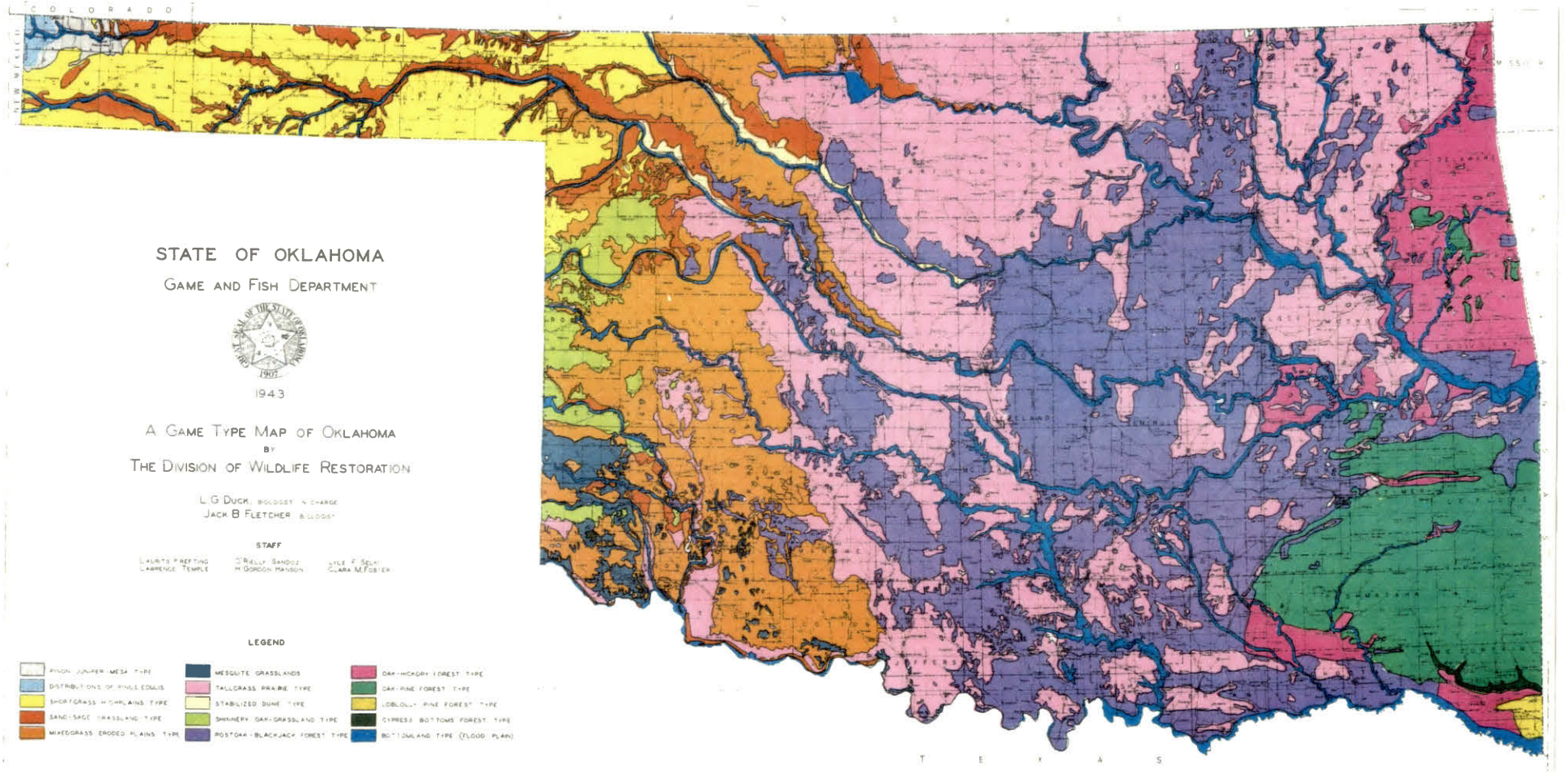

Figure 6. Duck and Fletcher Map of Oklahoma Vegetation Zones

variation of the amount of rainfall from the west to east side of the state. The average annual precipitation ranges from 16" to 52", creating vastly different ecosystems. During the growing season from April through September the average rainfall ranges from 12" in the west to 28" in the east. (Morris, 86) The two causes of this diversity are:

1. The western part of the state is in a "rain shadow" caused by the Rocky Mountains. Warm, moist clouds dump their rain as they rise on the western slopes of the Rockies, so western Oklahoma receives little rain.

2. Eastern Oklahoma is in the direct path of the moist warm air moving up from the Gulf of Mexico. So it will support many species that need more moisture than that available in western Oklahoma. (Morris, 86)

When first organizing the ODOT wildflower program, a formalized list of criteria on picking species for planting on highway ROW was useful. The list has evolved in the last three years but is still basically the same. Because all seed is donated the criteria are also a useful tool to educate donors as to why some species might not be suitable for the ROW.

1. They must be adapted for the climactic region and the specific site.

2. They should be drought tolerant.

3. Best if it already occurs in the region naturally.

4. They are commercially available in the region (home grown) and economically feasible.

5. They are not toxic to humans or livestock.

6. Compatible with existing vegetation (usually Bermuda), persistent but not invasive.

7. They will come back (perennial or self seeding).
8. They are aesthetically pleasing (high visibility).
9. Bloom period; spring or summer. The longer the period of bloom, the better.
10. Doesn't look too bad when not in bloom. Vegetation is a consideration.
11. Suitable height: tall enough to be seen but not block motorists vision.
12. If it is beneficial to the soil or makes good cover or forage for wildlife or livestock, it makes the species more desirable for planting.

The first criteria when choosing a wildflower species for a particular site in Oklahoma is will it be adapted for that spot. While little prior research is available to help, two books provide some valuable information. Doyle McCoy's Oklahoma Wildflower series is an important resource, and the Pasture and Range Plants published by Fort Hays University (Phillips Petroleum) provides some good information about plant and range associations. However, the best source is observing which plants and wildflowers are already growing in that area, either in the ROW or in adjacent fields and which wildflowers are the most common in Oklahoma and where. However, if a criterion is that the plant exists naturally in the region, this will eliminate many of the non-natives that might thrive on highway ROW.

The use of non-native plants for highway planting is controversial. Many experts feel that only wildflowers native to a particular region should be planted. For instance even Texas Bluebonnets, or California Poppy would

be suspect if planted in Oklahoma. Using some of the more popular 'wildflowers' like Bachelor Button, Corn Poppy, Scarlet Flax, or Catchfly which are not even native to the North American continent are even less desirable. A number of our most common highway wildflowers are not native but naturalized. Most people think that Oxeye Daisy, Queen Anne's Lace, and Yarrow are native to America but they are not. They are so successful because the checks and balances of their normal habitat are not present and they can replace less aggressive native species.

David Northington, former director of the National Wildflower Research Center, is adamantly against the use of non-natives on ROW. He states that there are three possible results when introducing exotics. (Slade, 89)

1. Neutral - adapts but it is not too aggressive. However, it will still be replacing something else in that ecosystem.

2. Fails miserably to establish

3. Too aggressive - Kudzu, Lythrum and Johnson Grass are all examples of what can happen through the well intentioned efforts of short-sighted people.

The controversy arises because as Wendy Welch, biologist for AHTD says, "Sometimes you have to 'get real'." (Welch, 91) Usually the more common naturalized and exotic flowers are less expensive, have flashier blooms, and are often easier to establish. The public (the ones paying for the project) are often impatient. They want immediate

Figure 7. Oxeye Daisy, Naturalized Highway Wildflower

results. The brighter and more vivid the colors, the more popular. Realistically, if results are delayed too long or less than impressive the funding can be cut and there is no wildflower program with no opportunities to re-establish the natives or preserve the existing flowers. Many of the natives are not for sale commercially or are prohibitively expensive.

Sometimes a species is needed for a particular reason. For instance Oxeye Daisy is the hardiest and easiest to establish of the earlier blooming, midsized (good height for highway use), white perennials. People like it and most assume it to be a native. It is compatible with existing vegetation (Bermuda) and will tolerate mowing. So far there are a limited amount of species available that are suitable for Oklahoma highways (satisfy all other criteria) and a white, early bloomer of the correct size is not among the natives that are available commercially.

The philosophy of the Beautification Office has evolved concerning the use of non-natives/natives. It may continue to change as the results come in over the years. So far the preference is always for natives. Many of our most common natives are available commercially and they are forming the backbone of the program. Local seed producers are being encouraged to harvest and try to grow some of the Oklahoma natives that are not already available for sale commercially and that satisfy the criteria for highway

planting. This is a slow process and will probably have many setbacks. In the meantime, the program must use what is available.

Each situation is evaluated on its own merits. There are not many species available that will thrive in Frederick, Oklahoma that are suitable for highway planting. So California Poppy has been tried and if successful will probably be planted more frequently. A legislator insists on an immediate show in a highly urbanized area in Oklahoma City, but is not willing to pay for it. Corn Flower are an inexpensive, fairly reliable species that will provide a short term solution. They do need to be reseeded every year. In all cases care is taken not to introduce something that will become too aggressive. Due to the harsh environment of the Oklahoma ROW this has not been a problem.

Another consideration is color. When traveling at high speeds, the plants must be vivid enough to be eye-catching. Pastels do not show up as well. The pale blues and pinks of the Corn Flower are not very striking from a distance. The orange-red of the Indian Blanket is not visible when planted in an area that is predominantly red clay because it blends in. So far the vivid yellows of Coreopsis, Black-eyed Susan and others seem to provide the best show, particularly when there is some white to act as a foil. White is also good because it remains visible at dusk after the other colors fade. Red is very popular with the

Figure 8. Indian Blanket, Edmond Plot

public, but affordable, red natives that are hardy on the ROW seem to be non-existent. Corn Poppy is not a native but it is a dramatic red, inexpensive, and it may be useful in some southern and eastern portions of the state with sufficient moisture available.

Along with color, height is important. The species needs to be tall enough to be visible above the grass but short enough that it won't cause any vision problems. Also plants that are too tall may be vulnerable to wind damage. Standing Cypress is a beautiful, red native that is too tall for some situations, but may be perfect for fencelines or backslopes in the portions of the state where it will grow.

Bloom season is also important. Of course, the longer the bloom season, the better. Species are chosen to provide a sequence of bloom where possible. Spring bloomers are preferred over summer bloomers for maintenance reasons. The spring bloomers put on a show before the grass and weedy vegetation get too tall and need to be mowed. The maintenance crews can normally be delayed no longer than July for their mowing schedule and prefer to start mowing in May. Unfortunately, most of the native Oklahoma standbys are late spring and early summer bloomers. Black-eyed Susan, Indian Blanket, Lemon Mint, and Plains Coreopsis all fall into this category. Currently the late summer and fall flowers are not being planted because of the Department's mowing schedule. Some of our showiest flowers bloom during late

summer; Liatris, Goldenrod, Maximillian Sunflower, and Partridge Pea.

Another interesting consideration is whether or not the species is an annual or a perennial. Of course, species that will return year after year without replanting are desired. So far the Department has had the most success with annuals such as Indian Blanket and Lemon Mint that are heavy reseeders. However, the program has not been in existence long enough to properly evaluate the perennial performance. Tickseed, Oxeye Daisy, Showy Primrose, and Purple Prairie Clover have all been planted and will be used extensively if they prove to be successful. Perennials may not tolerate the current ODOT mowing schedule.

To summarize: preference is given to vivid, spring blooming, mid-sized (18") plants, that <u>will</u> thrive and come back each year. Plus they must be affordable. Each site and situation is evaluated individually and a planting mix customized for that spot. (Appendix C)

Selecting a site for a wildflower plot is often difficult. Frequently a donor already has a location in mind when they first contact the Department of Transportation. They usually are interested in beautifying their community or property. The first rule explained to potential donors is that the wildflowers must be planted on state owned right-of-way, generally this also means that it is state maintained. It is not unusual for an inviting area to

turn out to belong to another agency or to a private individual.

Visibility from the highway is of primary importance, this is one reason that ditches and downslopes are normally not planted. There is also a requirement that at least one acre's worth of seed (or $200 worth) be purchased for planting. When traveling at 60 MPH down a state highway, it takes 90 feet of flowers to be visible for one second. The larger the area, the more spectacular it is. Federal clear zone policy requires that nothing be close to the pavement that would be dangerous to motorists who left the roadway. The exact distance varies depending on the posted speed limit and the curvature of the road, but it normally means that the shoulder or first 30' of ROW is limited to just grass which is kept mowed short.

Normal maintenance procedures involve spraying herbicides on the shoulder and regular mowing. Therefore, planting wildflowers on the shoulders is fairly controversial. Of course, they are not dangerous to motorists in collisions but if left to go to seed, the grass and flowers can become tall and shaggy. Fire hazards might possibly result. However, Texas has been letting their wildflowers grow to the pavement for years and generally mows their first safety mowing (15') in June. (Smith, 90) This means that only the earlier bloomers such as Bluebonnets grow next to the pavement. They also do not have a blanket spray

herbicide program which would automatically kill the wildflowers. (Hughes, 90) Oklahoma is starting to allow flowers to be planted to the pavement (or within 5'-6') with a great deal of success. Medians especially look better when planted this way.

Drainage away from the pavement is of utmost importance so nothing is allowed to obstruct drainage ditches. The majority of wildflowers do not like wet feet, so there is seldom any question of planting in ditches. Since the shoulder, downslope, and ditch are not normally planted with wildflowers the backslopes remain for planting. While this is often a successful solution, there are some common problems associated with backslopes. First, they are further from the pavement which might mean less visibility. Second, they are often too weedy for the successful establishment of wildflowers. Third, they may be too steep or rough for the equipment to handle. Finally, and most commonly, they may simply not be wide enough to make planting feasible. Many of Oklahoma's two lane highways have narrow ROW that are totally unsuitable for wildflower plots.

In many ways the interstate backslopes and wider medians are the most suitable for wildflower sites. They often have fewer invasive weeds and more existing native grasses and forbs and more space is available that is often visible from long distances. Because of the high traffic

counts many people see the wildflowers. Also, because of the much wider ROW the wildflowers interfere very little with normal maintenance and their use is much less controversial. Finally, interstate ROW usually blends in with the surrounding rural countryside and the wildflowers are very appropriate and natural looking used in these settings. Unfortunately, most donors are in urban areas and that is where they want to plant their seed.

The final consideration for site selection is the condition of the site and its existing vegetation. Vegetative competition plays a major role in the successful (or unsuccessful) establishment of the wildflowers. Johnson Grass is a major problem. Hairy vetch also chokes out the wildflowers. Winter grasses, such as Fescue or Rye grow at the same time as the wildflowers and usually prevent their establishment. Even a thick cover of Bermuda will prevent germination. The seedlings don't receive enough sunlight through the thatch and die.

Each Division has final approval on site selection. The local maintenance engineer may know of future construction plans for that area or that an adjoining landowner might cause problems.

Unfortunately, the perfect site does not seem to exist. If the donor understands the problems and still insists on trying a site that has a lot of weedy competition

than ODOT will plant the seed. Especially if there is not a better location in their area. Because the program is still new, experimentation with different species is valuable. Failures teach as much as successes and it will take years to determine which species can compete with the various types of existing vegetation.

Oklahoma seed donors fall into two categories. Typically, an individual or group would contact ODOT and express an interest in the wildflower program. The Department does not do any advertising or soliciting for Donors. The first donors were often Garden Clubs or Home Extension groups. Today they are often a Chamber of Commerce or city representative. Beautification organizations such as Oklahoma City Beautiful (OCB) are very active donors. But donors have ranged from the National Forest Service to a car club, and include many individuals who care about the appearance of their community. (Appendix D) If they contact their local ODOT representative first, they are given the telephone number of the Beautification Office. When they contact this office they are sent a standard packet of information explaining the program (Appendix A).

If there is a strong interest, funding and money is discussed. Creative fund raising ideas have been very successful. OCB has used a 'Pennies for Wildflowers' theme for four years and collected from $10,000 to $15,000 worth of pennies each year with which to purchase wildflower seed for

the Oklahoma City area. Half of these funds are donated to the City and half to ODOT. A Frederick organization started a recycling program. People were encouraged to donate their profits to purchase wildflower seed and $800 was collected. A Tonkawa official fined her city council members $1.00 every time they were caught not wearing their 'Homecoming 90' pins. A bookstore owner in Tulsa had children illustrate wildflower bookmarks at a local fair and sell them for 25¢ each. They raised $200.

After a financial commitment is made frequently a meeting is arranged to select the site and explain all the details. Starting in August, each donor finalizes their species choice in conjunction with the Beautification Office and orders the seed. Usually the seed is shipped to ODOT in Oklahoma City or to the local Division headquarters. The donor pays for the seed and ODOT is not involved in this procedure.

The other type of Donor came into being in 1989 with the establishment of the Donor Fund. (Appendix D) United Bank Card is an Oklahoma Credit Card institution. The first year each time a card was issued $2.00 was deposited in the Donor Fund and 2¢ deposited for each transaction. Today it is $1.00 for each card issued and 1¢ for each use. Approximately $13,000 to $16,000 has been collected each year. Other people who wish to donate money for wildflower landscaping can also deposit into this account. It is not part

of the ODOT budget or accounts in any way and may only be used for the wildflower program. This fund has been valuable to the program for several reasons. The obvious advantage is, that the Department can purchase more seed. However, the most important advantage is, because there is no immediate donor, unproven species and planting methods can be tried. It also allows ODOT to plant in locations where there is not a donor. Rest areas, state entries and high traffic interstate routes can be targeted.

Even though the Donor Fund is separate from other ODOT monies, it must still be used in accordance with Oklahoma laws. This means that seed orders are subjected to the bid process. When buying wildflower seed, this process can become complicated. Specifications must be written. (Figure 10)

Germination rate, purity, and noxious weed content must all be specified. Testing of the seed is still not a uniform procedure and few labs have developed reliable tests for many of the wildflower species. If requirements are set too high, then seed that meets those standards may be unavailable; however top quality seed is certainly to be desired. The seed is harvested in the summer and the testing procedure can then take several weeks. Each harvest is different with germination rates for a particular species varying each year. Gaillardia pulchella is a good example; in a good year the germination rates could be in the 80% to

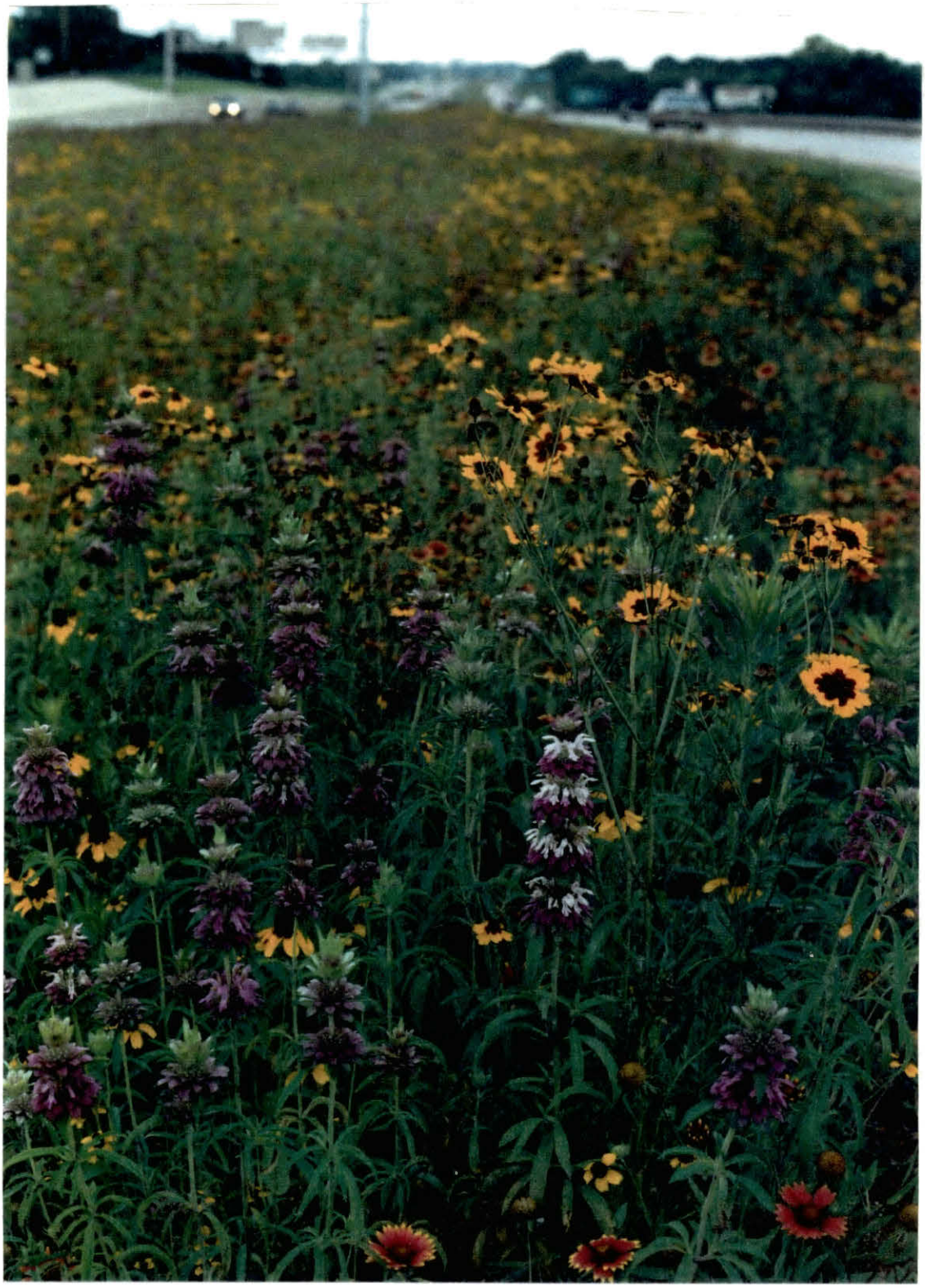

Figure 9. Lemon Mint and Plains Coreopsis in I-35 Median in Oklahoma City Wildflower Plot

90% range; in a bad year, it might be less than 35%. In general, seed that has been wild harvested has a lower germination rate than seed produced in fields. However, a company (and there are not very many in this region of the U.S.) might lose its production fields due to weather or pests and have to rely on wild harvests. Purity can also be a problem. Indian Blanket in particular is very difficult to clean. The machinery to clean wildflower seed is still in the developmental stage, with each company more or less building their own. The equipment that is for sale is very expensive and may not have the capabilities of cleaning some of the Oklahoma species.

The origin of the seed is also important and must be specified. Many of the large wildflower seed producers are located on the east or west coast. They even purchase some of their seed from Europe. Flowers grown in Washington or Oregon may not be properly adapted to the harsher Oklahoma climate, and are probably slightly different from their corresponding Oklahoma species. However, when the wildflower program started, there were not any wildflower seed producers in Oklahoma. Therefore, it was decided early in the program to specify that the seed had to originate from flowers grown in Oklahoma or one of its surrounding states. There have been several native grass seed producers in Oklahoma that are attempting to expand into wildflower production and two of them, Johnston's of Enid and Lorenzo

of Okeene are becoming established. They also have the capabilities of wild harvesting native Oklahoma flowers that are unavailable elsewhere commercially. As they become more established it is to be hoped that ODOT will be able to start planting some indigenous species better suited to our ROW than many of the popular species now available.

Since much of the seed is not completely tested until August and ODOT needs to start planting in September, this means that the seed needs to be purchased in late August or early September. Unfortunately, the bid process can be slow and cumbersome. Also the state employees who award the bid have no experience with wildflower seed and unless the specifications are well written ODOT could end up with poor seed. Sometimes the seed is not clean enough to feed properly through the seeder. Pure, (PLS) live seed is used to specify the quality of seed desired but this is often confusing to people involved in the bid process when comparing seed prices. Again, if the PLS is set too high, then the seed becomes unavailable or prohibitively expensive. Yet if it is set too low, the winning bid might result in poor quality seed. There has also been a lot of pressure to remove the regional requirement on some of the more standardized species such as Oxeye Daisy, Cornflower, Indian Blanket or others that are nationally distributed.

WILDFLOWER SEED SPECIFICATION LIST

AUGUST 14, 1991

All wildflower seed shall be from current production not more than one year old, viable without mold or insect damage. Only seed collected and grown in Oklahoma or one of its adjoining states (Texas, Arkansas, Missouri, Kansas, Colorado or New Mexico) is acceptable. A notarized statement verifying that all seed is of regional origin is required, unless otherwise noted.

Minimum Pure Live Seed (PLS) percentage for Indian Blanket (Gaillardia pulchella) is 50%.
For all other seed species, minimum PLS is 60%.

Seed should be packed in PLS one acre units or less. No bags should weigh more than 15 PLS pounds. For example:

Indian Blanket in 10 PLS pound bags
Indian Paintbrush in 1/4 PLS pound bags
Lemon Mint in 3 PLS pound bags
Texas Bluebonnet in 15 PLS pound bags
Oxeye Daisy in 5 PLS pound bags
Etc.

Bags should be labeled both on the inside and on the outside. All seed must be labeled to comply with the Oklahoma Department of Agriculture Seed Law.

Seed is to be delivered within two weeks of award of bid.

Figure 10. Oklahoma Department of Transportation Seed Specifications

The regular donors are given a list of sources of wildflower seed in the region. The Beautification Office keeps an informal list of the species available from each company and their current prices so that recommendations can be made.

Once the seed begins to arrive planting starts. The department had one seeder the first year, two the second year, and a third was delivered at the end of the 1990 planting season. The original seeder is in poor condition so only two seeders were used in 1991. The northern part of the state is planted first with the last Division planted in south central Oklahoma at about Thanksgiving each year.

Wildflowers need seed/soil contact to germinate yet if planted too deep, they will not germinate. Early efforts used hand broadcasting or small cyclone seeders. They were unsuccessful because the seed did not penetrate the existing vegetation and reach the soil. It was also very time consuming and labor intensive to plant large acreages.

It wasn't until July of 1985 that a wildflower seeder became commercially available. It was based on a much larger machine used as a pasture drill. The J-Thom 80 Wildseeder is a drill seeder designed to plant multiple varieties of wildflower and native grass seed in one application. (Thomas, 85) The small (4') machine used by ODOTis equipped with three separate seed boxes in order to handle the variety of seed types and sizes. Discs slice through

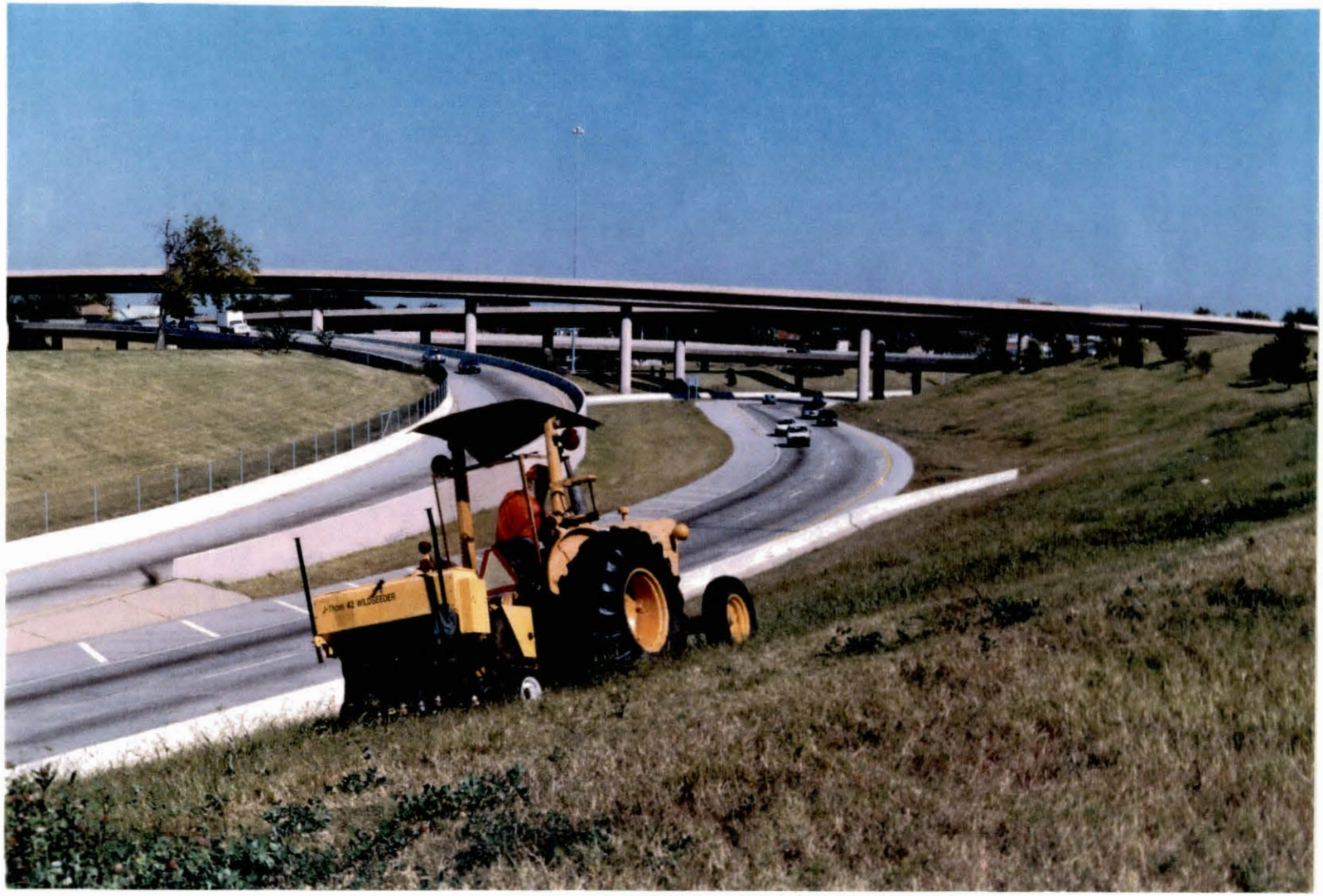

Figure 11. Wildflower Seed Planting in Tulsa

existing vegetation and open the soil. Chains attached to the rear shake the seed down to the soil. The J-Thom works on a three point hitch, is wheel driven and is used with local tractors. This machine was a vast improvement over hand broadcasting and it allowed the department to plant large quantities of seed over existing vegetation.

However there were still some drawbacks. Calibration, (rate per acre of seed planted), of the machine was time consuming and cumbersome. Traveling over the state it was used by local crews who had no previous experience planting wildflowers. Recalibrating the boxes before each application was totally impractical. It was also quickly discovered that the seeder was really not heavy enough to stand up to the travel and rough usage by the highway department. Frequently the machine was not heavy enough to cut through thick, dense stands of existing vegetation or penetrate the hard clay soil.

When the decision was made to purchase another seeder, it was quickly discovered that selection is limited. After much research, ODOT decided to try a heavier machine that works on a different principle. The Befco Green-Rite II is power driven and much easier to calibrate than the J-Thom. The Befco will cut through almost anything even sandstone outcroppings. However, because of its weight, it will pull the tractor down on steep slopes. It also won't work on muddy ground. It is often difficult to hitch to

tractors, and it is time consuming to properly adjust. Indian Blanket is a fluffy, light weight seed and neither seeder does a perfect job of feeding it through the box. The J-Thom does a better job than the Befco which had to have modifications to get it to distribute any Indian Blanket at all. (Appendix E)

Again, the statewide traveling, large variety of tractors, and inexperienced crews are very rough on the equipment and breakdowns are not uncommon. Improvements are hoped for in the design of future wildflower seeders.

In areas where the equipment won't go there are other methods of seeding possible. The important factor is to make sure that the seed gets down to the soil. Hand broadcasting and raking the seed in works, but is extremely time consuming. Often groups volunteer to disc or till the plot previous to planting but this is normally a mistake. Turning over the soil exposes dormant weed seeds and will often turn the wildflower plot into a weed patch. If the existing vegetation is destroyed, erosion control could be a problem. Scalp mowing is helpful when getting the plot ready.

Alternate methods of planting wildflowers are in the infant stages of development. Several companies offer 'wildflower' sod or mulch. The sod is extremely expensive, but is attractive for slopes on new construction where immediate cover is needed. ODOT tested a wildflower blanket

mulch in the spring of 1991. The manufacturer helped install the mulch in the Oklahoma City area. ODOT watered it twice weekly for weeks but nothing but weeds ever grew. Less expensive than the sod it would also have been good for establishment of ground cover on steep slopes. Hydro-mulching is another possible method of planting wildflower seed but has not been tried in Oklahoma.

After the seed is planted, all of the information is recorded on a standard form designed by the ODOT Landscape Specialist. These forms have proved invaluable in evaluating a species performance and in discovering possible variables that would affect the species. (Figure 12).

One unexpected problem with seed storage developed at the end of the 1989 planting season. The germination rate of the seed will deteriorate if not stored properly. A uniform, preferably cool temperature is required. A spot in the air conditioned ODOT offices was unavailable. Besides office space being limited, many people complained that the seed had a strong odor or caused allergy problems. A spot in a shop attic was found for winter storage with plans to move the seed when the weather warmed up in the spring. Mice ate all of it. In 1990 rat poison was purchased. Plans were made to purchase a storage shed and an air conditioner. It was finally decided that the easiest solution was to not have any leftover seed. So all seed is planted each year with none carried over to the next season.

Yukon

4 DIVISION COUNTY Oklahoma OKC HIGHWAY I44 & Woodson (27th) DATE 10-11-88

EXACT LOCATION North bound, east side of exit ramp; backslope right of way along fence. From just south of 29th street sign in a long pie shape extending to 29th st. DONOR OCB

SITE DATA: (20' from curbs)

AREA 1 acre EXPOSURE west SLOPE Moderate SOILS

SITE PREPARATION (AND DATE) Bermuda dense, few weeds-little thatch

METHOD PLANTED (AND NAME OF CREW) Drill seeder, Green; Tipton, Hodde, Walker + T.S.

SEED DATA:

SPECIES	ORIGIN	FIRST BLOOM	LAST BLOOM	DENSITY (per sq.ft.)	HEIGHT	OTHER
1. Coreopsis tinctoria 4 lbs	WS	6/15?		Very	2'	
2. Black eyed Susan 4 lbs	WS					
3.						
4.						
5.						
6.						
7.						
8.						
9.						

GROWTH:

DATE FIRST SPECIES GERMINATED DATE LAST SPECIES FINISHED SEED SET

WHICH SPECIES DIDN"T ESTABLISH

WHICH SPECIES WERE OVERLY AGGRESSIVE

COLOR SEQUENCE

NOTES ON GROWTH 4/27 tiny but lots germinated - 3-4", some bigger, fair coverage - 4/17 still small but healthy, hasn't been mowed - 5/2 was fleabane didn't see any coreopsis 5/23 dense small (6") coreopsis in about a 10' strip most of length of hill. 6/22 Dense coreopsis blooming on whole bank. No Rudbeckia. 6/28 Has been contour mowed - mowed in July 10/18 - Lots of Black-eyed Susan plants + a few blooms

Figure 12. Wildflower Plot Record, Woodson Park 1988

MAINTENANCE: Yukon: Kevin

DATES MOWED _____

DATES WATERED _____

OTHER _____

_____

CLIMATE DATA:

	MARCH	APRIL	MAY	JUNE	JULY 89 / 88	AUGUST	SEPTEMBER	OCTOBER
MONTHLY TEMP: OK C WFSO AP	51.1							
MONTHLY PRECIP	2.72							

DATE OF FIRST FREEZE 11/15 DATE OF LAST FREEZE _____

MISCELLANEOUS COMMENTS:

_____

_____

_____

_____

SIGNATURE: L. Stillings

Figure 12. Plot Record, Backside of Form, Woodson Park 1988

4 DIVISION COUNTY Oklahoma HIGHWAY I44 + 29th DATE 10-18-89

EXACT LOCATION I44 + SW 29th SE Quad - East side of exit ramp from sign (big street) to street (29th) on back slope - pie shaped DONOR OCB + Boner

SITE DATA:

AREA 1/4 acres EXPOSURE west SLOPE Mod SOILS

SITE PREPARATION (AND DATE) Mowed 6" - Thick, healthy Bermuda

METHOD PLANTED (AND NAME OF CREW) Befco - Tipton, Walkers & L.S.

SEED DATA:

SPECIES	ORIGIN	FIRST BLOOM	LAST BLOOM	DENSITY (per sq.ft.)	HEIGHT	OTHER
1. Lemon Mint 4-5 lbs	W.S					
2. Bluebonnet OCB 25#	W.S					Late freeze got - 2.
3. Paintbrush .5 lb	W.S.	5/20			8"-12"	Thin density but even - everywhere
4.						
5.						
6. Rudbeckia from 88		6/4			2'	Patchy
7. + Coreopsis		6/8			18"-2'	
8.						
9.						

GROWTH:

DATE FIRST SPECIES GERMINATED DATE LAST SPECIES FINISHED SEED SET

WHICH SPECIES DIDN"T ESTABLISH

WHICH SPECIES WERE OVERLY AGGRESSIVE

COLOR SEQUENCE

NOTES ON GROWTH 4/9 Lots up but small - coreopsis + a little Bluebonnet 5/23 - Paintbrush evenly + thinly scattered blooming obscured by weeds. Rudbeckia + coreopsis present 6/8 small mint plants - lots of coreopsis plants a few blooming. Rudbeckia patchy but thick + in full bloom. Paintbrush still in full bloom

Figure 12. Plot Record, Woodson Park 1989

4 DIVISION COUNTY OKLAHOMA HIGHWAY I-44 & SW 29th DATE Oct 23, 1990

EXACT LOCATION (Woodson Park), east side of off ramp going north - draining ditch to fence pie shaped, start @ 29th sign DONOR OCB

SITE DATA:

AREA ± 1.5 Acres EXPOSURE west SLOPE _____ SOILS _____

SITE PREPARATION (AND DATE) _____

METHOD PLANTED (AND NAME OF CREW) J. W. - Buffer # 1 + Theresa

SEED DATA:

SPECIES	ORIGIN	FIRST BLOOM	LAST BLOOM	DENSITY (per sq.ft.)	HEIGHT	OTHER
1. Bluebonnet 50#	WS					
2. Indian Paintbrush ½#	WS					
3. Black-eyed Susan 3#	Houston					
4. Plains Coreopsis 3#	Houston					
5.						
6.						
7.						
8.						
9.						

GROWTH:

DATE FIRST SPECIES GERMINATED _____ DATE LAST SPECIES FINISHED SEED SET _____

WHICH SPECIES DIDN"T ESTABLISH _____

WHICH SPECIES WERE OVERLY AGGRESSIVE _____

COLOR SEQUENCE _____

NOTES ON GROWTH 1-14-91 small blue bonnet, BEO & Coreopsis. Also alot dwarf Blue Leaf Blanket & Paintbrush 5/13/91 not much - got irrible. 5/29/91 scattered, blooming Paintbrush, obscured by g...
6/6/91 Victoria - mint blooming but grasses taller, still some Paintbrush.
4/30/92 Paintbrush ich denser than previous years - a good show.

Figure 12. Plot Record, Woodson Park 1990

The first years of the ODOT wildflower program were busy. Although the framework for the program was already in existance all of the working details needed to be arranged and tested. Record keeping was refined each season. With some of the questions resolved, such as the best planting equipment, method, and timing, it should now be possible to draw conclusions about the effects of weather and of weedy competition. Long term results should also shed light on annual versus perennial performance. Evaluation of the plots is now imperative to ensure the continued success of the program.

Figure 13. Oklahoma Department of Transportation Wildflower Plot Sign

CHAPTER V

OKLAHOMA WILDFLOWER PLOTS

Introduction

As the ODOT wildflower program progressed, it quickly became evident that research on the establishment of roadside wildflowers was desirable. As stated earlier, there is little existing literature or formal research on this subject. Most of the information available comes from the experiences of the transportation departments of other states. And of course what works in Minnesota, or even Texas, may not be appropriate in Oklahoma. Funding for Oklahoma wildflower research is unavailable so far.

Since formal research is not currently feasible, the ODOT Beautification Office hopes to answer some of the many questions about Oklahoma roadside wildflower establishment. Problems needing practical answers fall into three categories.

The first is species selection. Which species are best suited for Oklahoma roadsides and what are the optimum site conditions for their growth: soil, moisture, exposure and regional adaptations? Establishment techniques also need to be studied. What is the most effective way to

prepare the site for planting? Which planting methods and equipment are the most effective? How does the existing vegetation affect seedling germination and establishment? Does the timing of the planting make a difference in the successful germination of the wildflowers?

The last category concerns management techniques. The timing of mowing and the height of the mower blades are probably very important to the successful establishment of roadside wildflowers. Would burn management be beneficial for wildflowers? Is overplanting the same site for several years helpful or detrimental in managing roadside wildflowers?

The wildflower program has not been organized or implemented with the intention of answering these questions. However, due to the large volume of data becoming available as each year's plantings are evaluated, a few reliable conclusions may be drawn about answers to some of the questions.

The following list itemizes each one of the ODOT wildflower plots for the first three (1988-1990) planting seasons. A location is included for each plot, the acreage planted and the year(s) planted. The species planted are listed but not all of the listed species were planted every year. For instance, in 1988 only one species may have been planted; then in 1989 several more species may have been added to the plot. Some of the annuals need to be replanted

every year. The source of the funding for each plot is also listed. A brief evaluation of each plot, pertinent site information, unusual planting conditions, and results are included.

Not all of the sites can be checked personally by the Landscape Specialist every spring, so reports by the donors or by local ODOT personnel must be used. These are not always reliable. In particular, ODOT may report little or no bloom, yet other local people may say that there was a good or even spectacular show. On at least two occasions, the specialist was told no flowers and a few days later personally found flowers in full bloom.

Of course the terms "poor show", "fair show", "spectacular show" are all subjective. Some people feel that unless a site looks like a formal garden with solid, continuous bloom, it is a poor show. Others feel that a scattering of flowers in a natural looking setting is spectacular. For purposes of this paper, "poor show" means that while some flowers germinated and bloomed, there were either not enough flowers or the weedy competition was so bad that the flowers were not visible from the road. "Fair show" means that more of the flowers were visible from the road, but they may have been patchy or partially obscured by tall grasses and weeds. Passing motorists may not notice the flowers if they are not looking for them. A "good show" would be one that is noticeable to all motorists, but may

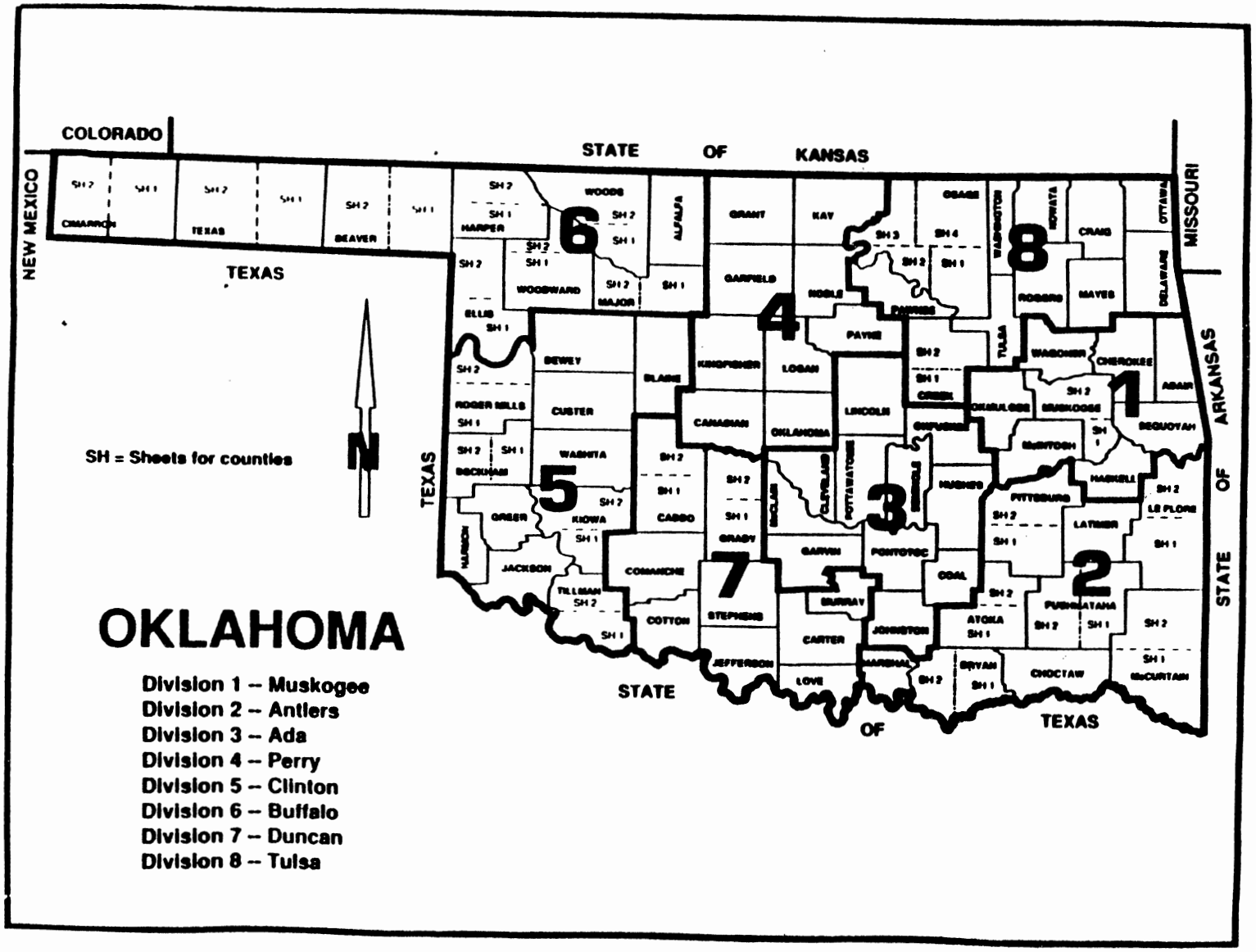

Figure 14. Oklahoma Department of Transportation Statewide Divisions

have been somewhat patchy and uneven. Or maybe there were plenty of blooms but because of color such as the red Indian Blanket on red clay, they were not strikingly visible. A "spectacular show" would be an almost solid blanket of bloom with little weedy competition. There is usually no doubt in anyone's mind that these flowers were planted. The red Corn Poppy and the purple Lemon Mint seem to most often put on the "spectacular shows".

While reports from donors or local ODOT personnel may use these terms they may not mean the same thing to these people consequently sites not personally checked have had very subjective reporting on their status. Even when a site was personally checked one or more times during the spring and summer, it may not have been often enough to fully judge the impact of the flowers at the height of their bloom. Their peak bloom may have occurred between visits. The Oklahoma City sites received the most consistent checking so they are useful for evaluation purposes for central Oklahoma.

Oklahoma Wildflower Sites 1988-1991

Division I - Muskogee

Muskogee County

1. US 69 & Border Street next to railroad bridge, US 69 & US 62 intersection, N.E. & S.E. banks (4 spots - 2 acres, 1989)
   Tickseed, Indian Blanket, Lemon Mint, Mexican Hat, Black-eyed Susan, Dwarf Red Coreopsis
   Muskogee Garden Club & A More Beautiful Muskogee

Site chosen by Muskogee Parks and Recreation. A very dry spring. Plants were stunted, but some bloomed. Lemon Mint, Indian Blanket and Black-eyed Susan did best. Local reports stated that the city mowed early and often.

2. US 69, south of division headquarters on west side - backslope (2 acres, 1989)
Lemon Mint, Tickseed, Plains Coreopsis, Showy Primrose, Paintbrush, Oxeye, Mexican Hat, Clasping Coneflower
Donor Fund
Site chosen by local ODOT personnel. They reported seeing no flowers blooming (except a few paintbrush) either in 1990 or 1991. Site covered with Johnson Grass.

3. US 69, median to US 62 intersection, city limits on south (3 acres, 1988, 1990, 1991)
Corn Flower, Corn Poppy, Toadflax, Lemon Mint, Mexican Hat, Catchfly, Plains Coreopsis
Muskogee Garden Club & A More Beautiful Muskogee
Donor reported a good show of the Corn Flower and Corn Poppy both years. This site is close mown Bermuda and is highly urbanized. It is replanted every fall and flowers are thicker some years than others.

Sequoyah County.

4. I-40, westbound rest area (Sallisaw), I-40 on-ramp, north backslope (1 acre, 1990)
Bluebonnets, Paintbrush, Tickseed
Donor Fund
Thick Bermuda. Local ODOT reports poor to fair show, but species need longer to become established.

Cherokee County

5. US 62, 1 mile east of US 62 and SH 82 jct. (Tahlequah), south side backslope
(1/2 acre, 1990)
Bluebonnet, Missouri Primrose, Showy Primrose
Donor Fund
Bermuda, urban area. Nothing bloomed (local ODOT report) but too soon to evaluate.

6. US 62, Eldon Hill, north end, bottom section
(1 acre, 1990)
Tickseed
Donor Fund
A steep terraced mountainside. Erosion mat over rock sides. Pines have been planted on terraces. Natives and Lespedeza growing from mat. Tickseed hand

broadcast.

7. US 62, right-of-way on north side of US 62
(1 acre, 1990)
Missouri Primrose, Lemon Mint, Plains Coreopsis
Donor Fund
Thick Bermuda. No reports of flowers blooming.

8. US 62, roadside park, 2 miles east of jct. SH 82 (south of Tahlequah), both sides of park
(1 acre, 1990)
Phlox, Showy Primrose, Indian Blanket
Donor Fund
Local ODOT reported poor show, only Indian Blanket bloomed. Have reason to suspect premature mowings; close mown Bermuda.

Division II - Antlers

Leflore County

1. SH 1 (Talimena Drive)
(19 acres, 1989)
Tickseed, Purple Coneflower, Purple Prairie Clover, Black-eyed Susan, Lemon Mint, Oxeye Daisy, Evening Primrose, Plains Coreopsis, Drummond Phlox, Showy Primrose, Mexican Hat, Gayfeather, Pitcher Sage, Larkspur, Bluebonnet
U.S. Forest Service
Planted at turnouts spring of 1989 and along ROW on Oklahoma's eastern half of drive the fall of 1989. Mown Bermuda or Lovegrass, very rocky rough soil. Reports of flowers blooming spring 1990 and numerous reports spring 1991. Tickseed and Oxeye Daisy strong show. Late June 1991 saw 2'-3' tall thick stands of Lemon Mint, Mexican Hat, Black-eyed Susan, Plains Coreopsis, and Purple Coneflower. Very impressive.

Bryan County

2. US 70 - Median on west side of Durant
(1 acre, 1990, 1991)
Corn Poppy, Cornflower
Durant Car Club
Close mown, dense Bermuda, drainage swale. Donor reported nothing bloomed. But several residents independently reported very showy (they were not aware that ODOT had planted it).

3. US 69 & US 70 - N.W. Quadrant

3. US 69 & US 70 - N.W. Quadrant
(1 acre, 1990)
Indian Blanket, Oxeye Daisy, Corn Poppy, Plains Coreopsis, Lemon Mint, Black-eyed Susan
Durant Car Club
Very thick, not mown, Bermuda, natives and patches of Johnson Grass. Donor reported poor to fair show. Flowers obscured by existing vegetation.

4. US 69 & SH 22, N.W. Quadrant
(1 acre, 1990)
Bluebonnets, Indian Paintbrush, Clasping Coneflower, Oxeye Daisy
Caddo Community.
Donor said little bloomed spring of 1991. However, spring 1992 might be better - native, natural existing vegetation.

Pittsburg County

5. US 69 & Electric Street (McAlester), N.W. Quadrant, south of ramp
(2 acres, 1990)
Showy Primrose, Plains Coreopsis, Lemon Mint
State Garden Council
Mown Bermuda and natives. Local ODOT reported good show.

6. US 69 & Electric Street (McAlester), N.W. Quadrant, north of ramp, beginning at fence
(3 acres, 1990)
Purple Coneflower, Clasping Coneflower, Plains Coreopsis State Garden Council
Mown Bermuda and natives, poor drainage in much of site.
Local ODOT reported lots of yellow flowers.

7. US 69 Business, median in town where 69B divides
(1-1/2 acres, 1990)
Corn Poppy, Plains Coreopsis, Lemon Mint
State Garden Council
Existing close mown Bermuda highly urbanized. City crews mowed median before flowers bloomed.

Division III - Ada

Seminole County

1. I-40 - Seminole rest area - eastbound on-ramp
(1 acre, 1987)

Indian Blanket
Wildseed
This is an original planting and probably the most successful. Was a close mown Bermuda slope. Flowers thick every year since. They reseed naturally.

2. I-40 - Seminole rest area, eastbound, off-ramp
(1 acre, 1987, 1988, 1989)
Indian Blanket, Lazy Daisy, Lemon Mint, Tickseed
Donor Fund
Very close mown Bermuda. Original planting was only Indian Blanket and not very showy. Plants are established but have never been extremely dense or tall. Often look as if they have been recently mowed although staff swears they haven't. Poor, dry, sandy soil.

3. I-40 - Seminole rest area, westbound, off-ramp
(1 acre, 1988, 1989, 1990)
Indian Blanket, Lazy Daisy, Lemon Mint, Tickseed, Black-eyed Susan, Showy Primrose
Donor Fund
Very close mown Bermuda. Very poor show spring of 1989. 1990 & 1991 springs better results, but again flowers not very dense and look stunted. Dry, sandy soil. Bermuda also thin and poor. Indian Blanket and Lazy Daisy best results.

4. I-40 - Seminole rest area, westbound, on-ramp
(1 acre, 1990)
Indian Blanket, Showy Primrose, Plains Coreopsis, Lemon Mint, Black-eyed Susan, Liatris
Donor Fund
Very close mown Bermuda. Local ODOT said site performed well and didn't need to be reseeded.

<u>Pottawatomie County</u>

5. US 177 at Kickapoo Spur (Shawnee), S.W. exit, both sides of ramp
(1-1/2 acres, 1988, 1989, 1990)
Indian Blanket, Lemon Mint, Plains Coreopsis, Lazy Daisy, Paintbrush, Showy Primrose, Tickseed, Dwarf Plains Coreopsis.
Shawnee Garden Council
First year planted only 2 lbs. of Indian Blanket which bloomed but was not noticeable. Lots of natural wild-flowers on site. Spring of 1990, Indian Blanket, Paintbrush, Mint and Coreopsis blooming lots of natives present and site very natural looking, rather than showy. Spring 1991 similar results.

6. US 177 at Kickapoo Spur (Shawnee) southeast of US 177
(1-1/2 acres, 1990)
Indian Blanket, Clasping Coneflower, Showy Primrose, Lemon Mint, Tickseed, Dwarf Red Plains Coreopsis, Corn Poppy
Shawnee Garden Council
Existing vegetation a dense winter grass. Local ODOT reported later that site also has been heavily polluted in past. Nothing germinated or bloomed spring 1991.

7. I-40 & Kickapoo (Shawnee Mall), both sides of on-ramp
(1-1/2 acres, 1989, 1990)
Indian Blanket, Oxeye Daisy, Lemon Mint, Plains Coreopsis, Missouri Primrose, Purple Coneflower, Paintbrush, Black-eyed Susan, Clasping Coneflower, Liatris
Shawnee Garden Council
Thick Bermuda and natives, poor show spring 1990 but was mowed too early. Also seeder not working properly for 1989 planting. Spring 1991 portions were dense Indian Blanket and Lemon Mint. Mint very showy in June. East end of site mowed in May. Some patches where flowers were obscured by weeds.

Cleveland County

8. I-35 & Shields Boulevard, north median
(4 acres, 1988, 1989)
Indian Blanket, Lemon Mint, Oxeye Daisy, Plains Coreopsis, Mexican Hat, Black-eyed Susan
Oklahoma City Beautiful
Site large meadow type median, very poor soil and existing vegetation (natives) sparse. Native flowers good in 1989 and also disappeared in 1990 and 1991. Spring 1989 Indian Blanket put on good show, but site mowed in June before Mint and Black-eyed Susan were in full bloom. Spring 1990 and 1991 very poor showing, although there were several large patches of Black-eyed Susan.

9. I-35 & Shields Boulevard, south median
(3 acres, 1988, 1989)
Cornflower, Lemon Mint, Yarrow, Plains Coreopsis, Lazy Daisy
Oklahoma City Beautiful & Donor Fund
Large meadow, has more and denser vegetation than north median. Only cornflower planted fall 1988 and spring 1989 put on a fair show. Spring 1990 and 1991 there were several large "drifts" of Lemon Mint, but nothing else bloomed. Both medians planned for construction so haven't replanted.

10. I-35 and Main Street (Norman), N.W. Quadrant
(1 acre, 1990)
Indian Blanket, Oxeye Daisy, Corn Poppy, Plains Coreopsis, Clasping Coneflower, Lemon Mint, Liatris
State Garden Council
Thick existing vegetation. In May 1991 saw some scattered plants. Tinctoria only thing that bloomed in June.

11. I-35 & SH 77 (Norman north campus exit), south median
(2 acres, 1990)
Oxeye Daisy, Corn Poppy, Indian Blanket, Plains Coreopsis, Clasping Coneflower, Lemon Mint, Liatris
State Garden Council
Thick native vegetation. Late May 1991 saw some Tinctoria and Oxeye Daisy plants, but nothing bloomed in June.

12. I-35 & US 77 (Purcell), median south of interchange
(3 acres, 1990, 1991)
Black-eyed Susan, Oxeye Daisy, Catchfly, Cornflower, Lemon Mint, Paintbrush, Tickseed, Red Clover, Indian Blanket, Lazy Daisy, Purple Coneflower
Purcell Extension Homemakers
Large, totally natural meadow-type median. Rural setting. Brush hogged normally only once or twice a year. Large areas of Love Grass, very thick hay mulch. Spring 1991 not much bloomed, some Paintbrush and Mint. Replanted fall 1991 (during snowstorm) with native Oklahoma species.

Division IV - Perry

Payne County

1. US 51 - 1/2 mile west of Stillwater city limits, median
(1 acre, 1989, 1991)
Indian Blanket, Daisy, Both Coreopsis, Black-eyed Susan, Purple Coneflower, Yarrow, Lemon Mint
Southwestern Bell Pioneers & Donor Fund
New seeder caused problems and seed planted unevenly. A few Indian Blanket bloomed in 1990. In 1991 large area of Oxeye bloomed (May) in center of plot. Very striking. Tickseed bloomed in patches around Oxeye area. Edges of plot were sprayed early in 1990 so replanted perimeter with Oxeye, Tickseed, and added Lemon Mint in fall 1991. Some vetch and thistle competition.

2. US 51 & I-35 - S.E. Quadrant.
(1 acre, 1990)
Plains Coreopsis, Rocket Larkspur, Black-eyed Susan, Indian Blanket
Southwestern Bell Pioneers
Nothing bloomed spring 1991. Plot has dense existing vegetation, including thick Johnson Grass.

3. US 51 & I-35 - N.W. Quadrant
(1 acre, 1990, 1991)
Lemon Mint, Plains Coreopsis, Indian Blanket, Oxeye Daisy, Tickseed, Larkspur, Mexican Hat, Lazy Daisy, Purple Prairie Clover, Cornflower
Donor Fund, Bell Telephone
On March 22, 1991, 7/8 of plot burned in grass fire. Remaining area had numerous Indian Blanket plants. On June 10, 1991, patches of Lemon Mint, Indian Blanket and Plains Coreopsis were blooming. Existing vegetation was weedy, but not dense. Much thistle. Replanted site in 1991 and added five species.

4. I-35 - Backslope opposite northbound truck pull-out
(1 acre, 1990)
Indian Blanket, Showy Primrose, Purple Coneflower
Donor Fund & Department of Corrections
Thick existing vegetation. On May 29, 1991, some Indian Blanket blooming, but not showy. Existing vegetation obscured bloom.

5. I-35 - Backslope at southbound truck pull-out
(1/2 acre, 1990)
Indian Blanket, Showy Primrose, Plains Coreopsis
Donor Fund and Department of Corrections
May 24, 1991 - Indian Blanket blooming, fair show

<u>Logan County</u>

6. I-35 - Backslope between mainline & southbound Guthrie rest area
(1 acre, 1990)
Indian Blanket, Showy Primrose, Plains Coreopsis
Donor Fund
Was mowed twice in April and early May by accident. On June 10, 1991, had Indian Blanket and large patches of Plains Coreopsis blooming. Was kept close mowed rest of summer. Local maintenance protested location of plot and will probably be eliminated in 1992.

7. I-35 - Backslope at off-ramp of northbound Guthrie rest area
(2 acres, 1989 & 1990)
Purple Prairie Clover, Indian Blanket, Showy Primrose,

Figure 15. Lemon Mint, Oklahoma City Plot

Lemon Mint, Purple Coneflower, Clasping Coneflower, Tickseed, Black-eyed Susan
Donor Fund
June 6, 1990 - Not highly visible but Purple Prairie Clover, Lemon Mint and Black-eyed Susan blooming. Site very native in type of existing vegetation and not too dense. Sandy soil. May 14, 1991 Tickseed showy.

8. I-35 - Backslope south of southbound Guthrie rest area on-ramp.
(1 acre, 1989)
Indian Blanket, Purple Coneflower, Tickseed, Clasping Coneflower, Lazy Daisy
Donor Fund
Site sandy and too steep for seeder in some spots. June, 1990 Plains Coreopsis blooming at base of slope. Natural flowers blooming on site.

9. I-35 - southbound Guthrie rest area, adjacent to on and off ramps
(1 acre, 1987)
Indian Blanket, Wildseed
Mowed Bermuda adjacent to rural areas. Reseeds well, is dense and puts on good show every year.

Kay County

10. I-35 - Blackwell rest area, backslopes of ramps
(3 acres, 1989, 1990, 1991)
Indian Blanket, Clasping Coneflower, Lazy Daisy, Plains Coreopsis, Lemon Mint
Donor Fund
Very close mown Bermuda, dry site. Spring 1990, local ODOT reported southeast and northwest ramps put on a good show - southwest and northeast were only poor to fair display. Rest area in 1990 had only 4" of rain.

11. US 60 at Tonkawa interchange - median
(1 acre, 1990)
Indian Blanket, Lemon Mint, Clasping Coneflower, Black-eyed Susan, Plains Coreopsis, Showy Primrose
Tonkawa Chamber of Commerce & Donor Fund
Mown thick Bermuda. Spring 1991 donor reported Indian Blanket and Lemon Mint did well, local ODOT not impressed.

Oklahoma County

12. I-35 and SH 66 - Edmond Interchange, N.W. & S.W. Quadrants
(3 acres, 1988 & 1989)
Indian Blanket & Black-eyed Susan

Keep Edmond Beautiful
Recently graded sites planted in 1988. Spring 1989 put on a very good show (color blended with bare soil). Site has reseeded well every year but weeds (yellow clover, thistle, etc.) are getting worse and detract from appearance.

13. I-35 and SH 66 - Edmond, S.W. backslope
(1/2 acre, 1989)
Indian Blanket, Black-eyed Susan, Showy Primrose, Evening Primrose, Lemon Mint
Donor Fund
Newly sodded Bermuda on slope. Flowers, especially Lemon Mint and Black-eyed Susan did extremely well, but weeds obscured much of them. Spring 1991 not as good as 1990.

14. I-35 and SH 66 - Edmond, S.E. Quadrant
(2 acres, 1989)
Indian Blanket, Black-eyed Susan, Lemon Mint, Oxeye Daisy
Keep Edmond Beautiful
Well established Bermuda. Very nice, natural plot loaded with healthy flowers. Weedy but same height as flowers so was a very good show. Everything bloomed, Oxeye first then Indian Blanket, Black-eyed Susan and last, the Lemon Mint.

15. I-35 & 15th Street, N.W. Quadrant
(1 acre, 1989 & 1990)
Lemon Mint, Oxeye Daisy, Black-eyed Susan, Plains Coreopsis
Keep Edmond Beautiful
Close mowed Bermuda. Plants germinated well but plot mowed prematurely early June of 1990. Spring 1991 Oxeye bloomed. Black-eyed Susan and Mint bloomed only on the south facing slope.

16. I-35 & Memorial, N.W. Quadrant below ODOT sign shop
(3 acres, 1990, 1991)
Indian Blanket, Tickseed, Oxeye Daisy, Black-eyed Susan, Lemon Mint, Plains Coreopsis, Clasping Coneflower, Showy Primrose
Keep Edmond Beautiful
Attractive site with lots of natural Plains Coreopsis. Large part is a "seep". Flowers thinly scattered and small, so didn't make much of an impact.

17. I-35 & Memorial - N.W. Quadrant, north of ramp
(2-1/2 acres, 1990)
Plains Coreopsis, Lemon Mint, Clasping Coneflower, Showy Primrose

Keep Edmond Beautiful
Dry Bermuda. Very poor show spring 1991.

18. I-35 & 122nd - S.W. Quadrant
(4 acres, 1988, 1989, 1990)
Indian Blanket, Lemon Mint, Oxeye Daisy, Plains Coreopsis, Black-eyed Susan, Lazy Daisy
Oklahoma City Beautiful & Donor Fund
Large natural looking site - Bermuda & natives. Flowers bloomed in drifts and large patches. Good show spring 1990 and 1991, but not striking. Indian Blanket most prolific, Lemon Mint and Oxeye also bloomed.

19. I-35 and 122nd - S.E. Quadrant
(3 acres, 1988 & 1989)
Indian Blanket, Lemon Mint, Lazy Daisy, Black-eyed Susan
Donor Fund
Another large site, very dry, mostly Bermuda. Very good show spring 1990 and 1991. Indian Blanket and Lemon Mint spectacular in large patches. Construction on site.

20. I-35 & Wilshire Blvd. - N.W. Quadrant
(1-1/2 acres, 1988, 1989, 1990)
Indian Blanket, Lemon Mint, Plains Coreopsis, Black-eyed Susan, Lazy Daisy
Sparse Bermuda. Nothing bloomed spring 1989 - only Coreopsis and Black-eyed Susan put on a very good show (it's a biannual) and Indian Blanket and Lemon Mint also bloomed. Spring 1991 the Indian Blanket and Lemon Mint were predominant and put on a good show, but not as flashy as the yellow in 1990. Weeds are a problem!

21. I-35 Median - North till it ends - <u>5' from pavement</u>
(8 acres, 1990, 1991)
Indian Blanket, Lemon Mint, Clasping Coneflower, Plains Coreopsis, Black-eyed Susan
Oklahoma City Beautiful
Thin Bermuda, large compacted areas of clay from traffic on the median. Spring 1991 median was spectacular - everything bloomed. Lemon Mint was last and put on best show. Only bare spots were from traffic. Very north end had a weed problem from new top soil.

22. I-44 - 2 backslopes east of M. L. King interchange on south side
(1-1/2 acres, 1988, 1989, 1990)
Cornflower, Corn Poppy, Tickseed, Plains Coreopsis, Oxeye Daisy, Standing Cypress, Black-eyed Susan
Oklahoma City Beautiful

Only Cornflower and poppy planted in 1988. Lots germinated but dry spring and late freezes seemed to kill many, put on a fair show spring 1989. Spring 1990 another fair show with Plains Coreopsis and some natural white flowers giving a meadowlike appearance. Spring 1991 Tickseed the main bloomer, again only a fair show. Sites are north facing, very poor soil, sparse Bermuda with large eroded areas.

23. I-44 & M. L. King - S.E. Quadrant west of ramp
(1-1/2 acres, 1988, 1989, 1990)
Black-eyed Susan, Plains Coreopsis, Lemon Mint, Oxeye Daisy, Indian Blanket
Oklahoma City Beautiful
Gravelly site, poor soil - thin Bermuda. Spring 1989 only scattered bloomers. Spring 1990 good show with lots of Black-eyed Susan and Indian Blanket. Spring 1991 spectacular show with Indian Blanket and Lemon Mint predominant - everything bloomed.

24. I-44 & M. L. King - S.E. Quadrant east of ramp
(1-1/2 acres, 1988, 1989, 1990)
Black-eyed Susan, Oxeye Daisy, Plains Coreopsis, Lemon Mint, Cornflower, Standing Cypress
Oklahoma City Beautiful
Very poor soil, little existing vegetation. Almost nothing bloomed spring of 1989. Lots of small plants spring 1990, but mowed prematurely before blooming. Spring 1991 good show - plants and blooms smaller than other side of ramp.

25. I-44 & M. L. King - N.E. Quadrant
(1 acre, 1988, 1989, 1991)
Larkspur, Indian Blanket, Lemon Mint, Tickseed, Yarrow, Clasping Coneflower, Evening Primrose, Mexican Hat, Lazy Daisy
Oklahoma City Beautiful & Donor Fund
Site almost bare soil and sandstone outcroppings. spring 1989 good Larkspur bloom on west end where there is a Bermuda cover and more moisture. Site replanted in 1989 with tougher natives. Plants germinated but in rocky areas very stunted, fair show. Spring 1991, better show with some Tickseed and mostly Indian Blanket.

26. I-44 - below Cowboy Hall of Fame
(1-1/2 acre, 1988, 1989, 1990)
Cornflower, Corn Poppy, Yarrow, Tickseed, Lemon Mint, Showy Primrose, Plains Coreopsis, Clasping Coneflower
Oklahoma City Beautiful
Clay site with poor drainage (has a spring on it). Cornflower bloomed in a few 'drifts' but not very

Figure 16. Lemon Mint and Plains Coreopsis, Oklahoma City Wildflower Plot

striking from road. Replanted in 1989 with natives. Both Coreopsis bloomed spring 1990 but patchy. Spring 1991 much better - Lemon Mint and both Coreopsis put on a good show.

27. I-44 & Grand - N.W. Quadrant
(1 acre, 1990)
Lemon Mint, Plains Coreopsis, Indian Blanket, Black-eyed Susan
First Interstate Bank
Thick Bermuda. Large patches of Lemon Mint and Black-eyed Susan in June 1991.

28. I-44 & Kelly - N.W. Quadrant, to pavement
(1 acre, 1990)
Lemon Mint, Plains Coreopsis, Indian Blanket, Black-eyed Susan
First Interstate Bank
Thick Bermuda. Scattered bloom, poor show.

29. I-44 & Broadway Extension - N.E. circle to pavement
(1-1/2 acres, 1988, 1989, 1990)
Cornflower, Corn Poppy, Tickseed, Indian Blanket, California Poppy, Plains Coreopsis, Lemon Mint, Showy Primrose, Paintbrush, Black-eyed Susan, Larkspur
Oklahoma City Beautiful & Donor Fund
Close mown Bermuda. Local maintenance crew has trouble remembering not to spray or mow outer edge so to pavement part has never worked. Good to spectacular shows every spring. Perimeter of circle and Broadway Extension slope best cover. Inner circle has only thin bloom.

30. I-44 & Broadway Extension, N.W., S.W. & S.E. circles
(3 acres, 1988 & 1990, 1991)
Cornflower, Corn Poppy, Lemon Mint, Clasping Coneflower, Plains Coreopsis, Oxeye Daisy
Oklahoma City Beautiful
Close mown Bermuda. Spring 1989 very poor show. Cornflower bloomed only in small patches; almost no poppy. Replanted fall 1990. Early spring 1991 was dry but Cornflower put on a fair (late) show. N.W. circle was the best. Again, center of circles had very few wildflowers. Not much poppy bloomed.

31. I-44 & Broadway Extension, S.E. triangle
(1 acre, 1988, 1990)
Indian Blanket, Lemon Mint, Black-eyed Susan, Tickseed, Plains Coreopsis
Oklahoma City Beautiful
Close mown Bermuda. Very good show every spring. Indian Blanket consistently prolific. Spring 1991

Figure 17. Oklahoma City Plot, I-44 & Broadway Extension

Lemon Mint was predominant.

32. I-44 & Broadway Extension - S.W. triangle
(1 acre, 1988, 1990)
Indian Blanket, Lemon Mint, Black-eyed Susan, Tickseed, Plains Coreopsis
Oklahoma City Beautiful

Close mown Bermuda. Better than the S.E. triangle, not as many weeds. Indian Blanket as close to spectacular as possible but not as striking as the brighter colors. Yellows haven't started blooming yet in this plot.

33. Broadway Extension, 36-50th median to pavement
(1 acre, 1990, 1991)]
Indian Blanket, Black-eyed Susan, Oxeye Daisy, Lemon Mint, Plains Coreopsis, Clasping Coneflower
Oklahoma City Beautiful
Close mown, sparse Bermuda. Drainage ditch. Flowers, mostly Indian Blanket and Lemon Mint bloomed on sides of ditch. Bottom didn't bloom. Flowers put on a good show but it is a very ugly site. Large bare patches from traffic and pollution.

34. I-44 and S.W. 29th (Woodson Park) S.E. Quadrant, east of ramp to fence
(1-1/2 acres, 1988, 1989, 1990)
Black-eyed Susan, Plains Coreopsis, Bluebonnet, Paintbrush, Lemon Mint
Oklahoma City Beautiful
First two species only ones planted in 1988. Thick, dense, (6"-8" tall) Bermuda. Plains Coreopsis spectacular spring 1989. Other species planted in 1989. Only fair shows spring 1990 and 1991. Healthy, evenly scattered plants, but obscured by grasses. Very few Bluebonnets.

35. I-44 and N.W. 10th (Fairgrounds) S.W. Quadrant, triangle
(2 acres, 1988, 1989, 1990)
Black-eyed Susan, Cornflower, California Poppy, Plains Coreopsis, Oxeye Daisy, Lemon Mint
Oklahoma City Beautiful
Very poor show of Phlox spring 1989. Additional species planted fall 1989. Mint & Coreopsis germinated, but were close mown late May of 1990. Replanted fall 1990. Only thing that bloomed (fair show) was Lemon Mint spring 1991. Tall broadleaf weeds obscured flowers.

36. I-44 and N.W. 10th (Fairgrounds) S.W. Quadrant, circle
(1 acre, 1988, 1989, 1990)

Lemon Mint, Plains Coreopsis, Black-eyed Susan, Cornflower
Oklahoma City Beautiful
Bermuda with lots of vetch in center. 1989 spring Cornflower put on good show wherever not vetch. Plains Coreopsis and Black-eyed Susan did the same in spring 1991, not very impressive. Mowed spring 1990.

37. I-44 & S.W. 44th - between access road & mainline, fence to pavement
(1 acre, 1988, 1989, 1990, 1991)
Corn Poppy, Cornflower
Oklahoma City Beautiful
Thick, but close mowed Bermuda. Spring 1989, loaded with plants but sprayed from both sides, had a 1' - 2' wide strip of flowers down the middle. Spring 1990 mowed before it could bloom again; good germination. Spring 1991 spectacular show of Corn Poppy.

38. I-44 & Airport - Exit 116B, west side
(4 acres, 1990)
Clasping Coneflower, Plains Coreopsis, Lemon Mint, Indian Blanket
Oklahoma City Beautiful
Dense Bermuda. Everything bloomed, a good show. Natural looking site.

39. I-44 & Airport - Median south of 116B
(4 acres, 1990)
Clasping Coneflower, Plains Coreopsis, Lemon Mint, Indian Blanket
Oklahoma City Beautiful
Dense Bermuda and natives. Meadow-type situations loaded with plants especially Indian Blanket. Good show but site was mowed while Lemon Mint in full bloom.

40. I-44 & Lawton - N.E. Quadrant, circle
(4 acres, 1988, 1989, 1990)
Cornflower, Indian Blanket, Lemon Mint, Clasping Coneflower
Oklahoma City Beautiful
Bermuda and natives poor soil and drainage. Grass thick on slopes, thinner elsewhere. Only Cornflower planted in 1988. Bloomed in large drifts spring 1989. Only fair show because visibility very poor from highway. Pastels blended into surrounding grasses. Spring 1991 very good show. Natural looking and yellows striking.

41. I-44 and Lawton - N.E. Quadrant, triangle
(4 acres, 1988, 1989, 1990)
Cornflower, Indian Blanket, Lemon Mint, Plains

Figure 18. Plains Coreopsis, Oklahoma City Wildflower Plot

Coreopsis, Clasping Coneflower, Lazy Daisy, Showy Primrose
Oklahoma City Beautiful
Very poor soil and thin vegetation. Only Cornflower planted 1988. Bloomed only in a few patches where existing vegetation was also better. Spring 1990 very little bloom, small stunted plants. Spring 1991 very good shows. Plants and blooms very small (some thesize of my fingernails) but prolific. Mint and Coreopsis predominate.

42. I-35 & I-240 (Crossroads Mall) S.W. Quadrant, circle
(1 acre, 1988)
Black-eyed Susan, Plains Coreopsis
Oklahoma City Beautiful
Thick Bermuda, lots of Johnson Grass. Each spring Coreopsis and Black-eyed Susan have bloomed in patches (approximately 1/4 of site). Even though weedy site, fairly attractive and natural looking.

43. I-35 & I-240 (Crossroads Mall) N.E. Quadrant, triangle to curb
(1 acre, 1988, 1989, 1990)
Black-eyed Susan, Plains Coreopsis, Oxeye Daisy, Evening Primrose, Lemon Mint, Indian Blanket & Showy Primrose
Oklahoma City Beautiful and Donor Fund
Close mowed Bermuda. Only first two species planted in 1988. Very little bloomed in 1989. Spring 1990 good show. Mostly Indian Blanket and Black-eyed Susan. Very good show spring 1991. Solid Indian Blanket and later Mint. Weeds becoming a problem.

44. I-40 & Douglas Boulevard, N.E. & S.E. triangles
(1-1/2 acres, 1989)
Indian Blanket, Lazy Daisy, Plains Coreopsis, Lemon Mint, Black-eyed Susan
Donor Fund
Bermuda. Good show every spring, mostly Indian Blanket

45. I-40 & Douglas Boulevard, S.E. & N.E. Circles
(2 acres, 1989, 1990)
Indian Blanket, Lemon Mint, Clasping Coneflower, Cornflower, Lazy Daisy
Donor Fund
Bermuda, dry sites. Fair to good shows both springs. Mostly Indian Blanket and patchy.

46. I-40 & Douglas Boulevard, N.W. & S.W. Circles
(2 acres, 1989)
Indian Blanket, Lazy Daisy, Plains Coreopsis, Lemon Mint, Black-eyed Susan

Donor Fund
Very ugly, trashy dry sites. Bermuda and bare soil. Vetch a problem in N.W. circle. Indian Blanket put on fair to good show than Lemon Mint.

Division V - Clinton

Custer County

1. I-40 & US 183 (Clinton), S.E. Quadrant, south of on-ramp
(1-1/2 acres, 1988, 1989, 1990)
Indian Blanket, Lazy Daisy, Purple Coneflower, Black-eyed Susan, Plains Coreopsis, Purple Prairie Clover
Donor Fund
Very dense Bermuda, thick thatch on south facing slope. No reports first spring (1989) but only Indian Blanket had been planted. Spring 1990 ODOT locals said slope had burned. June 26, 1990, visitor found site mowed but lots of plants in unmowed ditch. Spring 1991 ODOT locals said poor show plants obscured by tall grass.

2. I-40 (Weatherford), north side of I-40 near exit 82
(2 acres, 1989)
Indian Blanket, Lazy Daisy, Black-eyed Susan, Lemon Mint, Purple Prairie Clover, Mexican Hat
Donor Fund
Very sandy site, seeder not working properly and Indian Blanket was hand broadcast. Road construction on site during winter. No reports of flowers, however, site was mowed early.

3. US 281 (Watonga), east side of US 281, one block south of "4 corners"
(2 acres, 1990)
Indian Blanket, Black-eyed Susan, Plains Coreopsis, Lemon Mint, Purple Prairie Clover, Mexican Hat
Watonga Chamber of Commerce
spring 1991 donor said very poor show, but a personal check on June 12 showed thick showy Mint, Indian Blanket, Black-eyed Susan and Mexican Hat. Patches of tall weeds seriously obscured some areas. Site city maintained and
city is going to try some hand mowing and weeding spring 1992 to try and control weeds.

Beckham County

4. I-40 (Texas Border), 1 mile east of border on south
(1-1/2 acres, 1990)

Purple Prairie Clover, Tickseed, Black-eyed Susan, Lemon Mint, Plains Coreopsis
Donor Fund
Mowed but thick natives. No reports spring 1991.

5. I-40 - Erick rest area - eastbound at entry ramp
(2 acres, 1989, 1990)
Indian Blanket, Black-eyed Susan, Plains Coreopsis, Lemon Mint, Lazy Daisy
Donor Fund
Sandy soil, sparse Bermuda. Indian Blanket and Lazy Daisy good show.

6. I-40 - (Erick rest area - westbound at entry ramp
(1 acre, 1989, 1990)
Indian Blanket, Black-eyed Susan, Plains Coreopsis, Lemon Mint, Lazy Daisy
Donor Fund
Sandy soil, sparse Bermuda. Indian Blanket and Lazy Daisy good show.

Kiowa County

7. SH 44 & SH 99 (Lone Wolf), in front of bank
(1/2 acre, 1989)
Indian Blanket, Lemon Mint, Black-eyed Susan, Lazy Daisy, Clasping Coneflower, Plains Coreopsis
Lone Wolf Home Extension & Donor Fund
No reports.

Greer County

8. US 283 & SH 9 (Mangum)
(3/10 acre, 1988)
Indian Blanket
Chamber of Commerce
I was not involved in this plot in any way. All reports say poor or no show. Very weedy.

9. SH 34, south of Mangum
(3/10 acre, 1988)
Indian Blanket, Cornflower, Plains Coreopsis, Scarlet Flax, Black-eyed Susan
Chamber of Commerce
I was not involved in this plot in any way. All reports say poor or no show

Tillman County

10. US 183 at Frederick, north town sign
(1 acre, 1990)
Cornflower, Corn Poppy, Indian Blanket

Frederick
spring 1991 - Donor says no show - have had no rain.

11. US 183 (Frederick), roadside park south of town
(1 acre, 1990)
Scarlet Flax, California Poppy
Frederick
spring 1991 - Donor says no show - have had no rain.

12. US 5 (Frederick), right-of-way west of town
(1 acre, 1990)
Indian Blanket, Lemon Mint, Black-eyed Susan
Frederick
spring 1991 - Donor says no show - have had no rain.

Jackson County

13. Broadway & Kellywood (Altus), S.E. corner
(2-1/2 acres, 1989)
Indian Blanket, Black-eyed Susan, Plains Coreopsis, Lazy Daisy
Altus Parks & Recreation
Planted on city-owned and maintained property. No reports.

Division VI - Buffalo

Texas County

1. US 54 & SH 3 (Guymon)
(1 acre, 1990)
Indian Blanket, Plains Coreopsis, Oxeye Daisy, Showy Primrose, Black-eyed Susan
Guymon Chamber of Commerce
I was not present for planting. June 1991 a visit found no plants or blooms of any type. Site very sparse vegetation.

Woodward County

2. US 270, Roadside Park south of Woodward
(1/3 acre, 1990)
Purple Prairie Clover, Tickseed
Donor Fund
Sandy soil with Bermuda cover. Lots of natural Indian Blanket on site. Perennials not due to bloom until 1992.

3. US 270 & SH 34, north of jct. 1/4 mile, west of US 270
(2 acres, 1990)

Indian Blanket, Clasping Coneflower, Lemon Mint, Tickseed, Purple Prairie Clover
Donor Fund
Thick Bermuda and natives. Heavy thatch. Fair to good bloom, but often obscured by grasses.

Division VII - Duncan

Love County

1. I-35 Median, 1 mile north of Texas border
(3 acres, 1987, 1988, 1989, 1990)
Indian Blanket, Plains Coreopsis, Paintbrush, Black-eyed Susan, Corn Poppy, Cornflower, Oxeye Daisy, Lazy Daisy, Larkspur, Scarlet Flax, Lemon Mint, Illinois Bundleflower, Yarrow
State Garden Council & Donor Fund
Lots of natives in very large meadow-type site. Many species bloomed each spring, usually in drifts (good show) Oxeye Daisy, Corn Poppy, Plains Coreopsis predominate but all were present.

2. I-35 - northbound, Thackerville rest area - Backslope at one mile rest area sign
(1 acre, 1988)
Indian Blanket
State Garden Council
Seedlings germinated well and were very dense, but were mowed before they could bloom.

3. I-35 - northbound, Thackerville rest area - Median from trees to ditch
(2 acres, 1988, 1989)
Indian Blanket, Scarlet Flax, Tickseed, Bluebonnet, Paintbrush, Cornflower, Corn Poppy, Black-eyed Susan, Plains Coreopsis
State Garden Council & Donor Fund
Very close mown sparse Bermuda, sandy soil. Everything bloomed. Cornflower and Indian Blanket predominate. Site has reseeded well every year. Local staff complains of weedy look at end of season.

4. I-35 - Northbound, Thackerville rest area, east of on-ramp
(1 acre 1990, 1991)
California Poppy, Bluebonnet, Showy Primrose, Phlox, Corn Poppy
Donor Fund
spring 1991 only a scattered few poppies bloomed (only thing planted in 1990)

Garvin County

5. I-35 - Davis rest area, interstate median
(6 acres, 1987, 1988, 1989, 1990, 1991)
Indian Blanket, Tickseed, Black-eyed Susan, Lazy Daisy, Lemon Mint, Plains Coreopsis, Showy Primrose, Clasping Coneflower, Oxeye Daisy
State Garden Council & Donor Fund
Thick natives with lots of prairie hay thatch. Site extended (not replanted) each year. 1987 and 1988 only Indian Blanket planted. Little bloom until spring 1990 when Indian Blanket was dense. Spring 1991 was spectacular with Indian Blanket, Tickseed, Clasping Coneflower, Black-eyed Susan and Lemon Mint predominant

Grady County

6. US 81 & SH 19 (Ninnekah), east backslope
(1 acre, 1989)
Indian Blanket, Plains Coreopsis, Lemon Mint, Black-eyed Susan, Corn Poppy
Ninnekah Extension Homemakers
Local ODOT reported poor show. Site was mowed when inspected.

Stephens County

7. SH 7 Median, 1-3/4 miles east of US 81 (Duncan)
(3 acres, 1989, 1990)
Cornflower, Corn Poppy, Indian Blanket, Lemon Mint, Tickseed, Oxeye Daisy, Clasping Coneflower
Duncan Garden Council & Donor Fund
Thick Bermuda and thatch, weedy. Good shows spring 1990 and 1991. Corn Poppy was spectacular in 1991. Patches of vetch a problem. Plot mowed in full bloom spring 1991.

8. SH 7 - median east of Duncan
(2 acres, 1990)
Paintbrush, Bluebonnet, Standing Cypress
Donor Fund
Thick Bermuda. Paintbrush bloomed early spring 1991, but density was poor.

9. US 81, median north of Duncan
(1 acre, 1990)
African Daisy, Indian Blanket
Duncan Garden Council & Donor Fund
Thin Bermuda, compacted site. Nothing bloomed spring 1991

10. US 81, median south of Marlow
(1/2 acre, 1989, 1991)
Bluebonnet, Scarlet Flax, Lemon Mint, Indian Blanket, California Poppy
Donor Fund
Only Bluebonnets planted in 1989. Poor show spring 1990, but good show spring 1991. Large healthy plants bloomed in drifts.

11. US 81 - Marlow
(1/2 acre, 1989)
Corn Poppy, Lazy Daisy
Marlow Garden Club
Site was moved to Highway 7 because of construction. Corn Poppy put on a spectacular show

Comanche County

12. US 62 (west of Lawton), approximately 1/2 mile east of Indiahoma exit, south backslope
(1 acre, 1990)
Indian Blanket, Liatris, Tickseed
Ardmore Garden Club & Donor Fund
Very thick natives and prairie hay. Very little bloomed spring 1991, but really is too early. Johnson Grass and thistle is a problem in whole area.

Division VIII - Tulsa

Tulsa County

1. I-44 & Broken Arrow Expressway, S.W. Quadrant
(1 acre, 1988)
Indian Blanket, Plains Coreopsis, Lemon Mint, Cornflower, Black-eyed Susan, Tickseed, Scarlet Flax, Corn Poppy
A. R. Carter
Site bloomed very well spring 1989. Plains Coreopsis, Indian Blanket, Lemon Mint and Black-eyed Susan predominate. However, existing grasses obscured much of the show.

2. I-44 Median
(1 acre, 1989)
Indian Blanket, Lemon Mint, Plains Coreopsis
Donor Fund
Bermuda. Local ODOT reported very good show

3. I-44 at west turnpike gate
(1 acre, 1990)

Plains Coreopsis, Showy Primrose, Clasping Coneflower, Cornflower, Yarrow
Donor Fund
Local ODOT reports very poor show

4. I-75 - median backslope (IDL)
(1-1/2 acres, 1989, 1990)
Bluebonnet, Paintbrush, Lemon Mint, Plains Coreopsis, Oxeye Daisy, Tickseed, Purple Coneflower, Clasping Coneflower
Donor Fund
Thick Bermuda, spring 1990 fair show. Spring 1991 good show. Everything bloomed.

5. I-75 (IDL), with "Up With Trees" site
(1 acre, 1988, 1989, 1991)
Indian Blanket, Tickseed, Lemon Mint, Plains Coreopsis, Black-eyed Susan, Cornflower, Corn Poppy, Scarlet Flax, Oxeye Daisy, Showy Primrose
Up With Trees
Thick Bermuda. Good show spring 1989. Spectacular show spring 1990, good show spring 1991. This is the site whose picture was in the April 1991 issue of Readers Digest. Indian Blanket, Lemon Mint, Plains Coreopsis, Black-eyed Susan and Corn Flower predominate.

6. I-75 (IDL)
(1 acre, 1989)
Tickseed, Lemon Mint, Mexican Hat, Plains Coreopsis
Donor Fund
Thick Bermuda. Local ODOT reported Lemon Mint and Plains Coreopsis did well.

7. I-75 (IDL)
(1 acre, 1989)
Lemon Mint, Yarrow, Evening Primrose
Donor Fund
Thick Bermuda. Local ODOT reported good show of just Lemon Mint spring 1990 and 1991.

8. I-75 (IDL)
(1 acre, 1990)
Showy Primrose, Missouri Primrose, Lemon Mint, Plains Coreopsis, Bluebell
Donor Fund
Thick Bermuda. Good show of Lemon Mint and Plains Coreopsis spring 1991.

9. I-244 & I-44 - median
(4 acres, 1988, 1989, 1990)
Indian Blanket, Plains Coreopsis, Lemon Mint, Tickseed,

Yarrow, Black-eyed Susan
Donor Fund
Large meadow-type median with thick natives. Plot extended each year. Tall grasses obscured bloom. Tickseed blooming in spring 1991

10. I-244 & US 169, with "Up With Trees" plot
(2 acres, 1990)
Indian Blanket, Plains Coreopsis, Oxeye Daisy
Donor Fund
Thin Bermuda, highly urbanized site. Indian Blanket and Plains Coreopsis put on a very good show spring 1991.

11. I-244 & SH 11, two on north side and one on south side of interchange
(2 acres, 1989)
Indian Blanket, Lemon Mint, Plains Coreopsis, Yarrow
Donor Fund
Sites put on fair shows with Indian Blanket predominate

12. I-244 west of Sheridan, north backslope
(1 acre, 1989, 1990)
Evening Primrose, Lemon Mint, Mexican Hat, Showy Primrose, Corn Poppy
Donor Fund
Thick Bermuda some Johnson Grass. Spring 1990 site was moved prematurely. Spring 1991 fair to good show (weedy), Mexican Hat predominate.

13. I-244 east of Yale - north and south backslopes
(1 acre, 1989, 1990, 1991)
Lemon Mint, Showy Primrose, Evening Primrose, Missouri Primrose, Mexican Hat, Oxeye Daisy, Plains Coreopsis, Clasping Coneflower
Donor Fund
Thick Bermuda, some weeds. Poor to fair show. Only Mexican Hat and some Lemon Mint bloomed.

14. I-244 (at 33rd) near tree plot
(1 acre, 1990)
Bluebonnet, Catchfly, Showy Primrose
Pride in Tulsa
No reports of anything blooming

15. I-75 (IDL), fire station triangle
(1 acre, 1990, 1991)
Cornflower, Corn Poppy, Baby's Breath
Pride in Tulsa, Donor Fund
Bermuda. Spectacular show spring 1991.

16. SH 51 - median from Lewis to Peoria
(2-1/2 acres, 1990, 1991)
Indian Blanket, Lemon Mint, Plains Coreopsis, Clasping Coneflower, Mexican Hat
Pride in Tulsa, Donor Fund
Thin Bermuda, compacted soil. Very good show spring 1991. Everything bloomed. Some weedy patches.

17. US 169 at 71st, near "Up With Trees" plot
(1 acre, 1990, 1991)
Indian Blanket, Lemon Mint, Plains Coreopsis, Cornflower, Showy Primrose
Dr. & Mrs. Rabinowitz, Donor Fund
Planted in NE and SW Quads. Existing vegetation is Bermuda, a winter grass and weeds. Fair show in SW Quad of Indian Blanket, Lemon Mint, and Plains Coreopsis bloomed. NE had little bloom and very weedy.

Rogers County

18. US 169 & SH 88 (Oolagah), north on the east side
(4 acres, 1990)
Cornflower, Lemon Mint, Plains Coreopsis
Oolagah Chamber of Commerce
Very rough site, adjacent to railroad ROW. Fair to good show of Cornflower. Bloomed in drifts with large areas of weeds. Visibility was poor and donor was disappointed.

19. SH 66 (Claremore), median starting at south city limits
(18 acres, 1990)
Cornflower, Corn Poppy
Claremore Donors
Bermuda. Very good to spectacular show. Public picked large quantities for Mother's Day. Bloomed in large patches with bare areas in between.

20. SH 66 (Claremore), median south of town from bridge to city limits
(50 acres, 1989)
Crimson Clover
Claremore
Bermuda. Same site as #19. Site flooded after planting. Spring 1990 very dry. Clover bloomed in patches with a poor to fair show. Large patches died without blooming; cause not known, but herbicides a possibility.

21. SH 66 (Claremore)
(3 acres, 1989)
Lemon Mint, Toad Flax, Black-eyed Susan, Plains Coreopsis

Claremore
Very weedy site-Johnson Grass. Donor reported a poor show.

Conclusion

An evaluation of the plots must take into consideration one very important factor normally not mentioned in the individual plot evaluations. Weather plays a major role in the successful establishment of the wildflowers. The last four years have contained some unusual weather for Oklahoma (if that is possible). There have been numerous record breaking averages in the amount of rainfall, both high and low. Temperatures have been more normal with fairly average summers and mild winters.

The seeds are planted in the fall and many of the species will germinate at that time. Evenly spaced moisture is important during germination for many species. Once established most of the species are very drought tolerant. Spring rains are important for bloom periods, in general the more rain the longer the bloom season.

While rainfall amounts vary widely for the various plots statewide there were some general weather trends during the years evaluated that will have affected most of the plots. The fall of 1988 was dry for much of the state, early spring was also dry (1989). Many of the "poor shows" in the spring of 1989 were probably due to lack of adequate moisture. The fall of 1989 was more normal with the spring

of 1990 also being dry. The fall of 1990 had much more moisture but it was uneven. The early spring of 1991 (March and April) was the driest on record for many parts of the state. Then it started raining in May, and June became the wettest on record in parts of the state. As a result many of the early spring bloomers such as Cornflower, Bluebonnet, Corn Poppy, and Indian Paintbrush did poorly. The later bloomers such as Indian Blanket, Black-eyed Susan, and Clasping Coneflower did well and the Lemon Mint, in particular, was spectacular in most places.

The summer of 1991 was relatively mild. Fall and winter of 1991 have had tremendous amounts of moisture in much of the state. Some of the sites had as much as 12" of rain in the days right after they were planted. Some of the seeds may have been washed away. It has also been an unseasonably warm winter and the spring of 1992 should be interesting. Late February plot checking has shown a high germination rate. The Cornflower already has plants with flower buds.

Even allowing for the variation in weather and in soil conditions, it is evident that some species are more reliable than others at germinating and establishment. Evaluation of the plot results yields enough information to draw some conclusions, especially about species variation. Early results support the use of several Oklahoma native annuals. Indian Blanket and Lemon Mint have been the most

successful. Plains Coreopsis is not as reliable but is inexpensive and successful often enough to generally make it worthwhile to plant.

Mexican Hat has not been used extensively but has always done well and is inexpensive. Oklahoma City planted large plots where the Mexican Hat predominated in 1990. Because of their reddish-brown color from a distance the flowers looked dead and ugly. So ODOT has been hesitant to use large quantities in their mixes. Varieties that have more yellow are much more attractive.

It is still too early to draw definite conclusions about the perennials, but Tickseed, Oxeye Daisy and the Rudbeckias (biennial) have been the most successful. Few were planted in 1988 or in 1989 so they haven't had enough time to become established. Tickseed and Oxeye Daisy are both expensive which is one limit on their use. Showy Primrose, a fairly common Oklahoma perennial, has been planted in numerous locations with little result. Two other perennials, due to their expense, have had only limited use in roadside plots. Purple Coneflower and Purple Prairie Clover have not been successful often enough yet to justify their expense but have the potential to become a regularly recommended species if their germination requirements could be determined and if the price becomes more affordable.

Two species that have been tried repeatedly with poor results are Indian Paintbrush and Texas Bluebonnets. All

sources agree that they are often difficult species to establish in Oklahoma. However, the last two springs have been dry early in the season when these plants normally bloom, so that could be the reason for the poor results. Paintbrush was not planted at all the fall of 1991 because the seed was unavailable commercially. This is unfortunate since there has been plenty of moisture the fall of 1991 and the spring of 1992. Both species are spectacular in their native sites and are some of our earliest bloomers. So they will be tried many times in the hopes of discovering their roadside requirements.

Two other early flowering species often used in roadside beautification are Cornflower and Corn Poppy. The 1988 planting season was funded mostly by Oklahoma City Beautiful, Inc. (OCB) with 65 acres planted in the Oklahoma City area. Two mixes were ordered for the vast majority of the plots by the OCB wildflower committee. Most of the plots were planted with a Cornflower/Corn Poppy mix. Many of the others were planted with a Black-eyed Susan/Plains Coreopsis mix. Almost all of those plots had to be replanted in 1989 and 1990 because they grew poorly in 1989. The Cornflower and Corn Poppy have also been planted often in other parts of the state. Somewhat reliable conclusions can be drawn about the use of these species. They are very inexpensive and popular with the public. They are not completely cold hardy and several times the Cornflower and

Figure 19. Corn Flower and Corn Poppy, Del City Wildflower Plot, I-40

Corn Poppy plots have been damaged by late freezes. In most cases they are not suitable for highway planting. They seem to prefer better soils and more moisture than many of the Oklahoma natives. The Cornflower is the hardier of the two species but not nearly as flashy as the Corn Poppy. When intense color is desired, Corn Poppy is the best choice for southeastern and south central Oklahoma. Both Tulsa and Oklahoma City have had successful plots during years with adequate moisture and in areas of decent soil. They have not persisted or become established in any of the plots and need to be replanted every year.

Johnston's Seed Company of Enid has wild harvested two Oklahoma natives at ODOT's request. Lazy Daisy (Aphanostephus skirrobasis) and Liatris aspera have been tried in areas near where they were harvested. Results were poor although the Lazy Daisy was successful enough to justify continued experimentation in western Oklahoma where it is native.

Because not enough time has yet passed to properly evaluate the performance of the perennials, care needs to be taken to not rely too heavily on the annuals. It is also too soon to determine which species will be the most successful in long term establishment. Will the perennials eventually crowd out the annuals or is a planted mixture of both types delaying or even preventing the establishment of the perennials? The annuals can provide good color for the

first season or two while the perennials become established but one recent study reported by the National Wildflower Research Center shows that after three years plots planted with only perennials had the most color. The annuals continued to decrease each year. The plot with a mixture did not have as good perennial result after the third year as the perennial only plot. (Sanford, 91) The ODOT maintenance practice of scalp mowing in some of the urban areas may not be compatible with the establishment of the perennials.

Numerous other wildflower species have been tried (Appendix C) generally with poor results. However, because of the limited nature of most of their trials (only one or two sites) it is not fair to eliminate them at this point from future planting plans. Failures could be due to weather conditions, wrong soil type, or to existing vegetative competition. Most of these experimental species have been tried in the southern and eastern part of the state where more moisture is available.

Another variable that may have played a part in species germination was the kind of seeder used to plant the seed. The original seeder, the Wildseeder, was used through the fall planting season of 1990 in several of the eastern divisions. Because of the number of variables involved, it is impossible to tell with certainty which seeder does the better job. More plots planted with the Wildseeder failed

to germinate than with the Befco seeders. Only Befco seeders were used in the planting season of 1991 so one variable will be eliminated from the equation in later years.

Existing vegetation plays an important part in the establishment of the wildflowers. In many cases the urban sites did the best. The ROW in the cities is kept very close mowed and often has very little thatch buildup. They are kept treated for weeds and are relatively weed free. The Bermuda is often struggling and not very healthy looking. The drought tolerant species, Indian Blanket, Lemon Mint, Black-eyed Susan, Mexican Hat, Tickseed, and Oxeye Daisy seem to do very well in this situation. Urban sites with healthy Bermuda and a thick thatch made germination more difficult. These sites are not kept scalp mowed and the Bermuda is allowed to grow taller, over 6" tall. Probably much of the seed does not make contact with the soil when planted, especially if the Wildseeder was used. In addition, the seed that does germinate may be shaded out by the taller, dense Bermuda.

Sites in rural areas present other situations. Typically, they have been planted with Bermuda but native grasses and forbs are present to a lesser or greater degree. Again, if there is a thick thatch and very dense vegetation, the seedlings usually have trouble getting started. Often though, the bunch grass natives allow space for the wild-

flowers to grow and problems arise because the existing grasses and weeds obscure the blooms or make the site look unkempt and unattractive. It will be interesting to see if the introduced wildflowers can compete with the existing vegetation and become established on a long term basis. Years will be needed to monitor this process.

Another common situation is the presence of noxious or very aggressive weeds on the plot. Wildflowers so far have not competed with Johnson Grass. Also Hairy vetch and Thistle can take over a site if not controlled with herbicides or regular mowings.

The following list includes some specific observations and thoughts concerning the planting of roadside wildflowers.

1. Could protect roadside areas with superior stands of naturally occurring wildflowers by planting one inexpensive native wildflower and then adding to the list of protected wildflower plots.

2. Indian Blanket usually established easily, even on poor sites. However, drawbacks include; not tall enough for weedy sites, color not enough contrast for Oklahoma red clay, doesn't show up well when traveling at high speeds.

3. Coreopsis tinctoria suitable for plots with poor drainage.

4. Yellow and white species most visible from highway but there are not any commercially available early blooming species, except Oxeye Daisy.

5. The less vivid colors and taller species look good in large sites mixed with the taller native grasses.

6. In urban sites that need a more manicured look plant earlier blooming species that can be mowed before the weeds begin to look too bad.

7. Don't put "all eggs in one basket". Because of the weather, a species that did well one year may do poorly the next and vice versa. This is one reason for diversity.

8. Use Indian Paintbrush or Paintbrush/Bluebonnet mix for early bloom.

9. Some species that have had consistently poor results are Scarlet Flax, Catchfly, Drummond Phlox, and Bluebonnet.

10. Species don't establish well in dense, tall Bermuda with lots of thatch.

11. There is no point in planting non-reseeding annual in large sites, they won't spread to fill the site and are only impressive if the whole site is planted.

12. Need to find some taller perennials that will compete with yellow Clover, Wild Alfalfa, Daisy Fleabane and Yarrow.

13. Don't give up on sites for several years, they may be waiting for the correct weather to germinate.

14. Don't be impatient in the spring; the later blooming species seem to appear almost overnight.

15. Indian Blanket tolerates accidental mowings extremely well and often seems to do better with an early season mowing.

16. Cornflower shows up best when planted very close to road, the pastel colors aren't very showy from a distance.

17. Proper seeding techniques definitely affect germination rate. Some plot failures can be attributed to improper adjustment of the seeder or to mechanical problems.

18. Indian Paintbrush, Showy Primrose and Plains Coreopsis are picky about the weather.

Although results have yet to be tabulated for the spring 1992 wildflower season, telephone reports and personal site checks are providing a wealth of new information. In general, winter 1992 was mild with a sunny

early spring with adequate moisture. As April and May progressed, the weather stayed cool with evenly spaced, plentiful, rainfall.

For the first time since the program began the early spring bloomers, both natural and planted, performed spectacularly all over the state. Indian Paintbrush put on the best show that most people could remember. Plots bloomed for the first time in two or three years and several put on "spectacular shows". Cornflower and Corn Poppy did well wherever planted. Both the Tickseed and Oxeye Daisy plots continued to improve over previous years showings with the Tickseed putting on "very good shows". The spreading of the perennials is encouraging. Both these species are striking. All of the species are having an exceptionally long bloom season.

As of mid-May, the Indian Blanket is reaching the height of its bloom. It is doing well everywhere. Seen from above at interstate interchanges it is spectacular. This is also true at many of the urban sites, especially the medians. However, seen from the side in rural areas or weedier urban sites it is often obscured by tall grasses and weeds.

The success of the wildflowers this spring is gathering much support for the wildflower program from the public. Outcries over the mowing of the naturally blooming wildflowers have been numerous and hopefully will make ODOT

management take note. The week of May 25th had seen very cool (low of 48° in Oklahoma City) nights with plenty of rain. It will be interesting to see how this affects the June blooming species. Probably the bloom season will be extended and later bloomers such as Lemon Mint may have the start of their bloom season delayed. It may also mean more of a problem with weedy competition.

Figure 20. Natural Roughleaved Sunflower, Talimena Drive

CHAPTER VI

RECOMMENDATIONS FOR OKLAHOMA ROADSIDES

Introduction

From six acres of roadside wildflowers in 1987 to 350 active acres in 1991 shows a tremendous amount of growth in the wildflower program. These results have been accomplished without any internal funding (except salaries) and no formal publicity or advertising (Figure 21). The public is very interested in wildflowers as a tool to beautify their home communities and their state (Appendix D). However, continued support will depend on successful establishment of the wildflowers. The goal of establishing and preserving native wildflowers in Oklahoma highway ROW is far from accomplished but a good start has been achieved. Other goals set for the wildflower program are being met with varying degrees of success:

1. Improve the public image of the Oklahoma Department of Transportation.
2. Promote and encourage Oklahoma Tourism through the beautification of Oklahoma's highways.
3. Establish an environmentally sound vegetation policy that would also be economically beneficial to the state.
4. Preserve Oklahoma heritage.

5. Beautify Oklahoma's "front yard" for its residents.

After four years, conclusions are possible about continuing problems and many of the reasons the objectives are not being met. Specific solutions have been suggested. Many of the technical problems such as proper establishment techniques, correct species for the site and correct planting timing are being solved through the trial and error methods discussed in Chapter V. However, much refinement is still needed and weedy competition is still the number one technical problem and stumbling block for public acceptance.

The greatest threat to the ODOT wildflower program is lack of internal support or commitment. During these times of budget and severe personnel cuts the wildflower program appears on the surface to be a rather frivolous waste of funds, particularly at the Field Division management level. Fortunately, not all of the Divisions feel that way. Most of the Divisions reluctantly support the program because of its public relations impact.

Vegetation Management Policy

To become a permanent fixture the program needs to show both economic and environmental benefits. The best way to do this would be to make it an integral part of ODOT's vegetation management policy. All roadside maintenance areas should be meshed into one; mowing, herbicides, erosion control and preservation of native vegetation. This would

OKLAHOMA DEPARTMENT OF TRANSPORTATION
WILDFLOWER STATISTICS
1988-1991

	1988	1989	1990	1991	TOTAL
# of Donors	9	17	24	28	
Total Dollars Spent		27,719	30,803	40,365	
Donor Fund		23,063	16,322	14,705	54,090
Donor Dollars Spent		13,532	12,886	19,835	
Community Donations		14,187	17,917	20,530	
# of Acres Planted	75	171	167	88	502*
# of Sites	54	57	86	52	*
# of Species Planted	14	32	29	31	

*This is not the number of active wildflower plots in the state. The actual number is less due to replanting of many of the sites during the first two or three years and to elimination of some unsuitable sites. There are 350 active acres in 156 plots statewide as of January 1, 1992.

Figure 21. ODOT Wildflower Statistics 1988-1991

include reestablishment of native grasses and forbs where appropriate. Texas and Nebraska have successful, long term "wildflower programs" which don't separate wildflower programs but routinely include wildflowers as part of their routine vegetation management duties. Until Oklahoma thoroughly meshes their roadside maintenance strategies, the wildflower program will continue to be vulnerable to changes of administration and public opinion. Both short term and long range objectives with planned strategies to meet them, should be written and formally approved.

The most important objective would be a new integrated vegetation management policy. Little progress has been made towards this objective. Current mowing and herbicide policies need to be reviewed and revised. Texas' question of "Why are you mowing?" (or spraying) needs to be applied in Oklahoma. If the answer is only "for appearances" then changes may need to be made. Of course, appearances are important but as a Missouri public relations brochure stated, "there is no agreement on what is aesthetically pleasing". Since mowing is the single most expensive maintenance activity $3,678,227 in 1991, its use should be place on an objective rather than subjective basis.

The Bermuda release herbicide program also needs a thorough evaluation. Exactly how many mowings has it eliminated and what savings have been produced? At $16.74/acre as compared to $13.76/acre for 1991,

applications are now more expensive per acre than mowing. Perhaps the emphasis needs to shift from blanket broadcast spraying to more effective spot spraying. Musk Thistle is becoming an increasingly common threat according to ODOT agronomist, Gary Roach. Johnson Grass has taken over large sections of roadside. Both species crowd out the less aggressive natives.

To effectively control Musk Thistle and other noxious weeds a roadside inventory is needed. Many states have initiated an inventory so that healthy stands of native grasses and forbs can be protected from invading non-native species and unnecessary mowing or spraying reduced. Promotion of low maintenance native grasses and wildflowers could provide huge dollar savings in the long run. Besides the economic benefits, they are more environmentally sound than a monoculture ROW. They provide better erosion control from deeper roots than Bermuda, require less mowing and, when not infested with noxious weeds, most would agree are aesthetically pleasing.

Along with a new vegetation maintenance policy the existing policies for establishment of grass on areas of new construction needs to be revised. Instead of the automatic planting of Bermuda, new specifications and standards need to be written promoting the planting of appropriate mixes. Many states have been using mixes, and avoiding monocultures, for years. Texas, Minnesota and Nebraska all have

successful mixed species seeding programs. Their grass mixtures include forbs. The Oklahoma ROW backslopes, with existing stands of native grasses, should be left alone to recover after new construction. Over the years there have been sporadic attempts to plant such natives as Buffalo Grass. None have met with success and there doesn't seem to have been any long term commitment or review to discover what is actually needed to establish the native species.

Research

This suggests something else is needed to help satisfy the goal of establishing wildflowers on Oklahoma ROW. Formal research on establishment of vegetation on Oklahoma roadsides is still very much needed. Both wildflowers and native grasses need funding for research projects. The Beautification Office applied for a $185,000 grant from the Noble Foundation in 1990 for research on wildflower establishment. OSU was a co-sponsor. This grant was turned down. It called for research on the best species for Oklahoma roadsides, optimum establishment techniques, and optimum management techniques. While some of the questions raised are being answered by the field experiments of ODOT there are still many unanswered questions. Management of weedy competition is still a major obstacle of the program. Besides reapplying with the Noble Foundation other possible funding sources should include the Transportation Research

Board, The National Wildflower Research Center, AASHTO, the Federal Highway Administration, or any of the other Oklahoma philanthropic organizations. Other states have acquired funding from various sources for wildflower research but what works in Pennsylvania, Georgia, Minnesota, or even Texas seldom applies to Oklahoma's varied soil and climate. Perhaps it would be possible to apply for the funding as part of a grant proposal to acquire the computer program and equipment necessary to inventory Oklahoma roadside vegetation.

Education

Another important area needing to be addressed in a formal plan is education of both the public and ODOT personnel. Since the greatest support for the wildflower program has come from the public, educational programs for the public may not seem important. This is not the case. As stated earlier, to many people, a close-mown golf course look is synonymous with what a well groomed roadside should be. All the states participating in a reduced mowing policy commented that, especially the first year, calls were very much in favor of more frequent mowing. Education of the public in the form of brochures, explanatory letters or public programs quickly swayed public opinion. Minnesota has actively promoted the saving of their prairie heritage (reduced mowings) with a great deal of success. Even those

Oklahoma Dept. of Transportation

BE A FLOWER FINDER

The Oklahoma Department of Transportation wants to find native stands of wildflowers that bloom along our state highways. When large areas are located, special maintenance procedures will be initiated to preserve these naturally established flowers. To inventory the 12,000 mile highway system during the growing season, your help is needed.

Please answer as many questions as possible. An accurate location is very important. If the wildflower name is not known then describe in more detail. Questions? Call ODOT Beautification Office 405/521-4037. Thanks for helping beautify our state!

Joanne Orr
Beautification Coordinator

WILDFLOWER INVENTORY

County _____ Highway _____

Date wildflowers were seen _____

Exact location (Use mile markers and other landmarks. Include which side of the highway has the wildflowers.) _____

_____

_____

Were the flowers in the roadside _____ or in adjacent fields _____

Name of wildflower _____

Description (color, height, etc.) _____

_____

Size of plot: _____

Density (number of plants per square foot) _____

Comments: _____

Name _____ Phone _____

Address _____

Mail to: Beautification Office, Department of Transportation
200 N.E. 21st, Oklahoma City, OK 73105

Figure 22. Form Distributed in 1989 to Inventory Roadside Wildflowers

the aesthetics of the roadside can usually be impressed by the saving of taxpayers dollars with reduced mowings. As long as the wildflower program remains separate from an integrated vegetation policy, the potential economic benefits are limited. However, education of the public concerning the wildflower program is still important.

While in bloom, almost everyone seems to like the flowers. But many people are intolerant of the shaggy period before they bloom and the unkempt appearance while they are going to seed. A simple explanation explaining why an area is not being mowed satisfies most people.

There are other educational tools that would promote public donations. The Beautification Office receives numerous calls requesting wildflower information and a brochure explaining the program, how to plant wildflowers in your backyard, where to buy seed, etc. would be helpful. A picture brochure would be popular with both tourists and residents who are interested in identification of roadside wildflowers. There are many requests from civic groups and organizations who would like programs about Oklahoma wildflowers. Due to the limited personnel, this is often not feasible. A video that could be checked out showing Oklahoma wildflowers and the ODOT program would receive wide use. Most of the field divisions have requested such a tool as they also receive frequent requests for programs. Besides the possibility that these materials would elicit

additional wildflower funding, they are also a valid method of improving ODOT's public image which is one of the goals of the program.

Education of ODOT personnel is just as important as that of the public. There are many misconceptions about the wildflower program. Many are not even aware that all of the seed is donated. If preservation of the existing wildflowers is going to occur the person on the mower needs to become reasonably knowledgeable about wildflowers. First, training sessions could be held in conjunction with the monthly maintenance supervisors meetings and also with the yearly training classes for the herbicide applicators. Second, a video could be made available for use in the county maintenance yards as each has a VCR. The identification picture brochure for the public would also be valuable for the mowers to help them learn species. And last, an award program for the maintenance supervisor who has done the most to beautify his roadside should be established. States (Texas, Georgia, Virginia, etc.) that have such a program feel that it is an important factor in the beautification of their highways. As taxpayer dollars could not be used for cash awards, the money for awards would need to come from private sources such as the State Garden Club, Inc.

A personal observation has been that when the crews understand the reasons for the wildflower program and its

administration they are much more supportive. They begin to take an interest in the wildflowers and are proud of their wildflower plots. Those that have orders to "do it" with no explanations or training are often hostile about, or scornful of, the program.

Tourism

All of the suggestions listed will help the establishment and preservation of Oklahoma wildflowers which in turn will naturally promote Oklahoma tourism. A specific proposal to promote tourism would involve the establishment and naming of Oklahoma wildflower trails. A proposal to establish a "Paintbrush Trail" in south central Oklahoma was put forward by participants of the eleventh and twelfth wildflower workshops in 1989. No action has been taken on this idea but it could probably be implemented with limited funding and is an entirely feasible idea. A more grandiose scheme has been proposed by the Minnesota Wildflower Task Force and promoted by Terry Cederstrom of the National Park Service. The establishment of a "North Star to Lone Star" national wildflower highway is currently being discussed among the involved (including ODOT) DOTs.

Tourism is big business and Oklahoma scenic beauty is not being fully utilized to attract tourists. The Texas Highway Department has a quarterly Auto Visitors Survey. Of the 13,086 out of state or foreign visitors surveyed in 1988

30% cited wildflowers as a tourist attraction. In spring 1989, 44.5% listed wildflowers as one reason for visiting Texas. In the spring 1991 survey 53% listed wildflowers as something they enjoyed about Texas. This put wildflowers among the top four items enjoyed by tourists in Texas. Their wildflower trails and festivals are a major tourist attraction.

The Oklahoma Department of Tourism publishes an annual report of their survey of Auto Visitors to Oklahoma. In 1990, there were 1,668 respondents to their open ended, two question survey. One question asks for positive impressions of Oklahoma and the other for negative experiences. During all times of the year, the beauty of the Oklahoma environment had a high frequency of recall. Both the natural wildflowers and the highway wildflower plantings are commented on favorably.

Conclusion

A summary of the conclusions about the wildflower program objectives follows.

1. Short and long range plans need to be written and formalized.
2. A new integrated vegetation management policy should be established.
3. A roadside vegetation inventory is needed.
4. Reestablishment of native grasses and forbs is needed and can provide major economic benefits to Oklahoma.
5. Oklahoma's prairie heritage is aesthetically pleasing.

6. Education of the public through brochures, public programs, including a video, and letters are important.

7. Education of ODOT personnel is vital to the success of the program. Training sessions, brochures, and especially an award program are necessary.

8. Success of the program will naturally promote Oklahoma tourism but specific promotionals will further help.

It is appropriate to conclude with quotes illustrating the deeper more important (than economics) reasons for beautifying Oklahoma highways through the use of wildflowers. An ancient Persian saying states: "If you have but two pennies to spend, first buy bread for your body, then with the other buy a flower for your soul."

More recently, Lady Bird Johnson concludes: "Beautification involves much more than mere cosmetics: clean roadsides, clean air, clean water, safe waste-disposal and preservation of valued old landmarks as well as great parks and wilderness areas. In sum, beautification means our total concern for the physical and human quality we pass on to our children and the future."

Lastly, the following letter (Figure 23) reached the Beautification Office the summer of 1991. For thousands of years, flowers have helped people enjoy their lives and provided help during tough emotional times. Wildflowers on the roadside are available for everyone to enjoy: young, old, the poor, the lonely, the busy, and the tired. Oklahoma needs to preserve one of its most spectacular, and threatened, assets for its citizens of today and of the future.

May 1, 1991

Dear Beautification Division,

My heart was sad as I drove home from attending the funeral of my dear sister in Tennessee. As I entered my state of Oklahoma I became aware of the red clover and other wild flowers planted by the roadside. The pretty blooms ministered to my spirit and my thoughts were turned to God who created them. My sadness was lifted as my eyes searched for each patch of color. It seemed that the flowers had been planted especially for me to fulfill God's promise:

"To console those who mourn .... to give beauty for ashes, the oil of joy for mourning, the garment of praise for the spirit of heaviness, the planting of the Lord that He may be glorified." Isaiah 61:3

Thank you for adding beauty to our roadsides - I am sure that others enjoy your handiwork as much as I do.

With appreciation,
Helen Moore

Figure 23. Thank-you letter for Highway Wildflowers

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APPENDICES

APPENDIX A

OKLAHOMA DEPARTMENT OF TRANSPORTATION

WILDFLOWER PROGRAM HANDOUTS

STATE OF OKLAHOMA
DEPARTMENT OF
TRANSPORTATION
200 N E 21st Street
Oklahoma City, OK 73105-3204

Contact: Laurie Stillings
Beautification Office
(405) 521-4037

ROADSIDE WILDFLOWER PROGRAM

Oklahomans are proud of their state wildflowers, as proven by their participation in the Oklahoma Department of Transportation (ODOT) Wildflower Program. They have voluntarily contributed a total of $107,000 for the purchase of seed for highway planting during the last four years. Approximately 90 acres of donated seed were planted by ODOT crews in the fall of 1991, in 52 different roadside sites statewide.

In Oklahoma, wildflowers should be planted in September and October. They are most appropriate when used in perimeter areas near fields and natural settings. The site should be reasonably free of noxious weeds, especially Johnson Grass and Musk Thistle. Soil should not be tilled. Seeds should be planted no more than 1/4 inch deep. Species native to Oklahoma have the best chance, but many varieties will require several years to become well established and provide a heavy cover of bloom. Species should be chosen for a seasonal sequence of bloom, whereby a second species blooms and hides the first species as its flowers turn brown and go to seed.

In order to participate in the Wildflower Program, the ODOT Beautification Office needs to be contacted early in the planning stage. ODOT's Beautification Office will advise groups wanting to purchase and donate wildflower seeds, and highway crews will plant the wildflowers in a mutually agreed upon roadside site. Lists of appropriate species and of sources for bulk wildflower seed are available, plus fund raising ideas. Wildflower seed is expensive. The state wildflower, Indian Blanket (Gaillardia pulchella), costs approximately $20 a pound, and 10 pounds are needed to plant one acre. ODOT requests that enough seed be purchased to plant a minimum of one acre, or approximately $200 worth of seed.

Three drill seeders especially designed for wildflowers are used by the Department for planting on highway roadsides. In order to have a seeder scheduled, the Beautification Office has to be contacted before August 1st. So, please contact us in the spring or early summer as you start the planning and organizing process.

1/92

OKLAHOMA SEED PRODUCERS

Grasslander
Chuck Grimes
Route 1, Box 56
Hennessey, OK 73742
405/853-2607
(contract planting & native grasses)

Johnston Seed Company
Ed Shovanec
P. O. Box 1392
Enid, OK 73702
405/233-5800

Guy's Seed Company
Rodney Guy
2520 Main Street
Woodward, OK 73801
405/254-2926

Lorenz OK Seeds
Freddie Lorenz
Route 2, Box 3
Okeene, OK 73763
1-800-826-3655

OUT-OF-STATE SEED PRODUCERS

Browning Seed, Inc.
Box 1836
Plainview, TX 79072
806/293-5271

Plants of the Southwest
1812 Second Street
Santa Fe, NM 87501
505/983-1548
(wholesale whole world)

Holland Wildflower Farm
Route 2, Box 7
Elkins, AR 72727
(small amounts only)

Sharp Bros. Seed Company
Judith Rogers
P. O. Box 665
Clinton, MO 64735
1-800-451-3779

Horizon Seeds, Inc.
(Miller Grass Company)
Box 886
Hereford, TX 79045
806/258-7288
(only a few species, but home grown)

Stock Seed Farms, Inc.
Route 1, Box 112
Murdock, NE 68407
402/867-3771

Missouri Wildflowers Nursery
Route 2, Box 373
Jefferson City, MO 65109
314/496-3492

Wildseed, Inc.
P. O. Box 308
Eagle Lake, TX 77434
1-800-848-0078

Hamilton Seeds
HC Route 9, Box 138
Elk Creek, MO 65464
417/967-2190

For information concerning the Oklahoma Department of Transportation's Wildflower Program, contact Laurie Stillings, Beautification Office, 405/521-4037.

2/92

SOME WILDFLOWERS FOR ROADSIDE PLANTING

Listed in approximate order of bloom sequence. Not all are suitable for all parts of Oklahoma. Not all are available commercially.

1. Corn Flower -- Centaura cyanus
2. Corn Poppy -- Papaver rhoeas
3. Bluebonnet --Lupinus subcarnosus
4. Showy Primrose -- Oenothera speciosa
5. Verbena -- Verbena tenuisecta
6. Indian Paintbrush -- Castilleja indivisa
7. Drummond Phlox -- Phlox drummondii
8. Yarrow -- Achillea millefolium
9. Bladder Pod -- Lesquerella gracilis
10. Rocket Larkspur -- Delphinium gracilis
11. Scarlet Flax -- Linum rubrum
12. California Poppy -- Eschscholzia californica
13. African Daisy -- Dimorphotheca aurantiaca
14. Catch Fly -- Silene armeria
15. Oxeye Daisy -- Chrysanthemum leucanthemum
16. Tickseed -- Coreopsis lanceolata
17. Indian Blanket -- Gaillardia pulchella
18. Blanketflower -- Gaillardia aristata
19. Standing Cypress -- Ipomopsis rubra
20. Lazy Daisy -- Aphanostephus skirrobasis
21. Prairie Sabatia -- Sabatia campestre
22. Sand Primrose -- Oenothera laciniata
23. Missouri Primrose -- Oenothera missouriensis
24. Purple Coneflower -- Echinacea angustifolia
25. Beard-Tongue -- Penstemon cobaea
26. Plains Coreopsis -- Coreopsis tinctoria
27. Purple Prairie Clover 'Kaneb' -- Petalostemum purpureum
28. Lemon Mint -- Monarda citriodora
29. Mexican Hat -- Ratibida columnaris
30. Clasping Coneflower -- Rudbeckia amplexicaulis
31. Black-eyed Susan -- Rudbeckia hirta
32. Four Point Primrose -- Oenothera rhombipetala
33. Handsome Blazing Star -- Liatris aspera

For information concerning the Oklahoma Department of Transportation's Wildflower Program, contact Laurie Stillings, Beautification Office, (405) 521-4037.

1/31/91

SOURCES OF WILDFLOWER INFORMATION

Blaylock, Craig & Nadine, Photographing Wildflowers, Voyageur Press, 1987 (64 p.)

Grower's Guide to Wildflowers, Wildseed, Inc., P. O. Box 308, Eagle Lake, TX 77434

Irwin, Howard S. and Wills, Mary M., Roadside Flowers of Texas, University of Texas Press, 1961 (309 p.)

Johnson, Lady Bird and Lees, Carlton B., Wildflowers Across America, Abbeville Press, 1988

Loughmiller, Campbell & Lynn, Texas Wildflowers: A Field Guide, University of Texas Press, 1986 (271 p.)

McCoy, Doyle, Oklahoma Wildflowers, McCoy Publishing Co., 1987 (206 p.)

McCoy, Doyle, Roadside Flowers of Oklahoma, McCoy Publishing Co., 1976 (116 p.)

McCoy, Doyle, Roadside Flowers of Oklahoma, Vol. II, McCoy Publishing Co., 1978 (60 p.)

McCoy, Doyle, Roadside Wild Fruits of Oklahoma, University of Oklahoma Press, 1980 (96 p.)

The National Wildflower Research Center's Wildflower Handbook, Texas Monthly Press, 1989

Niehaus, Thomas, et al., A Field Guide to Southwestern and Texas Wildflowers (Peterson Field Guide Series), Houghton-Mifflin, 1984

Nokes, Jill, How to Grow Native Plants of Texas and the Southwest, Texas Monthly Press, 1986 (288 p.)

Pasture and Range Plants, Fort Hays State University, Hays, Kansas, 1986, Formerly Phillips Petroleum, 1963 (175 p.)

Phillips, Harry, Growing and Propagating Wildflowers, North Carolina University Press, 1985 (331 p.)

For information concerning the Oklahoma Department of Transportation's Wildflower Program, contact Laurie Stillings, Beautification Office, (405) 521-4037.

4/91

Legend of the INDIAN BLANKET MAKER

The legend tells of an old Indian anket maker whose talent for weaving oduced such beautiful blankets that her Indians would travel many miles trade for one. The old blanket maker id never taken an apprentice and when : realized he had only a short time ft. he began weaving his own burial anket It blended his favorite browns, ds and yellows into the beautiful pat-rns for which he was so famous. In time, the old man died and his mily wrapped him in this blanket, hich was to be his gift to the Great pirit when they met. The Great Spirit as very pleased because of the beauty of the gift but also saddened because he realized that only those in the Happy Hunting Ground would be able to appreciate the old blanket maker's beautiful creation. So, he decided that he would give this gift back to those that the old Indian had left behind.

The spring following the old man's death, wildflowers of the colors and design of the old Indian's blanket appeared in profusion on his grave to bloom and spread forever.

David Northington, Executive Director, National Wildflower Research Center.

"INDIAN BLANKET"
Gaillardia Pulchella

Oklahoma's State Wildflower

The "Indian Blanket" was approved as Oklahoma's official state wildflower in 1986. The lovely red flowers with yellow tipped petals bloom along Oklahoma's roadsides from May to August

"INDIAN BLANKET"
Gaillardia Pulchella

Oklahoma's State Wildflower

PLANTING INTRUCTIONS

This hardy upright annual prefers sun and will tolerate drought well in various soils Blooming from May to August, it reaches 1 to 2 feet in height. Seeds should be planted in the fall (September–December). For many of you, this will be your first attempt to grow wildflowers at home. Below are planting instructions to assure you the best possible results.

WHERE TO PLANT

1. Borders around lawns and gardens
2. Around small trees and shrubs
3. Wildflower gardens
4. Vacant lots
5. Bark-mulch beds
6. Open meadows

HOW TO PLANT

On bare soil areas:

1. Use a garden rake to loosen soil surface (¼" deep)
2. Hand broadcast seed on area to be planted.
3. Lightly rake to establish proper seed to soil contact.
4. Walk carefully over area to tamp soil lightly.

On existing grass:

1. Mow existing vegetation as short as possible. Rake up thatch and remove.
2. Use a garden rake to loosen soil surface or hoe lightly (¼" deep).
3. Hand broadcast seed on area to be planted.
4. Lightly rake to establish proper seed to soil contact.
5. Walk carefully over area to tamp soil lightly.

Note: DO NOT plant your wildflowers in grasses that grow during the winter (e.g.: annual rye grass, fescue grass), as winter grasses will be too aggressive to allow the wildflowers to become established.

DO I WATER THE SEED?

If there was no rainfall after planting, watering will help in germination and seedling establishment. Wildflowers will survive long dry periods, but will not flower as often.

WHEN WILL SEEDS GERMINATE?

The seeds will show signs of germination approximately 20 days after planting. Regardless of the planting location, to germinate, your wildflowers will require at least eight hours of sunlight per day, minimum foot traffic and some water, if rainfall is not substantial.

HOW DO I ALLOW WILDFLOWERS TO RESEED?

After the full bloom period in late June or July allow several weeks for the seed to mature. The vegetation will look brown. After this delay, the area can be mowed, as nature has already reseeded for next year. The seeds can be harvested for planting in a second location.

Discover America

SOURCES OF WILDFLOWER INFORMATION

Blaylock, Craig & Nadine, Photographing Wildflowers, Voyageur Press, 1987 (64 p.)

Grower's Guide to Wildflowers, Wildseed, Inc., P. O. Box 308, Eagle Lake, TX 77434

Irwin, Howard S. and Wills, Mary M., Roadside Flowers of Texas, University of Texas Press, 1961 (309 p.)

Johnson, Lady Bird and Lees, Carlton B., Wildflowers Across America, Abbeville Press, 1988

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Nokes, Jill, How to Grow Native Plants of Texas and the Southwest, Texas Monthly Press, 1986 (288 p.)

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Phillips, Harry, Growing and Propagating Wildflowers, North Carolina University Press, 1985 (331 p.)

For information concerning the Oklahoma Department of Transportation's Wildflower Program, contact Laurie Stillings, Beautification Office, (405) 521-4037.

4/91

WHERE TO PLANT WILDFLOWERS

Create a Wilderness in Your Own Backyard—Now you can enjoy your own wildflower meadow at home. Experience Mother Nature's everchanging colors and aromas. Witness first hand the ecology of plants as well as learning to be the neighborhood expert on wildflowers. Your friends will enjoy visiting your meadow as well as appreciating your interest in preserving local fauna and flora.

Wildflower Garden—You may choose to have a very special garden just for wildflowers. Just as some people enjoy vegetable gardens, you can derive pleasure from the everchanging colors for months on end.

Wildflowers Around Your Vegetable Garden—Growing wildflowers near vegetable gardens attract honey bees and butterflies which in turn provide additional pollination to your garden plants.

Hard to Maintain Areas—We all have areas such as corners and slopes that can be converted into "native" areas. An area especially difficult to mow or water would make a perfect home for your wildflowers.

Cut Flower Garden—You will enjoy the fresh supply of blooms your wildflower garden will provide. A handful of wildflowers dropped into a drinking glass will brighten any room. You may also enjoy making arrangements for friends for those special occasions.

Beautify Your City—A handful of wildflower seeds can turn the base of a stop sign or utility pole into an area of beauty. Look for cracks in sidewalks or curbs to drop seed. Inconspicuous spaces are fun to plant with wildflowers. Plant some along a favorite jogging trail or park area for everyone to enjoy.

Clay Pots and Whiskey Barrels make great places to experiment with your wildflowers. Not only will they look beautiful, but you can take a small pot of wildflowers with you when visiting a friend.

Roadsides—Are an impressive showcase that allow the traveler to enjoy the beauty of wildflowers and will last for years to come.

Vacant Lots—You can transform a vacant lot into a feast for the eye and also cut maintenance costs. Show others that you care.

Open Fields—What a pleasure to envision a blanket of color growing in wide open spaces. Working with Mother Nature brings a warm feeling of accomplishment.

WHEN DO I PLANT?

Wildflower planting dates largely depend on site location and geographic weather patterns. The planting timetable should be decided more by the seasonal precipitation in your area than by temperature. In most areas the autumn months of August, September, October and November are the most favorable months to plant your wildflowers. If the weather will allow you to work the soil, a fall planting is best. If fall planting isn't possible, spring planting will also produce vistas of color for your enjoyment.

HOW DO I PLANT WILDFLOWERS?

The most essential procedure in achieving a successful stand of wildflowers lies in obtaining proper seed/soil contact. Casually broadcasting the seed on an unprepared area will only bring disappointing results. Deep soil tilling encourages unwanted weeds to grow rapidly, which could in turn crowd out your wildflowers.

A little work and patience will reward you in the long run by producing a more successful stand of blooms.

We have outlined a step-by-step planting procedure to assure you the best possible results.

TO PLANT ON EXISTING GRASS:

1a. Use a herbicide to eliminate any vegetation which may compete. (Optional) (See Note)
1b. Mow the existing vegetation as short as possible. Rake the clippings and remove from site.
2. Rake the area with a garden rake to loosen soil surface or hoe lightly. (No more than ½ inch deep)
3. Mix seeds thoroughly to provide equal distribution. (Small seeds tend to filter to the bottom of the mix)
4. Hand broadcast the seed on the area to be planted.
5. Lightly rake over the area to establish proper soil/seed contact.

NOTE: DO NOT plant wildflowers in grasses that grow during winter (example—annual rye grass or fescues) as the winter grasses will be too aggressive to allow the wildflowers to become established.

APPENDIX B

OKLAHOMA DEPARTMENT OF TRANSPORTATION HISTORICAL CORRESPONDENCE AND INFORMATION

Shirley Bellmon
The Governor's Mansion
Oklahoma City, Oklahoma

National Wildflower Research Center
Clearinghouse
2600 FM 973 North
Austin, TX 78725

Dear Researchers,

The first lady of the state of Oklahoma is in the planning stages of promoting a wildflower project for the entire state. Please, share your information for the Oklahoma regions that you may have. I have briefly spoken with Tom Kramer at Wildseed in Houston about purchasing seed. Presently, we have been given some seed for school children's projects and with the first signs of new plants we are becoming evangical enthusiasts.

Please send any appropriate information and ideas that you may have. We are looking forward to a statewide project. Due to the climate differences, I feel certain we will be talking about a great deal of variety. Any help you may offer would be greatly appreciated.

Sincerely,

Midge Lippmann

Miss Midge Lippmann
Assistant for Constituent Affairs
Office of the Governor
212 Capitol
Oklahoma City, OK 73105

(405) 521-2345

Thank you.

KANSAS ASSOCIATED GARDEN CLUBS, INC.
President
MRS. JACK KEEHN
407 West Street
Emporia, Kansas 66801

Joanne S. Orr
Public Information Office

Dear Mrs. Orr,

I was delighted to hear from you and we are very serious about Operation Wildflower. We have one plot growing at Independence, and an area soil conservationest brought us approximately $250 worth of seed the other day.

My husbands vacation starts June 20th, and I believe, during that five weeks I could find a reason to come to Oklahoma City and see you. I hate to ask you to come up here.

I feel Kansas can grow flowers as easily as Oklahoma, and wouldn't it be great to have the central states a flower haven.

Anyway, I must talk to you before gathering a committee for you to come and sell your program to.. I need to know who to contact, and to set a date for the meeting. Probibly October 14th would be a good date.

We do need your help in planning and starting.

Sincerily,

Mrs Jack Keehn

Mrs. Jack Keehn
President-K.A.G.C.
316-342-6816

National Council of State Garden Clubs, Inc.

President
MRS. HOWARD S. KITTEL
5402 Byers Ave.
Fort Worth, Texas 76107

January 29, 1974

Ms. Joanne Orr, Manager
Public Information Branch
Oklahoma Department of Highways
Jim Thorpe Building
Oklahoma City, Oklahoma 73105

Dear Joanne Orr:

In spite of the fact that your tremendously stimulating mailing of the 4 has just been unearthed from usual sea of between-planes mail, could not take off again without expressing appreciation and admiration for a job well done.

You, Mrs. Roads, Mrs. Connors - and National Council (!) - are to be congratulated on a fantastic project superbly launched.

Your mailing is by far the most inspirational and best organized program to come across my desk in many a day. Oklahoma could well be the catalyst needed to activate other States throughout the country.

Would it be too much to ask that you make similar mailings to the following National Chairman whose specific fields all dovetail into the possible development of similar projects:

Mrs. Roswell E. Fisher, Environmental Action Coordinator
59 Arrowhead Trail, New Canaan Connecticut 06840
Mrs. Robert Reyer, Civic Development Chairman
1706 Barclay Street, St. Paul, Minnesota 55109
Mrs. McCauley Cooey, Roadsides Chairman
9747 Forest Drive, Hagerstown, Maryland 21740
Mrs. C. E. Fitzwater, Horticulture Coordinator
2000 Inwood Drive, Huntington, West Virginia 25701
Mrs. Tom Pethtel, Indigenous Plants Chairman
Route 2, Box 10, Kamiah, Idaho 83536

It would be a tremendous service to our organization - as well as to the field of beautification through the use of indigenous plantings - if you could also enclose a copy of this letter in your mailing. With tremendous enthusiasm - but too limited time.

Much too hastily,

Mary Kittel
Mrs. Howard S. Kittel
cc: Mrs. Willian C. Roads, 2828 East 35th Street, Tulsa, Oklahoma 74105

STATE OF OKLAHOMA
DEPARTMENT OF
HIGHWAYS
JIM THORPE BUILDING
OKLAHOMA CITY, OKLAHOMA 73105

January 4, 1974

Dear Garden Club President:

It is wildflower time, even in January and the Oklahoma Departmeht of Highways and the Federated Garden Clubs of Oklahoma have some exciting plans afoot. By their cooperative efforts the Highway Department and the garden clubs want to beautify Oklahoma's 12,000 miles of highways. Many roadsides in Oklahoma already have lovely stands of wildflowers. To create many more such areas is our goal. Driving past waving fields of yellow coreopsis, crimson clover and Indian paintbrush makes us all glad to be living in Oklahoma where people care.

To show that we care, the Highway Department has volunteered to plant all wildflower seed that is donated, to delay mowing certain areas until wildflowers have gone to seed and in all ways to give tender loving care to roadside flowers.

We know that you and your club care too and will want to help by selecting and purchasing seed for the Highway Department to plant. (The Department cannot accept cash donations.) The enclosed sheets give a step by step procedure, sources of seeds and name of the Oklahoma Department of Highways Maintenance foreman in your county. Contact him first to coordinate where flowers can be planted and to discuss flower selection, harvest of seeds this summer, etc.

Mrs. W. C. Roads, president and Mrs. Charles Connors, conservation committee chairman, of the Tulsa Garden Club, have been pioneers in the establishment of this program. After consultation with knowledgeable horticulturists the two ladies have prepared a list of native flowers that will grow happily in part or all of Oklahoma. Some of the flowers may be purchased commercially but many more lovely wildflowers are not available and seed will have to be harvested for sowing.

Highway Beautification with wildflowers benefits everyone with lower mowing costs and greater pride in our state. Most of all, it gives joy to all who pass by.

Wildflower time is NOW! Talk to our Highway Department representative, order seeds so they can be planted before February 15 and we'll all admire the view this spring.

Sincerely,

Joanne S. Orr
Manager
Public Information Branch

Enclosures

JSO/grj

HOW TO PARTICIPATE IN HIGHWAY BEAUTIFICATION PROGRAM

1. Contact Department of Highways Maintenance district foreman concerning planting location and type of flower. If possible, the highway department will plant in location of your choice. If not, he can suggest other possible locations.

2. If you have questions about flower characteristics, planting requirements, etc., your OSU County Extension Director or U.S. Department of Agriculture Soil Representative will be happy to help find answers for you.

3. Purchase seed and give to highway department for planting in January or early February. Allow approximately ten pounds of seed per acre. To plant a larger area, several garden clubs might combine their funds. No money can be accepted by the Department, just seed donations.

4. Seed will be planted by Department of Highways and summer mowing of right of way areas containing wildflowers will be delayed until after seeds ripen.

5. Areas of wildflowers that are to be harvested for reseeding in nearby locations should be marked or located specifically during blooming period. When it is time to harvest the seeds, arrangements should be coordinated with Department of Highways. Harvesting along side a busy highway should only be done with proper safety precautions.

   The Texas Highway Department has harvested many of the seeds used in their extensive wildflower program. We encourage you to work out a similar plan to mark the large areas of native wildflowers and harvest them in cooperation with your Oklahoma Department of Highways maintenance district foreman. Indian paintbrush, one of our loveliest native flowers, will have to be harvested as it is not available commercially.

GENERAL INFORMATION

1. Other organizations are welcome to participate in the Highway Beautification program. Sierra Club, Audubon Society, study groups, Scouts, Camp Fire Girls, civic groups may all participate.

2. Arrangements about your planting should be made with the Department of Highways Maintenance District Foreman in your county or with the appropriate Division Engineer for Maintenance in one of the eight Division offices in the state. (See attached list)

3. Confused, need help or have questions about the program? Write or call

   Joanne Orr, Manager — Telephone 405 521-2554
   Public Information Branch
   Oklahoma Department of Highways
   Jim Thorpe Building
   Oklahoma City, Oklahoma 73105

4. Want a slide show and informal talk about the Highway Beautification Program? We are ready and willing to spread the word anywhere and anytime. (preferably to a council or several clubs meeting together) In the Tulsa area you may contact Mrs. Aileen Roads, Tulsa Garden Club President - 918 747-1757 - or for clubs throughout the state, call or write the above office.

SUGGESTED WILDFLOWERS AND SOURCES

	Area	Blooms	Catalogue No.	Price
Oenothera	east, south and central	May-June	1456	$35.0C 3.9[illegible]
Coreopsis (New Gold)	all of state	June to frost	0595	14.7[illegible]
Gaillardia (Grandiflora)	all of state	June to frost		40.0C 10.0C
Rudbeckia (Kelvidon Star) (My Joy)	all of state	May and June	1769 1770	35.0C
Verbena		May-August		9.0C
Phlox	east	Spring	1681	37.5C

The above seeds can be purchased from George W. Park Seed Company, Greenwood, South Carol 29646. The prices are special for us so note on your order that it is for the Oklahoma Highway Beautification Program.

Crimson Clover (15 lbs. per acre suggested coverage)	east	May-June		$ .7C 70.0C

The above seeds can be purchased from Muskogee Seed Company, P. O. Box 1568, Muskogee, Oklahoma 74401.

The following is a list of wild flowers that will grow well in the state, but we cannot f any commercial source of seed. They will have to be collected locally and sowed near the where they were collected.

Aster - Native Blue			Phlox Davaracata (Blue) Pilosa (Pink)		
Echinacea	Salada Purpurea	east central south east	Oenotherea	Missourianses Rhombipatata	west west and south (sandy soil)
Manarda Native			Ipomosis (Gilia)		south east south central
Penstemon (Beard Tongue)					
Chrysathammus (Rabbit Brush)		west	Castillaia (Indian Paint Brush)		
				Integra (short red)	west
				Indivisa	south east
Rudbecia Serotina (Black eyed Susan)				Purpurea	east central

If you have questions about flower characteristics, etc. your OSU County Extension Direc or US Department of Agriculture Soil Representative will be happy to help find the answe for you.

COOPERATIVE EXTENSION SERVICE

OKLAHOMA STATE UNIVERSITY — UNIVERSITY EXTENSION

137 Federal Building
McAlester, Oklahoma 74501
January 9, 1974

Ms. Joanne S. Orr, Manager
Public Information Branch
State Department of Highways
Jim Thorpe Building
Oklahoma City, Oklahoma 73105

Dear Joanne:

I congratulate you on your excellent work on the planting of wildflowers you shared with us on January 4th at the meeting of the Keep Oklahoma Beautiful Board of Directors meeting.

A good job! Joanne, I wish you much success in this worthy effort.

Would you be kind enough to mail a copy of the cover letter and accompanying three page green sheets to:

Dr. Robert Fite, 201 Whitehurst
Oklahoma State University
Stillwater, Oklahoma 74074

Mr. Paul Mitchell
Horticulturist, Orn.
337 Ag Hall
Oklahoma State University
Stillwater, Oklahoma 74074

I want these gentlemen to know of your effort too.

Best regards,

Max L. Minor

Max L. Minor
Area Specialized Agent
Community Resource Development
O.S.U. Extension Service

MLM:rf

FEB 19 1974

Action Committee for the Environment

National Council of State Garden Clubs, Inc.

Chairman
Mrs. Roswell E. Fisher
59 Arrowhead Trail
New Canaan, Conn. 06840

Ms. Joanne Orr, Manager
Public Information Branch
Oklahoma Department of Highways
Jim Thorpe Building
Oklahoma City, Oklahoma 73105

Dear Ms. Orr;

Thank you very much for sending me a copy of the letter from Mrs. Kittel and the material sent to the Garden Club Presidents of the Federated Garden Clubs of Oklahoma.

I wish to join with Mrs. Kittel in expressing my delight in such a well conceived and organized program. I hope it will prove to be the bell wether for similar programs throughout the country.

I shall watch the progress of this project with greatest interest and hope I will hear that it was a huge success this first year and will be self renewing each year to come. With all the problems that beset us it is invigorating to find one that should give pleasure to many and be beneficial as well to the environment. There should be time to promote beauty as well as to cope with our misstakes!

Most sincerely,

Helen F. Fisher

Mrs. Roswell E. Fisher, Chairman
Action Committee for the Environment

KEEP OKLAHOMA BEAUTIFUL

SOONER ECO

VOLUME 1, NO. 3 **KEEP OKLAHOMA BEAUTIFUL** AUGUST, 1974

ROADSIDE WILDFLOWERS PLANTED

Native wildflowers, already found in many natural stands along Oklahoma roads, may be found blooming in far greater numbers in the future, thanks to a wildflower planting project sponsored jointly by the Oklahoma Department of Highways and the Federated Garden Clubs of Oklahoma.

The Highway Department reports that since January more than 75 garden clubs have donated seed, which has been planted by state highway crews on roadsides leading to 50 Oklahoma towns.

The colorful flowers, including such varieties as crimson clover and blue flax, have already bloomed and many are still blooming across the state. All planted areas are designated by a "wildflower plot" sign. Mowing of the plots will be delayed until this year's blooms have fully gone to seed.

In addition to adding color and beauty to Oklahoma's roadsides, the project is expected to significantly reduce the $1 million-plus mowing costs incurred annually by the Highway Department.

For more information about the program, contact Joanne Orr, Public Information Office, Oklahoma Department of Highways, Jim Thorpe Building, Oklahoma City, Oklahoma 73105. A slide show, speakers and displays are available to help spark interest in your area.

CERTIFICATE SENT TO KOB

Keep Oklahoma Beautiful now has in its state office a beautifully engraved certificate of recognition from Keep America Beautiful, Inc., for "distinguished public service in the nationwide program to Keep America Beautiful."

The KAB awards were based on activities of state organizations as presented through scrapbooks detailing the activities at the state level. Announcement of the winners was made at the annual meeting of Keep America Beautiful, held in New York last December.

OFFICE OF THE LIEUTENANT GOVERNOR
211 STATE CAPITOL BUILDING
OKLAHOMA CITY, OKLAHOMA 73105

May 9, 1975

Mr. J. C. Kennedy
Chairman
Highway Commission
1119 Cherry
Lawton, Ok. 73501

Dear Mr. Chairman:

Let me say that from the very beginning I really doubted the success of the wildflower program as initiated by the Highway Department. I thought it was a good idea; I just didn't think it would work.

At this stage of the game, I don't know what the program has cost, or what the long-range policy will be, but I want to say, emphatically, that it's one of the most beautiful things that's happened to Oklahoma in many years. I was really pleasantly surprised and proud on my first weekend excursion out into the State when I saw the beauty you had added to the already beautiful State of Oklahoma.

Congratulations to the Commission and the Department for what has to be a beautiful success.

Sincerely,

George Nigh

George Nigh
Lt. Governor

GN:ra

cc: Dick Ward
Director
Highway Dept.

June 5, 1975

The Honorable George Nigh
Lieutenant Governor
State of Oklahoma
211 State Capitol Building
Oklahoma City, Oklahoma 73105

Dear Governor Nigh:

I have received your recent letter commending the Department's Wild Flower Program, and want to say thank you for your comments and for taking the time to send them to us.

We believe the current Wild Flower Program is one of the better public relations programs in the Department and will do much to make Oklahoma more attractive to all who wish to travel its highways, as well as save the Department considerable money in reduced mowing costs. Too, the fruits of the program are just now being realized; and, as it develops and grows, we expect much greater things for the people of Oklahoma as a result of these efforts.

We are grateful for your letter, and please feel free to sing our praises in any way you think would benefit the tourism and highway industry in our state.

Sincerely,

J. C. Kennedy, Chairman
State Highway Commission

JCK:vp

cc: Manager, Public Information

236-3541

2205 City National Bank Tower
Oklahoma City
73102

May 12, 1975

Wildflowers
Oklahoma Department of Highways
200 N.E. 21st Street
Oklahoma City, Oklahoma 73105

Dear Sirs:

Your new map for 1975 with wildflowers is a joy. I was wondering when we were going to get a folder such as the Texas Highway Department puts out.

I am always asking people for information and I wondered if there is a book (or several books) about the level of your map, but with many more flowers in it. It takes a good illustration for most of us who know no botany to figure out the names of plants. For instance there is something like Snake Grass that now people ask about and people say there are Lupins here when they actually mean Wild Indigo, I believe. This is white and also in purple. And then there are things people call Cowboy Rose and Buttercup and Night Primrose that people would like to identify;but this map is a wonderful starter!

Sincerely,

Archibald C. Edwards

ACE/ad

APPENDIX C

OKLAHOMA DEPARTMENT OF TRANSPORTATION

WILDFLOWER SPECIES PLANTED 1989-1991

WILDFLOWER SPECIES PLANTED BY ODOT

1989-1991

Family	Botanical Name	Common Name
CARYOPHYLLACEAE	Dianthus barbatus	Sweet William
	Gypsophila muralis	Baby's Breath
	Silene armeria	Catchfly
COMPOSITAE	Achillea millefolium	Yarrow
	Aphanostephus skirrobasis	Lazy Daisy
	Centaurea cyanus	Cornflower
	Cichorium intybus	Chicory
	Chrysanthemum leucanthemum	Oxeye Daisy
	Chrysanthemum leucanthemum	Shasta Daisy
	Coreopsis lanceolata	Tickseed
	Coreopsis tinctoria	Plains Coreopsis
	Coreopsis tinctoria 'rubra'	Dwarf Red Coreopsis
	Cosmos bipinnatus	Cosmos
	Dimorphotheca aurantiaca	African Daisy
	Echinacea purpurea	Purple Coneflower
	Gaillardia aristata	Blanketflower
	Gaillardia pulchella	Indian Blanket
	Liatria aspera	Gayfeather
	Ratibida pinnata	Mexican Hat

Family	Botanical Name	Common Name
	Rudbeckia amplexicaulis	Clasping Coneflower
	Rudbeckia hirta	Black-eyed Susan
CRUCIFERAE	Hesperis matronalis	Dames Rocket
	Lesquerella gracilis	Bladderpod
GENTIANACEAE	Eustoma grandiflorum	Bluebell
LABIATAE	Monarda citriodora	Lemon Mint
	Salvia azurea 'Nekan'	Pitchers Sage
LEGUMINOSAE	Desmanthus illinoensis	Illinois Bundleflower
	Lupinus texensis	Texas Bluebonnet
	Petalostemum purpureum	Purple Prairie Clover
	Trifolium incarnatum	Crimson Clover
	Trifolium pratense	Red Clover
LINACEAE	Linum rubrum	Scarlet Flax
ONAGRACEAE	Oenothera lamarckiana	Evening Primrose
	Oenothera missouriensis	Missouri Primrose
	Oenothera speciosa	Showy Primrose
PAPAVERACEAE	Eschscholzia californica	California Poppy
	Papaver rhoeas	Corn Poppy
POLEMONIACEAE	Ipomopsis rubra	Standing Cypress
	Phlox drummondii	Drummond Phlox
RANUNCULACEAE	Delphinium ajacis	Rocket Larkspur
SCROPHULARIACEAE	Castillija indivisa	Indian Paintbrush
	Linaria maroccana	Toadflax
UBELLIFERAE	Daucus carota	Queen Anne's Lace

WILDFLOWER SPECIES PLANTED BY ODOT

1989-1991

Common Name	Botanical Name
African Daisy	Dimorphotheca aurantiaca
Baby's Breath	Gypsophila muralis
Black-eyed Susan	Rudbeckia hirta
Bladderpod	Lesquerella gracilis
Blanketflower	Gaillardia aristata
California Poppy	Eschscholzia californica
Catchfly	Silene armeria
Chicory	Cichorium intybus
Clasping Coneflower	Rudbeckia amplexicaulis
Cornflower	Centaurea cyanus
Corn Poppy	Papaver rhoeas
Cosmos	Cosmos bipinnatus
Crimson Clover	Trifolium incarnatum
Dames Rocket	Hesperis matronalis
Drummond Phlox	Phlox drummondii
Dwarf Red Coreopsis	Coreopsis tinctoria 'rubra'
Evening Primrose	Oenothera lamarckiana
Gayfeather	Liatris aspera
Illinois Bundleflower	Desmanthus illinoensis
Indian Blanket	Gaillardia pulchella
Indian Paintbrush	Castilleja indivisa
Lazy Daisy	Aphanostephus skirrobasis
Lemon Mint	Monarda citriodora
Mexican Hat	Ratibida pinnata

Common Name	Botanical Name
Missouri Primrose	Oenothera missouriensis
Ox-eyed Daisy	Chrysanthemum leucanthemum
Pitcher's Sage	Salvia azurea 'Nekan'
Plains Coreopsis	Coreopsis tinctoria
Purple Coneflower	Echinacea purpurea
Purple Prairie Clover	Petalostemum purpureum
Queen Anne's Lace	Daucus carota
Red Clover	Trifolium pratense
Rocket Larkspur	Delphinium ajacis
Scarlet Flax	Linum rubrum
Shasta Daisy	Chrysanthemum leucanthemum
Showy Primrose	Oenothera speciosa
Standing Cypress	Ipmopsis rubra
Sweet William	Dianthus barbatus
Texas Bluebell	Eustoma grandiflorum
Texas Bluebonnet	Lupinus texensis
Tickseed	Coreopsis lanceolata
Toadflax	Linaria maroccana
Yarrow	Achillea millefolium

WILDFLOWER SPECIES PLANTED IN 1991
BY THE OKLAHOMA DEPARTMENT OF TRANSPORTATION

Common Name	Botanical Name	Total lbs.	Acres
Baby's Breath	Gypsophila muralis	19	4
Black-eyed Susan	Rudbeckia hirta	60.5	30.5
Blanket Flower	Gaillardia aristata	24	2.5
California Poppy	Eschscholzia californica	8	1
Catchfly	Silene armeria	3	3
Clasping Coneflower	Rudbeckia amplexicaulis	169.5	56.5
Cornflower	Centaurea cyanus	64	16
Corn Poppy	Papaver rhoeas	50	25
Cosmos	Cosmos bipinnatus	1	x
Dames Rocket	Hesperis matronalis	64	8
Drummond Phlox	Phlox drummondii	16	2
Gayfeather	Liatris pychostachya	8	1
Indian Blanket	Gaillardia puchella	577.5	58
Lazy Daisy	Aphanostephus skirrobasis	109.5	22
Lemon Mint	Monarda citriodora	175.5	58.5
Mexican Hat	Ratibida columnaris	54.5	27
Ox-eye Daisy	Chrysanthemum leucanthemum	54	11
Plains Coreopsis	Coreopsis tinctoria	112	56
Purple Coneflower	Echinacea purpurea	23	2
Purple Prairie Clover	Petalostemum purpureum	40	5
Red Clover	Trifolium pratense	50	3

Common Name	Botanical Name	Total lbs.	Acres
Rocket Larkspur	Delphinium ajacis	32	3.5
Scarlet Flax	Linum rubrum	25	3
Showy Primrose	Oenothera speciosa	21.75	22
Standing Cypress	Ipomopsis rubra	1	x
Sweet William	Dianthus barbatus	21	3.5
Texas Bluebell	Eustoma grandiflorum	4.35	17
Texas Bluebonnets	Lupinus texensis	135	4
Tickseed	Coreopsis lanceolata	187	19
Toadflax	Linaria maroccana	1.5	3
Yarrow	Achillea millefolium	18	12

2/92

wfspeci/plant91

WILDFLOWER SPECIES PLANTED IN 1990
BY THE OKLAHOMA DEPARTMENT OF TRANSPORTATION

Common Name	Botanical Name	* ODOT lbs.	** Partner lbs.	Total lbs.
African Daisy	Dimorphotheca aurantiaca	9		9
Black-eyed Susan	Rudbeckia hirta	34	48	82
California Poppy	Eschscholzia californica	16	4	20
Catchfly	Silene armeria		5	5
Chicory	Cichorium intybus	8		8
Clasping Coneflower	Rudbeckia amplexicaulis	30	78	108
Cornflower	Centaurea cyanus	20	135	155
Corn Poppy	Papaver rhoeas	16	37	53
Drummond Phlox	Phlox drummondii	8		8
Dwarf Red Coreopsis	Coreopsis tinctoria 'rubra'		6	6
Gayfeather	Liatris pychostachya	30		30
Indian Blanket	Gaillardia puchella	210	296	506
Lemon Mint	Monarda citriodora	87	167.25	254.25
Mexican Hat	Ratibida columnaris		4.5	4.5
Missouri Primrose	Oenothera missouriensis	20		20
Ox-eyed Daisy	Chrysanthemum leucanthemum	50	42	92
Plains Coreopsis	Coreopsis tinctoria	72	110.75	182.75

Common Name	Botanical Name	* ODOT lbs.	** Partner lbs.	Total lbs.
Purple Coneflower	Echinacea purpurea	24		24
Purple Prairie Clover	Petalostemum purpureum	32	20	52
Queen Anne's Lace	Daucus carota	10		10
Rocket Larkspur	Delphinium ajacis	10	8	18
Scarlet Flax	Linum rubrum	8	4	12
Showy Primrose	Oenothera speciosa	15	13.5	28.5
Standing Cypress	Ipomopsis rubra	6.25	8	14.25
Texas Bluebell	Eustoma grandiflorum	.25		.25
Texas Bluebonnets	Lupinus texensis	105	120	225
Texas Paintbrush	Castilleja indivisa	1.5	1.25	2.75
Tickseed	Coreopsis lanceolata	80	42	122
Yarrow	Achillea millefolium	3		3
TOTALS		905	1150.25	2055.25

TOTAL POUNDS - 2,055.25

* ODOT - Seed purchased with Donor Fund money, division replacement funds, or grown by the Department of Corrections.

**Partner - All other donated seed.

WILDFLOWER SPECIES PLANTED IN 1989 BY ODOT

Achillea millefolium	White Yarrow	10 lbs.
Aphanostephus Skirrhobasis	Lazy Daisy	216 lbs.
Castilleja indivisa	Indian Paintbrush	1 lbs.
Centaurea cyanus	Cornflower	16 lbs.
Chrysanthemum leucanthemum	Ox-eyed Daisy	106 lbs.
Chrysanthemum leucanthemum	Shasta Daisy	½ lbs.
Coreopsis lanceolata	Tickseed	185½ lbs.
Coreopsis tinctoria	Plains Coreopsis	133 lbs.
Delphinium ajacis	Rocket Larkspur	10 lbs.
Desmanthus illinoensis	Illinois Bundleflower	10 lbs.
Enchinacea purpurea	Purple Coneflower	46 lbs.
Gaillardia aristata	Blanketflower	20 lbs.
Gaillardia pulchella	Indian Blanket	434 lbs.
Lesquerella gracilis	Bladderpod	1 lbs.
Liatris pychostachya 'Eureka'	Eureka Gayfeather	1 lbs.
Linaria maroccana	Toadflax	1½ lbs.
Linum rubrum	Scarlet Flax	6 lbs.
Lupinus texensis	Texas Bluebonnet	175 lbs.
Monarda citriodora	Lemon Mint	200 lbs.
Oenothera lamarckiana	Evening Primrose	24 lbs.
Oenothera speciosa	Showy Primrose	1 3/4 lbs.
Papaver rhoeas	Corn Poppy	5 lbs.
Petalostemum purpureum	Purple Prairie Clover	16 lbs.
Petalostemum purpureum 'Kaneb'	Purple Prairie Clover	12 lbs.
Phlox drummondii	Drummond Phlox	6 lbs.
Ratibida columnaris	Mexican Hat	15 lbs.
Ratibida pinnata	Grayhead Prairie - Coneflower, Sunglow	2 lbs.
Rudbeckia amplexicaulis	Clasping Coneflower	86 lbs.
Rudbeckia hirta	Black-eyed Susan	62 lbs.
Salvia azurea 'Nekan'	Pitcher's Sage	1 lbs.
Trifolium incarnatum	Crimson Clover	750 lbs.

APPENDIX D

OKLAHOMA DEPARTMENT OF TRANSPORTATION

WILDFLOWER DONORS 1989 - 1991

DONORS OF WILDFLOWER SEED PURCHASED IN 1991

Muskogee City Parks & Recreation, $279.00
Broken Bow Chamber of Commerce, $204.50
Poteau Garden Club, $228.00
Shawnee Garden Council, $396.00
Norman Parkway 9 Contributors/George Hulsey, $2,329.52
City of Pauls Valley, $567.50
Oklahoma City Beautiful, $5,443.00
Keep Edmond Beautiful, $964.00
Ardmore Garden Club, $184.19
Jay Home and Garden Club, $226.00
Tulsa, Mary O'Brien Bookstore, $195.00
Tulsa, Marcy Rabinowitz, $423.50
Tulsa, Up With Trees, $600.00
Northeastern Oklahoma Electric Coop, $5,935.50
Oklahoma State Garden Council, $500.00
Stillwater Southwestern Bell Pioneers, $200.00
Cushing Chamber of Commerce, $767.75
Enid, Winona Marshall, $250.75
Mangum, Bradley Banister, $212.00
Weatherford Sorosis Clubs, $172.00
Woodward Rotary Club, $502.00
Indiahoma,' Bess Snodgrass Memorial Award/Tennie Zumwalt, $400.00
Duncan Garden Council, $132.00

STATEWIDE DONOR FUND:

United BankCard, Inc., $15,350.00
Yukon Garden Club (Jane Stanley), $25.00
Midwest City Japonica Garden Club, $20.00
Atoka Thunderbird Elementary Second Grade, $15.28

1/92

OKLAHOMA SEED DONORS 1990

Donation	
$ 500.00	Caddo - Belinda Davison, 1 acre
612.50	City of Claremore - Trudi Haase, 18 acres
400.00	City of Durant - Pete Peterson, 2 acres
372.00	City of Guymon - Cindy Tuttle, 1 acre
318.00	City of Muskogee - Mark Wilkerson, 2 acres
390.00	City of Oolagah - Wanda Sanders, 4 acres
150.00	City of Tonkawa - Betty Ridgeway, 1 acre
582.00	City of Watonga - Sheila Shaw, 2 acres
12,733.02	ODOT Donor Fund - Statewide
100.00	Duncan Garden Council - Bobbie Clinkenbeard, 1 acre
300.00	First Interstate Bank (Okla City) - Donna Greene, 2 acres
409.50	Frederick - Faye Simpson, 3 acres
940.00	Keep Edmond Beautiful - Judy Fleetwood, 5 acres
7,700.00	Oklahoma City Beautiful, 39 acres
1,000.00	Oklahoma State Garden Council - Mrs. W.A. Williams, 11 acres
1,100.00	Pride In Tulsa - Wilma Jenkins, 4 1/2 acres
659.00	Purcell Home Extension - Marilyn Berosek, 3 acres
259.00	Rabinowitz, Dr. and Mrs., Tulsa, 1 acre
800.00	Shawnee Garden Council - Louise Counts, 4 1/2 acres
267.15	Stillwater Southwestern Bell Pioneers - Connie Covington, 1 acre
$29,592.17	

Department of Corrections, 70# Indian Blanket Seed

1989 WILDFLOWER SEED DONORS

United Bankcard Donor Fund:	$ 13,531.80
Ok State Garden Council:	1,000.00
Oklahoma City Beautiful:	4,506.80
Up With Trees (Tulsa):	500.00
City of Claremore:	986.75
Keep Edmond Beautiful:	1,201.00
Shawnee Garden Council:	300.00
A More Beautiful Muskogee & Muskogee Garden Club:	910.00
Stillwater SW Bell Telephone Pioneers:	206.25
Lone Wolf Home Extension and 1st State Bank:	59.00
Duncan Garden Council:	200.00
Stevens County Homemakers:	100.00
Ninnekah Extension Homemakers:	100.00
City of Altus:	300.00
National Forest Service:	3,817.64
TOTAL	**$ 27,719.24**

OKLAHOMA CITY BEAUTIFUL, INC.
Wildflower Plantings

	Donation	Acres
1988	$5,046	66*
1989	$4,506	27
1990	$7,700	39
1991	$5,443	15

1992 Total Active Acres: 66 1/2

Total Donation to ODOT: $22,695

*Note: The first year almost all plantings consisted of inexpensive annuals. Seed has become more expensive, and more perennials and natives are being planted now.

Charge cards help fund wildflowers in Oklahoma

The Oklahoma DOT works with state banks to fund roadside wildflowers using a creative charge card plan; funds are used for seeds, equipment and research

by Martha Heine

The Oklahoma Department of Transportation (DOT) is working with United BankCard, a credit card company with more than 200 member-banks in Oklahoma, to add wildflowers to the roadside with the help of a continuing donor fund financed through special MasterCard and Visa users around the state.

Seed obtained through the donor program has been planted in 12 different communities and rest areas around the state. The DOT planted a total of 170 acres this fall; of those, 70 acres were a result of the donor fund and the United BankCard.

"It began when the United BankCard people went to the governor's wife, Mrs. Shirley Bellmon, because she has been very supportive of beautification in Oklahoma," said Joanne Orr, beautification coordinator for the Oklahoma DOT. "They wanted to donate some funds to the wildflower program. They were particularly interested in wildflowers, not trees or shrubs. She sent them over to us."

George Carlton, president of United BankCard and a strong proponent of the program, said that between 60 and 70 member banks have chosen to participate in the optional program. The banks promote the program partly because all funds will stay in Oklahoma.

Carlton says that the program will continue in 1990. "I think it is worth the effort," he said. "We did not know whether we should go through the DOT or through the office of tourism. We decided that the DOT has a strong interest in maintenance on those roads. We are delighted with the choice we made. It takes some interest on the part of the management of the department to make sure this program comes off."

Orr's department is responsible for the adopt-a-highway program and roadside wildflower program. "They (United BankCard) wanted to donate in a way that would be a continuing donation, not a lump sum. Because we are a state agency that cannot receive direct donations, the funds are actually given to the governor. He turns around and gives them to the office of state finance and then they are forwarded on to us, but the funds are clearly intended for the wildflower program," said Orr. A special "donor fund" has been set up by the DOT to receive the donations.

Fees generate funds From the initial credit card fee for each new account, $2 is donated to the fund. Two cents is donated to the fund for each transaction made with one of the specialty cards. The cards are embossed with photographs of Oklahoma nature scenes by David Fitzgerald, a prominent native Oklahoman photographer.

Orr said that the program spent $13,747.50 on wildflower seed from the donor fund. When the program is in full swing, officials expect that it will generate between $30,000 and $60,000 per year in new revenue.

The donation program originally began in June of 1989. Since the wildflower planting season is in September and October, more funds should be raised in the coming year. "In order to take advantage of the season, they advanced us a little bit of money so we could use it to buy seed," said Orr. "The remainder, accumulating in November and December, will be used in next year's program. I expect that next year we will buy a wildflower drill seeder because we need another one. We had two, but we need one more. Not only has the donor fund created more activity, but a lot of our communities in Oklahoma are getting excited about wildflowers. They are also donating. The communities frequently will buy the seeds directly."

Although no other corporation has been approached for donations, Orr said that the program is running well. "We are hoping that they will be the first of many corporations or organizations who are major donors who will utilize this procedure."□

Laurie Stillings, landscape architect for the Oklahoma DOT, explains the operation of a drill seeder. George Calton, president of United BankCard Inc., Joanne Orr, beautification Coordinator, Oklahoma DOT, and two representatives from the 60 banks participating in the charge card program look on.

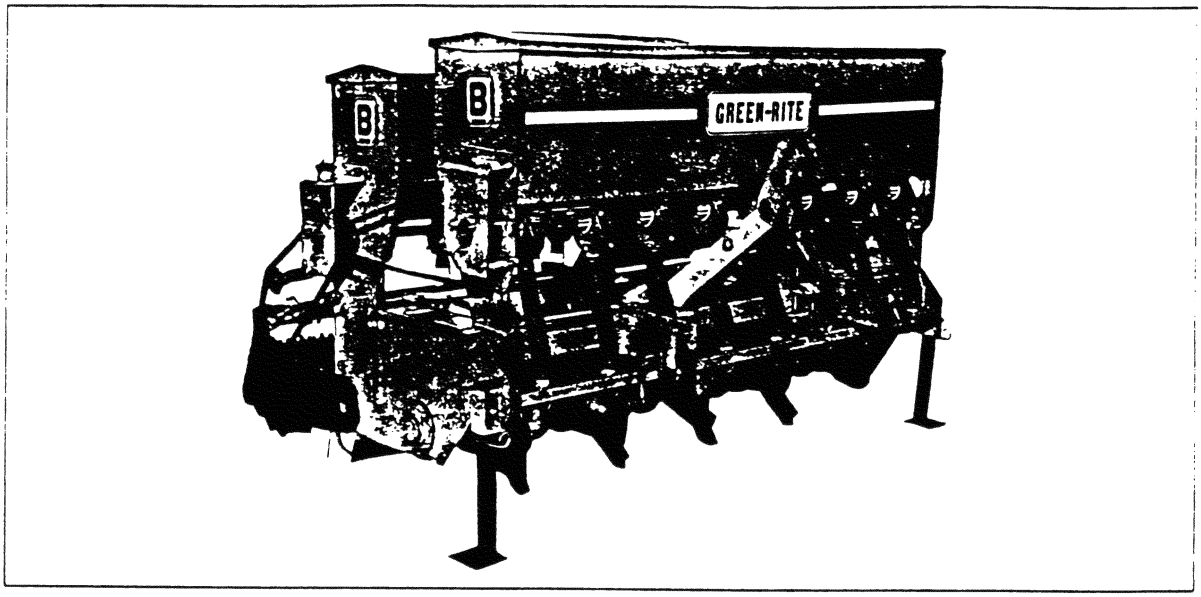
Photos for this article provided by the Oklahoma Department of Transportation

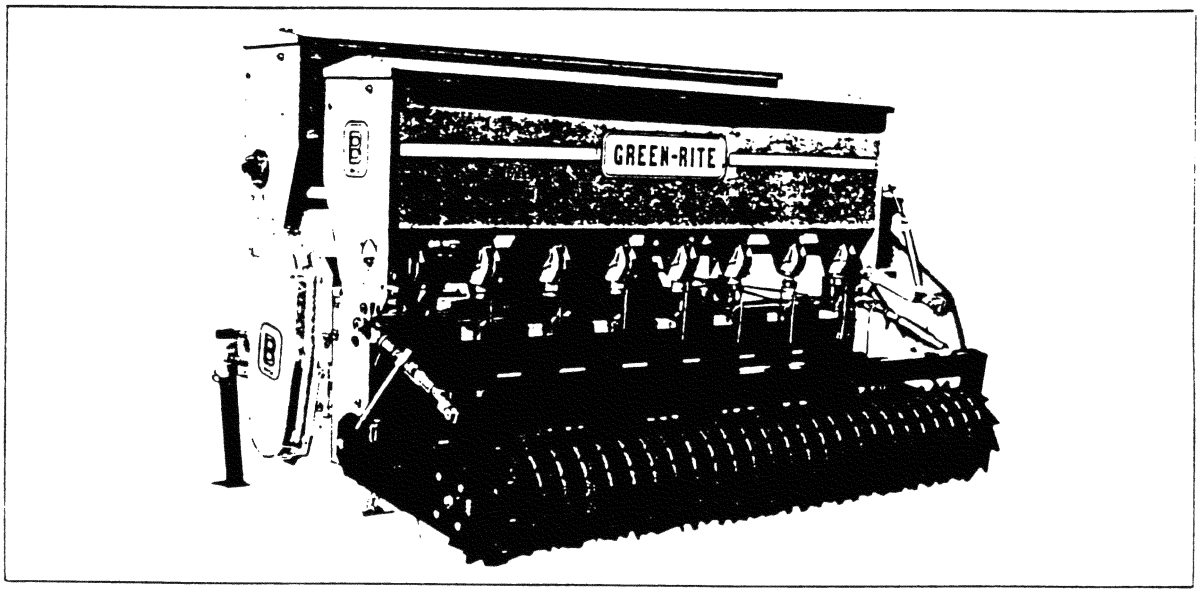
APPENDIX E

WILDFLOWER DRILL SEEDERS

BEFCO GREEN-RITE II

GREEN-RITE II – A ONE PASS MULTI PURPOSE SEEDER, AERATOR, TILLER AT AN AFFORDABLE PRICE FOR TRACTORS FROM 30 TO 60 HORSEPOWER. THREE WORKING WIDTHS: 50″-58″ 66″.





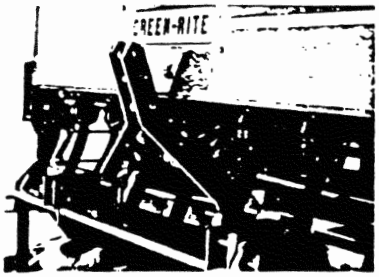
Get dependable service from the BEFCO Green-Rite II with these key features.

With its straight knife rotor the Green-Rite II is the perfect machine for aerating, original seeding, or over seeding. By changing to a standard rotor, it functions as a rotary tiller preparing the soil for planting or laying sod.

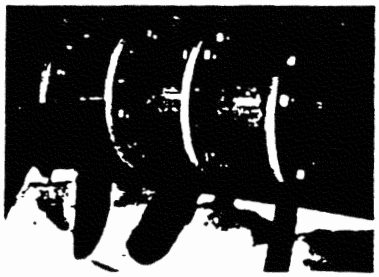
BEFCO's exclusive ONE PASS system lets golf course superintendents, ground keepers for athletic fields and parks, commercial and industrial maintenance people prepare the soil, incorporate fertilizer, seed, compact and level in just ONE PASS.

KEY FEATURES AND BENEFITS

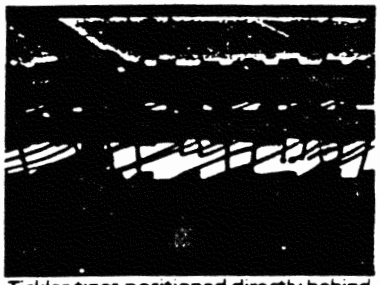
Large capacity seed and fertilizer hoppers give you longer operation and less down time. The front hopper comes equipped with an agitator to maintain uniform flow of fertilizer.



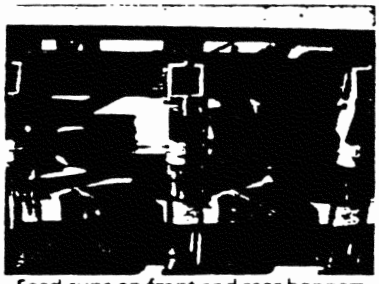
The straight knife rotor is excellent for aeration, seed bed preparation, and fertilizer incorporation.



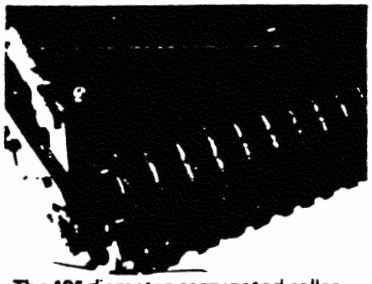
It is a simple task to change from the straight knife rotor to the optional tilling rotor for use in more extensive soil preparation.



Tickler tines positioned directly behind the rear seed hopper and splash plate help incorporate and cover the seed and fertilizer over the entire working width of the Green-Rite II before compaction and leveling by the final corrugated rollers.



Seed cups on front and rear hoppers are designed to allow for precise metering of seed and fertilizer flow to insure uniform coverage over the standard operating widths ranging from 50" to 66."



The 10" diameter corrugated roller works in conjunction with the ground-driven chain drive transmission to control the precise flow of seed and fertilizer and to provide the final soil compaction and leveling.

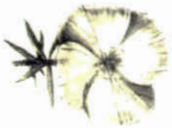
BEFCO

BEFCO, Inc.
Highway 301 South By-Pass
P.O. Box 6036
Rocky Mount, NC 27801
919/977-9920
Telex: 579496 Telefax: 919/977-9718

J-Thom Wildflower Seeder

APPENDIX F

WILDFLOWER PUBLICATIONS FROM OTHER STATES



National Wildflower Research Center

National Wildflower Research Center
2600 FM 973 North
Austin, Texas 78725

Place Your Stamp Here

7. Gaillardias are one of our nation's most colorful wildflowers. Also known as Indian Blanket and Firewheel, fields of Gaillardia pulchella form a beautiful mosaic of reds and yellows.

A Brief History

The National Wildflower Research Center is a non-profit, tax-exempt organization supported by gifts and grants from individuals, corporations, foundations and other organizations. It is administered by a Board of Trustees, a small professional staff and volunteers.

The National Wildflower Research Center was established in December, 1982, by a group of concerned citizens from all across the United States. The inaugural gift establishing the Center came from Lady Bird Johnson in the form of sixty acres of land on the Colorado River in Central Texas near Austin and a gift of $125,000.

The work of the National Wildflower Research Center combines a sense of beauty, preservation and economic feasibility. Its efforts include:

- Promoting and conducting research on the conservation and cultivation of wildflowers;
- Conducting experiments and demonstration plantings;
- Measuring and making available facts on water conservation, labor-saving and other benefits of wildflower landscapes, augmenting research on erosion control, and soil conservation and enrichment through a National Clearinghouse for information and research;
- Developing national educational programs; and
- Establishing national achievement awards for professional and volunteer contributions to the effort.

National Wildflower Research Center
2600 FM 973 North
Austin, Texas 78725
(512) 929-3600

NATIONAL *Wildflower* RESEARCH CENTER

An Organization in Bloom

Dedicated to the preservation, propagation and use of wildflowers and other native plants throughout the United States.

National Wildflower Research Center Brochure

The Importance of Wildflowers

Wildflowers have special meaning to us all—a natural canvas on which annually is painted a wide array of colors and textures. They provide a sense of continuity and hope that comes with the changing of seasons. We now know that these very plants which offer so much beauty can be utilized for the nation's economic and environmental benefit. Wildflowers lift our spirits, enrich our lives and, as we are just beginning to learn, improve the environment which surrounds us.

Wildflowers are hardy survivors but little is known about how best to propagate and grow them. While much is known in theory, there is a great deal to be learned and researched about the contributions that these native flowers and plants can make in improving the quality of our future, in addition to beautifying our lives.

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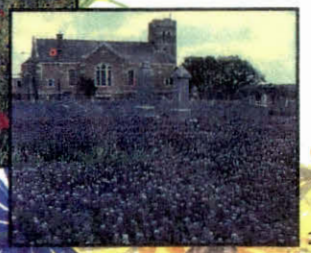


2.

3.

4.

1. A field of Poppies and Bachelor Buttons surround a mountain home. 2. Bluebonnets (Lupines) in a Central Texas churchyard. 3. An expanse of wildflowers along a California coastline. 4. The Maximillian Sunflower (Helianthus maximiliani) *is a striking wildflower in late summer and early fall.*

1. Applewood Seed Co., 2. and 4. Texas Highway Dept., 3. Linda Adkins, 5. David Northington & Kjell Sandved, 6. I.M. State Park

Economic Benefits

The use of wildflowers can save water and literally millions of dollars in maintenance costs and upkeep of public spaces and roadways. They can have numerous beneficial effects on our environment. They can economically beautify industrial sites and country lanes alike and provide alternatives to conventional residential and commercial landscaping.

Where do we go from here?

We need additional knowledge of propagation and management techniques before wildflower landscapes become a dependable alternative in suitable areas. The National Wildflower Research Center was created to further our knowledge of these beautiful gifts of nature and to stimulate research and education about their preservation, propagation and use throughout our nation.

Your involvement and support is critical to the future of the Center's efforts.

The National Wildflower Research Center requires broad support. Financial support for research, willing volunteers and sharing of information about wildflowers and native plants through the Center's Clearinghouse are critical to its successful future. Please show your support by sending this tear-off reply form. (Place your stamp on the reverse side of the card and drop in any mailbox.)

____ Please send me more information.

____ I'd like to help.
Please accept my contribution and make me a
Member: ____ $25 ____ $50 ____ $100
____ Other: $_____ (amount)

Mr./Mrs./Ms. _____

Address: _____

_____

City: _____ State ____ ZIP: ____

Telephone: ( ) _____

Your support is greatly appreciated.
Donations are tax deductible.

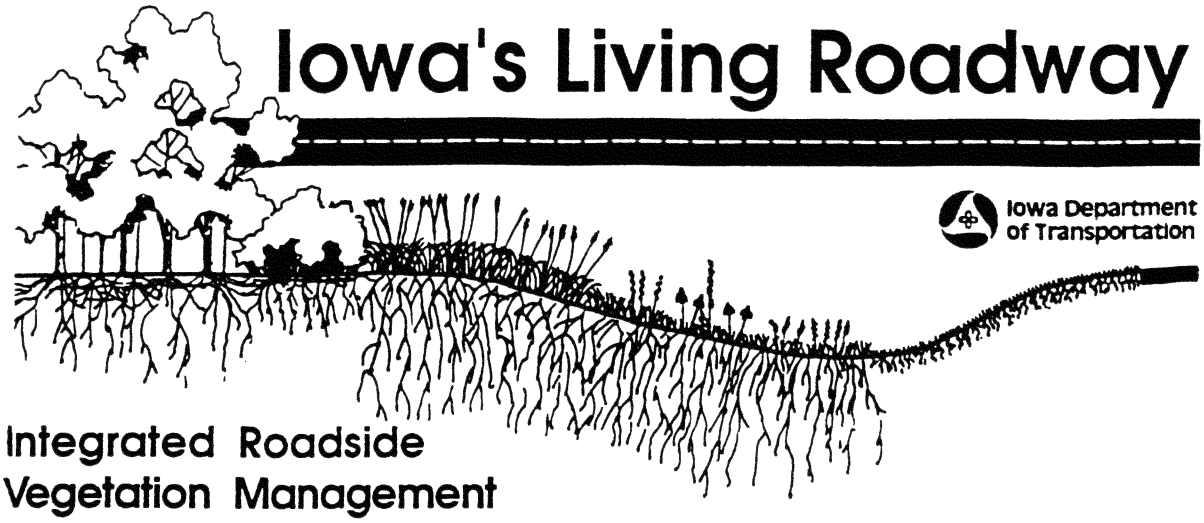
5

6

5. Purslane (Portulaca) *is a colorful favorite.*
6. The California Poppy (Eschscholzia californica) *is popular in the western U.S.*

National Wildflower Research Center Brochure

Iowa's Living Roadway



Iowa Department of Transportation

Integrated Roadside Vegetation Management

Integrated Roadside Vegetation Management (IRVM) in Iowa is a result of concern for our environment and escalating budget deficits. IRVM brings together several maintenance practices to make it possible to manage rights of way more effectively. These practices include mowing, spot spraying, preservation and re-introduction of native plants, and burning — on a limited basis — for vegetation enhancement.

Until the gasoline shortages of the 1970s the rights of way were mowed from fence to fence. This created a manicured appearance that damaged tall prairie grasses. Mowing the rights of way also reduced habitat for all kinds of wildlife.

A limited mowing policy was then developed because of a change in funding priorities. This policy reduced mowing to areas along the shoulders and through medians to reduce blowing snow on road surfaces. This type of mowing also helps eliminate undesirable plant growth that might reduce visibility at intersections.

In addition, the Iowa Code requires those in charge of the roads to control noxious weed growth. Mowing selectively, and at the proper time, can be one type of control.

Spot spraying is another practice used to manage rights of way. In the past, some rights of way were sprayed from fence to fence. Spraying is now done only on noxious weeds. Sterilants are used to remove vegetation from cracks in pavement or granular and stabilized shoulders. The DOT's spot spraying policy has reduced chemical usage by 80 percent and still maintains an acceptable level of weed control. This will ultimately result in an improved environment for all of us.

When our ancestors moved west and settled here, they plowed under Iowa's native vegetation, which was 85 percent tall grass prairie. They also planted non-native cool season grasses, which resulted in the disappearance of the tall grass prairie. Researching our past can show the benefits of planting native plants. Native plants are hardy, require less maintenance and water, need only a minimum of fertilizer, and are usually less prone to disease. The native warm season grasses have deep root systems, growing 12 feet or more into the soil. This allows them to withstand prolonged periods of drought.

The cool season grasses which were introduced lose vigor during droughts and in the infertile areas common to roadsides. This allows noxious weeds to establish themselves. The warm season native plants can tolerate drought and have minimal requirements. Native plants also add aesthetic benefits to the rights of way. These benefits include flowers, fruits, fall color and a consistently changing view for the motorist.

Fire is a natural management technique for warm season grasses. It can control the unwanted competition of trees and the cool season grasses which have been introduced, and thus give the warm season grasses an advantage. Recently the DOT has experimented with burning to enhance specific prairie areas in the rights of way. Due to safety considerations for the motoring public, burning will not be conducted on a large scale. Many variables make burning unpredictable for high traffic roads. However, in the future, small burns will be conducted to measure their potential for right of way management.

IRVM is important to everyone. By managing our roadsides more effectively, efficiently and safely, we will have a more appealing roadside environment for future generations.

"Iowa's Living Roadway" is a newsletter for Iowans concerned about preserving, protecting and improving our roadway environment. The newsletter is funded by the Living Roadway Trust Fund, and written by the staff of the Integrated Roadside Vegetation Management Coordinator's Office at the Iowa Department of Transportation.

1991 Fiscal Year Projects

(selected from December 1990 application deadline)

CITY PROJECTS

Grimes	Gateway Planting	$ 1,440
Ogden	Gateway Planting	2,648
Thompson	Gateway Planting	1,694
Gateway Meeting		15,000
Avian Nesting Research		793
Demonstration Project		1,865
TOTAL		$ 23,440

COUNTY PROJECTS

Cerro Gordo	Special Seed Purchase	$ 3,392
Crawford	Demonstration Project	628
Crawford	Demonstration Project	2,317
Crawford	Roadside Inventory	4,500
Crawford	Special Equipment	1,101
Crawford	Special Seed Propagation	593
Crawford	Special Seed Purchase	4,549
Crawford	Special Seed Purchase	1,139
Delaware	Special Equipment	7,030
Hardin	Special Seed Purchase	2,265
Howard	Roadside Inventory	4,500
Howard	Special Equipment	11,864
Lee	Special Equipment	1,595
Linn	Roadside Inventory	4,500
Page	Special Equipment	9,280
Polk	Special Seed Propagation	1,416
Winnebago	Roadside Inventory	3,993
Winnebago	Special Seed Purchase	10,337
Woodbury	Special Plantings	2,053
Avian Nesting		1,288
Demonstration Project		3,030
TOTAL		$ 81,370

STATE PROJECTS

Avian Nesting	$ 1,882
Demonstration Project	4,429
Woodbury County Special Planting	20,584
Special Demonstration Plantings	270,000
Newsletter Mailing	4,000
TOTAL	$ 300,895

Our fiscal year 1991 REAP funds have been cut 20 percent We will receive $600,000 instead of $750,000 from the REAP account. Currently we have evaluated 148 applications and approved approximately $1,090,000 for 126 projects (16 city, 69 county and 41 state)

LOUISIANA PROJECT WILDFLOWER

olume 3, Number 2 Spring, 1990

1990 and Beyond: Where Do We Go From Here?

by Bill Fontenot

Last March, a conference entiled, New Trends in the Culture and Use of Native Plants was held at the ward-winning Pinecote Pavilion in Picayune, Mississippi's Crosby Arboretum. The featured speaker was William E Brumback of Garden in the Woods, one of the finest arboreta in North America, and keepsake of the amed New England Wildflower Society.

In his keynote address, A National Perspective, Brumback admittedly raised more questions than answers as he presented an overview of he history, current status, and future possibilities involving our nation's community of native flora. Beginning with humankind's rather recent rise to predominance in the natural world, Brumback placed the responsibility of shaping America's future landscapes squarely on our own shoulders. Gone are the days when our natural environment dictated our very lifestyles to us. For the most part, Nature has been conquered – in many instances, to the point of obliteration – by man. And since we have wrested controlling power from our environment and into our own hands, it is now our duty to plan the future environmental course of nation, and indeed, of our planet.

Brumback spoke of the few remaining pockets of untamed natural habitat on earth, and their crucial importance in maintaining the genetic integrity of the world's flora and fauna. Hybridization, cloning, selective breeding, and other methods of propagation have risen to the forefront of plant and animal culture, but the naturally selected genetic makeup of our remaining stock of wildlife has always been – and will always be – the key to the future health and diversity of life on Earth. Disease resistance, drought tolerance, hardiness, and other critical survival factors will always find their origins in the realm of the wild, through the ancient and time honored process referred to as natural selection, or "survival of the fittest." And as we continue to grope for "popular" or "economic" reasons as to exactly why it is that we should actively protect and preserve our wilderness, our very survival as a global community hangs in the balance.

Bruback then introduced the concept of "integrated conservation," where wild species are both protected within their natural habitats, as well as propagated in areas such as botanical gardens, arboreta, roadsides, and other suitable places. He warned against our lopsided desire to create "zoos" where many organisms are conserved at the expense of the habitats from which they naturally originated. Too strong a dose of this type of conservation provides a wide avenue for "developers" to simply save the organism while destroying the habitat. A proper balance of habitat protection, species conservation and propagation, and habitat restoration must be planned.

Finally, the question was raised as to the acceptability of introducing exotic plant species into native habitats. At the outset, a distinction was made between small-scale (i.e. residential and commercial) properties, and large-scale, natural or "semi-natural" habitats. Bruback stated, and certainly everyone concurred, that exotics do have a place in small-scale, private and public landscapes, so long as the species in question is not prone to escape the area and proliferate in the wild at the expense of native plants and animals. Purple Loostrife in the east and midwest, and kudzu vine and Japanese honeysuckle in the southeast were cited as examples of such a lack of foresight for which we are now paying dearly.

In the case of large scale natural areas, the introduction of exotic species almost never fits the "ecological imbalances in feeding patterns which often favor the proliferation of one species over another, eventually upsetting the ecological integrity of the area. Even the introduction of propagules of a native species which are purchased or otherwise obtained from distant places could prove harmful. An example of a tiny population of a "Tennessee form" of Purple Coneflower which was "enriched" with Purple Coneflower from another area was cited. The rather delicate genetic constitution of the Tennessee form was immediately destroyed through subsequent hybridization with the "exotic natives" that were moved in. The result was sad, as one more plant which contributed to the uniqueness of that state's flora was lost. As a result of this, and other similar catastrophes, many professional botanists and ecologists are warning against the introduction of

Roadsides . . . A living link

Native plants are a living reminder of Minnesota's natural and cultural history. Recognizing this, a Wildflower Task Force was created to:

1) identify and protect existing native vegetation along Minnesota roadsides;
2) restore native wildflowers and grasses along Minnesota roadsides where appropriate; and
3) increase public awareness of the value of native plants.

To encourage the spread of native plants, especially wildflowers, Mn/DOT and others limit roadside mowing and spraying. Roadside management for renaturalization has greatly increased the number of native plants in the roadside over the last 25 years. But more can be done.

What can you do?

1) Inform friends, neighbors and land owners about the value of native plants along Minnesota roadsides.
2) Encourage management practices that do not destroy or damage native plant communities and the wildlife that depend on them.
3) Support local conservation groups that encourage habitat preservation.
4) Learn about federal and state plant protection laws. Support further legislation on rare plants.
5) Help preserve natural habitats by cooperating with preservation efforts of the MnDNR, Mn/DOT, county and local agencies.

For more information, contact:

The Wildflower Task Force
℅ Minnesota Beautiful
Mn. Dept. of Trade and Economic Development
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150 East Kellogg Blvd.
St. Paul, MN 55101-1421
612/297-3190

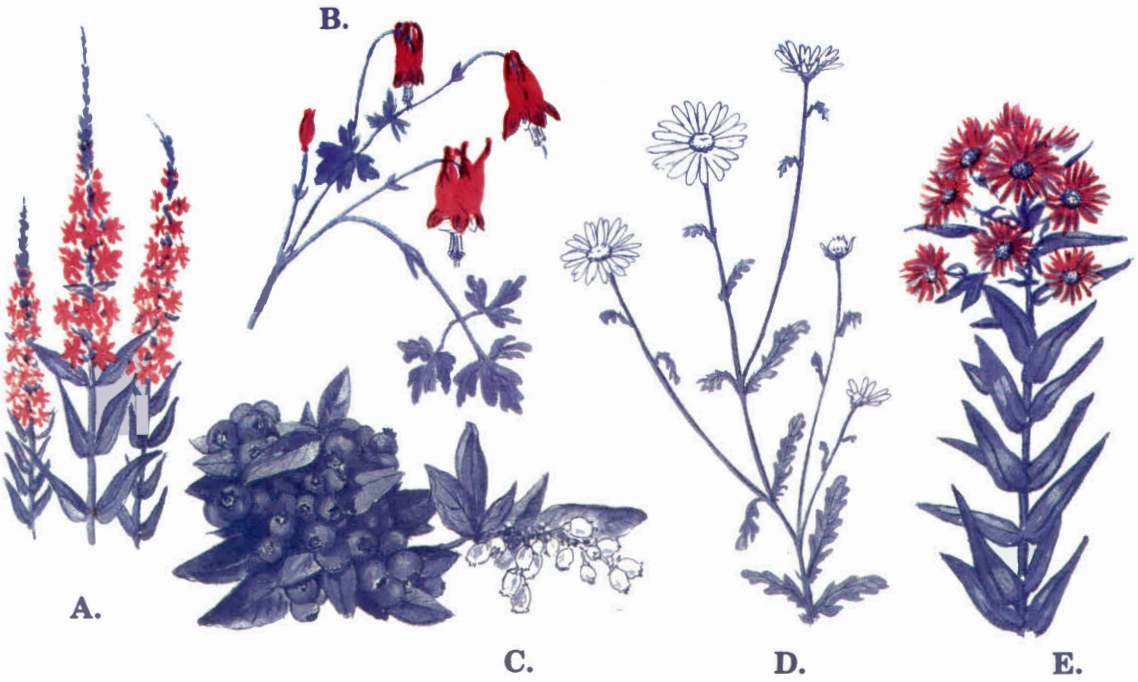
Minnesota Department of Trade and Economic Development

EXPLORE Minnesota

Wildflowers

Roadside wildflowers: Native or not?

Can you identify which of these is native to Minnesota?



A natural resource worth protecting!

Native plants are a resource worth protecting for future generations. They are important for many reasons:

Environmental: There are no substitutes for the original wild species of Minnesota. Once lost, they and their genetic material can never be recreated. Native wildlife often depend on native vegetation.

Economic: Native plant communities are relatively stable and require little maintenance. These natural communities provide good erosion control and are less susceptible to weed invasions.

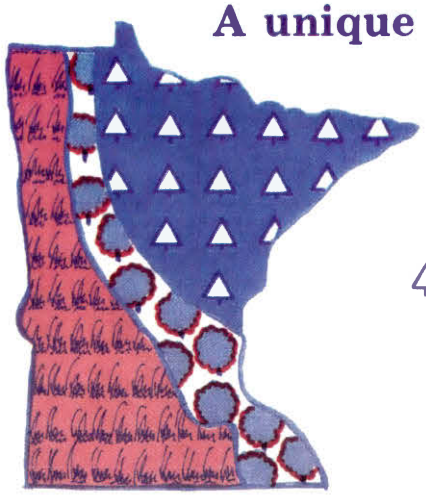
Aesthetic: Native wildflowers and grasses provide seasonal color changes along roadsides, a "natural beautification."

Currently, there are 75 species of plants that are endangered or threatened with extinction in Minnesota. Rare plants are frequently threatened with habitat loss due to land use changes. The best way to save these rare plants is to preserve their natural habitats now.

COVER: Purple coneflower (*Echinacea angustifolia*). Found in the dry prairies of western Minnesota, it is an example of a native plant adapted to a specific habitat.

ANSWERS: B. wild columbine, C. wild blueberry, and E. New England aster are all native to Minnesota. A. Purple loosestrife and D. ox-eye daisy are originally from Europe.

A unique natural heritage . . .



Three different vegetation types meet in Minnesota: the northern conifer forests, the eastern deciduous forests and the western tallgrass prairies. Each of these vegetation types has a characteristic array of native plants. Each has played a unique role in Minnesota's cultural history.

Northern conifer forests: Extensive pine and spruce forests, peat bogs and muskegs give the feeling of "wilderness" to the northeastern third of the state. These forests drew the initial logging companies to Minnesota. Look for the inconspicuous members of the heath family (blueberry, swamp laurel, labrador tea) in the spring, along with other forest plants such as twinflower, Canada mayflower, bunchberry, star flower and blue-bead lily. Roadside wildflowers, more commonly seen in the summer, include fireweed, joe-pye weed, evening primrose, prickly wild rose and wild columbine.

Eastern deciduous hardwoods: Ranging from oak savannas to maple-basswood forests or the "Big Woods",

Prairie

Wild Bergamot
Monarda fistulosa
roadsides; dry prairies

Tall Blazing Star

Purple Prairie Clover

Petalostemum purpureum
roadsides; dry prairies

Liatris pycnostachya
roadsides; moist prairies

Deciduous Forests

Wild Geranium
Geranium maculatum
roadsides; forest edges

Large-flowered Trillium

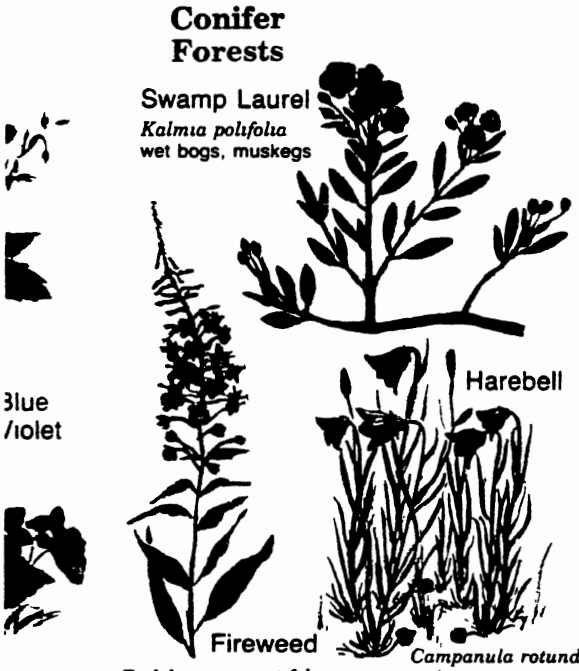
Trillium grandiflorum
roadsides; forest edges

Downy

Viola sororia
open woods; moist

the eastern deciduous forests have a different variety of wildflowers These woods are especially well-known for their showy spring ephemerals, so-called because their blossoms are short-lived Look for trillium, jack-in-the-pulpit, hepatica, bloodroot, violets and wild geranium along the roadsides in late April and May

Western tallgrass prairies: It was the fertile soils created by native prairie grasses that originally drew European settlers into southern and western Minnesota Today, much of what was originally tallgrass prairie is now productive cropland Less than 1% of the original acreage of native tallgrass prairie remains in Minnesota Rare prairie remnants are occasionally found along railroad/highway rights-of-way and in old cemeteries, on land that was never used agriculturally. Prairie wildflowers bloom at various times Watch the roadsides for hoary puccoon (spring), butterfly weed (summer), bergamot (summer), blazing star (late summer), and New England aster (fall). Native prairie grasses such as big bluestem, little bluestem and Indian grass are often more visible in the fall



What is a native plant?

The word native refers to a plant species' place of origin Native plants are often thought of as the original wild species of an area

Native Plants

- were present in Minnesota long before European settlers arrived in the 1800's As such, they are part of Minnesota's natural history
- form naturally diverse plant communities
- are well adapted to Minnesota's soils, wildlife and extreme climate

Nonnative Plants

- have been introduced into Minnesota from Eurasia by settlers, gardeners, or simply by accident since the 1800's.
- can displace native plants because their natural checks and balances do not exist here
- form less diverse plant communities that often do not provide good habitat for native wildlife.

Today, Minnesota has approximately 1,800 species of flowering plants; as many as 20% of these are introduced or nonnative species.

Planting Prairie Wildflowers

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This brochure was produced by the Minnesota Department of Transportation Wildflower Program.

For more information contact:

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St. Paul, MN 55155
(612) 297-1722

Planting Prairie Wildflowers

"The chance to find a pasque-flower
is a right as inalienable as free speech"

Aldo Leopold, 1949

At the same time that a pasque-flower becomes more difficult to find, wildflowers have become very popular. The availability of "wildflowers" in the market place now reflects this trend and underscores the fact that the term wildflower means different things to different people

> ***Definition***: In the fall of 1989 the Lieutenant Governor's Roadside Wildflower Task Force defined wildflowers for Minnesota. Wildflowers include both flowers (forbs) and grasses Furthermore, the Task Force recommended that only native or indigenous wildflowers be used in roadside plantings Native species are those that existed here before European settlers arrived in the 1800's Non-native or exotic species are those that have been introduced to the region since that time They may be of European origin or they may be from other parts of the USA.

In addition to true natives from this area, most wildflower seed mixes appearing in the marketplace typically contain exotic species. When planted in Minnesota, non-native species are often either short-lived because they cannot survive Minnesota winters or they can be potentially aggressive and may displace plants that are native to this region. Purple loosestrife is a good example of a non-native plant which has become a weed problem in the USA and Canada. It was originally brought here from Europe as a showy, horticultural, garden plant. Removed from it's natural competitors, purple loosestrife has escaped cultivation and invaded our wetlands disrupting many of our native plant communities and degrading wildlife habitat. Canada thistle and leafy spurge are two other examples of non-natives that have become weed problems. In order to avoid introducing exotic species when starting your own Minnesota prairie wildflower garden, it is recommended that you follow the Task Force suggestions and seek out seed mixes that contain only seed that is native to our region

Planting native wildflowers (forbs and grasses) will provide functional, ecological, aesthetic, and economic benefits in our state. What one establishes by planting a mix of native wildflowers, is a community, which when managed properly is self sustaining and relatively maintenance free Minnesota has three biomes that occur in the state; Northern coniferous forest, Eastern deciduous forest, and tallgrass prairie. Most of the wildflowers that are commercially available now, are those that are native to prairies.

The Department of Transportation Wildflower Program is involved in preserving and planting prairie wildflowers at many rest areas and along selected roadsides around the state Some state highways that either already contain exceptional displays of wildflowers or those that are being planted with wildflowers, will be designated, signed and maintained as "Wildflower Routes" In addition to the beautification of Minnesota roadsides, there are many foreseeable benefits to preserving and re-establishing prairie along Minnesota roadsides

- prairie communities are adapted to Minnesota's extreme climate and survive drought and severe winters.
- the plants have very extensive root systems which are able to stabilize slopes, preventing erosion better than those exotic species that are commonly used
- once the community is established it is very difficult for weeds to invade
- restoring prairie near an existing prairie remnant will allow rare plants to move in Thus, habitat for rare plants will be preserved and enhanced.
- habitat for wildlife along our roadsides will be created or enhanced.
- seasonal changes in the plant community will provide color, texture, and variety to the visual experience as we are driving
- tall grass prairie may serve as a "living snow fence" preventing excessive drifting etc
- the use of chemicals and mowing will decrease

Wildflower Garden Establishment

Planting Tips:

1) Seed/seedling Source - Try to choose Minnesota seed that has been collected within 200 miles of the planting to ensure the genetic integrity and regional character of the plants. Some Minnesota retail growers include:

   - Landscape Alternatives, Inc., St. Paul, MN
     Roy Robison (612) 788-4621
     Karl Ruser (612) 647-9521
   - Prairie Moon Nursery, Winona, MN
     Allen Wade (507) 452-5231
   - Prairie Restorations, Inc., Princeton, MN
     Ron Bowen (612) 398-4342

2) Species Selection - Not all species native to Minnesota are appropriate in all regions of the state. Within regions, care should be taken to match wildflowers with the proper environmental conditions; especially soil type, light, and moisture Try to include a diversity of plants (a minimum of 20 different species is recommended). Of the 20 species, 3 to 5 should be grasses and the rest forbs Total coverage of an area is generally 80% grasses and 20% forbs A large diversity of species will ensure a variety of color and texture, plus bloom throughout the season A "nurse" crop is sometimes necessary for quick establishment to help prevent erosion on steep slopes Canada wild rye and oats

are two frequently used nurse crops that fade out after a few years

In addition to the guidance seed growers can provide, consider obtaining a plant inventory list from a nearby nature preserve These preserves can serve as models since they more closely resemble conditions of presettlement For information call

- The Nature Conservancy (612) 379-2134
- The Department of Natural Resources Division of Scientific and Natural Areas (612) 297-2357

3) Timing - Seed should be sown in the spring (April - June) or fall (October - November)

4) Site Selection - If plants are not matched with the proper site conditions; ie , light, moisture and soil type, the success of the planting will be very low and much time, money, and effort will have been wasted Fortunately, many of the commercially available seed mixes are from plants that can tolerate a range of moisture and soil conditions. Prairie wildflowers however, do require full sun

Care should be taken to ensure that the area nearby the site does not have populations of noxious weeds present. Noxious weeds such as leafy spurge and Canada thistle can volunteer into your site once it has been cleared and planted with wildflowers. If these weeds become established, they are very persistent and are difficult to get rid of If noxious weeds are found nearby the site you wish to plant, you should either choose a new site or eradicate the weeds If alot of these weeds are present, the proper authorities should be notified as to their location

5) Soil Preparation - Eliminate existing vegetation with Round-Up herbicide. Allow two weeks for plants to translocate the chemical and die. Mow and/or burn If soil is sandy, simply rake or harrow If soil is very compact, shallow disking and harrowing may be necessary Avoid deep plowing. Do not fertilize. The topsoil should be loose in order to maximize soil-seed contact If topsoil is too compacted seedling roots will have difficulty pushing through it

6) Planting Techniques - For large areas, agronomic planting techniques can be used Grass seed can be drilled or broadcast Cross hatching will diminish the look of rows Broadcasting of flower seed can be done by hand or with a seeder For small areas such as a backyard garden, seed can be spread by hand just as you would spread ordinary grass seed. It is essential that seed be in contact with the soil However, many of the wildflower seeds require light for germination so care must be taken to sow seed only 1/4 - 1/8 inch deep After planting rake or harrow. Some wildflowers are only available from commercial vendors as seedlings, these can be planted following seeding They can be planted in late May or early June.

Management

The first one or two seasons of growth are often a period of distress for those who have just planted an area with native wildflowers. Do not be alarmed that there is not an instant wildflower community established the first season. Most of the plants in these communities are perennials, they take several years to become established.

First Year: In the first year seedlings are concentrating energy on underground root establishment and there will not be alot of noticeable above ground vegetative growth. During this first growing season weeds will volunteer in. You can expect this These weeds are mostly annuals that volunteer into disturbed areas. They will be displaced by the perennial wildflowers that you have planted during the second or third year. You can help cut down on weed competition for light and moisture by mowing to a height of 6" with a rotary mower as needed. Scything may be necessary on steep slopes or rough sites.

Second Year: During the second season, flowers and grasses begin to perform above ground Mow only if the area looks out of control to the public This is a wait and watch year Traditional maintenance in terms of weeding, watering and fertilizing is not desirable Any of these procedures is more likely to favor competitive weeds than the wildflowers

Third Year: By the third year enough growth should have occurred to begin management nature's way, by burning Fire is the natural, low cost, low energy way to suppress weed and woody invasion of prairie wildflower communities. Prairie plants are adapted to survive fires by resprouting from below ground. Weeds and woody species can be effectively controlled by burning. Their buds and growing portions are above ground and are destroyed by the fire. Burning clears away dead plant material and at the same time replenishes the nutrients in the soil, providing excellent growing conditions for wildflowers Resprouting of the grasses and wildflowers is very rapid following a fire Be prepared to burn on a day between snow melt and prairie plant growth, that has 5-10 mph wind velocity and dry plant material to serve as fuel. Burns need only be performed once every 3-5 years thereafter. Where prescribed burns are prohibited, random mowings every one to four years will suffice.

Safety: Safety while burning is of the utmost importance Local weather conditions play an important role in determining whether or not one should burn Personnel should be properly trained and the proper equipment and permits must be present at the site when the burn is being performed This means contacting the DNR Forester in your area to obtain a permit to burn The general public must

obey burning bans when they are in effect However, State agencies such as the DNR and Mn/DOT are often allowed to burn even when a ban is in effect because their personnel are trained in safe prescribed burning techniques Local law enforcement officials, utilities, railroads and the fire department should be informed of when a burn is going to be done. The local fire departments in many communities may be interested in getting involved. Be a good neighbor and alert the neighborhood as well

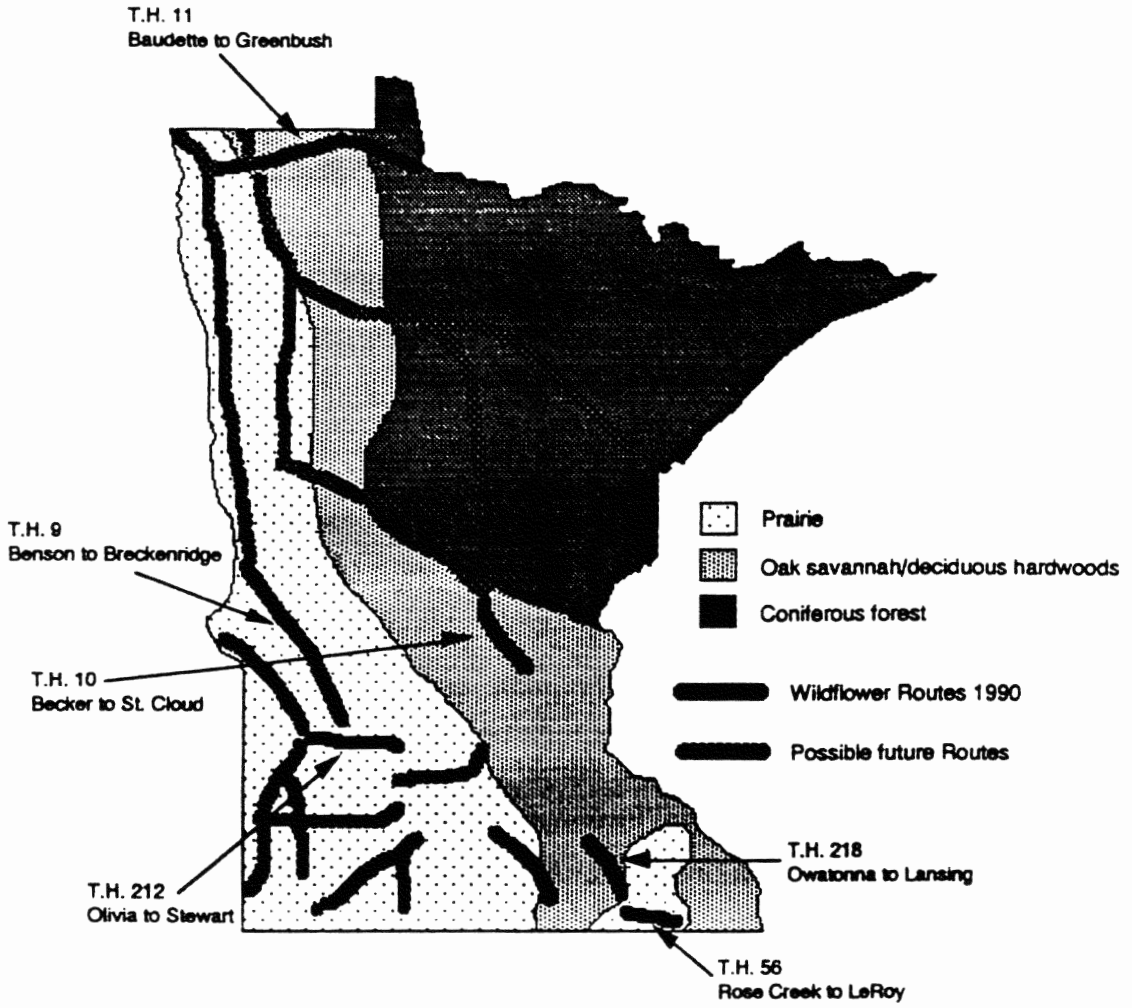
List of Prairie Wildflowers

By now your species selection list is a result of visiting a nearby reserve, a call to The Nature Conservancy or the DNR's Scientific and Natural Areas division, and/or a talk with a commercial vendor Availability of seed and cost considerations will shorten this list. Another constraint is your site's environment, especially moisture conditions which support different plants.

The following is a list of grasses and forbs that the Department of Transportation has put together for it's own wildflower plantings These plants do well in sunny, prairie-type sites This list is by no means comprehensive, however it should provide a good starting point for species selection. The scientific name is provided in italics below the common name to ensure proper identification. Shady, woodland and wetland site plant lists will be available in the future.

Grasses:	Soil Moisture
Big Bluestem *Andropogon gerardi*	Medium Wet
Bluejoint Grass *Calamagrostis canadensis*	Wet
Blue Grama *Bouteloua curtipendula*	Dry
Buffalo Grass *Buchloe dactyloides*	Dry
Canada Wild Rye *Elymus canadensis*	Medium
Hairy Grama *Bouteloua hirsuta*	Dry
Indian Grass *Sorghastrum nutans*	Medium, Wet
Junegrass *Koeleria cristata*	Dry
Kalm s Brome *Bromus kalmii*	Dry, Medium
Little Bluestem *Schizachyrium scoparium*	Dry, Medium
Prairie Cordgrass *Spartina pectinata*	Wet
Needle Grass *Stipa spartea*	Dry
Prairie Dropseed *Sporobolus heterolepis*	Dry - Wet
Sideoats Grama *Bouteloua curtipendula*	Dry
Switch Grass *Panicum virgatum*	Dry - Wet
Forbs:	
Frost Aster *Aster pilosus*	Dry - Wet
Gayfeather *Liatris pycnostachya*	Dry - Wet
Golden Alexander *Zizea aurea*	Wet
Golden Aster *Chrysopsis lanceolata*	Medium
Great Blue Lobelia *Lobelia siphilitica*	Wet
Great St John s Wort *Hypericum pyramidatum*	Wet
Harebell *Campanula rotundifolia*	Dry
Heath Aster *Aster ericoides*	Dry, Medium
Heart-leafed Alexander *Zizea aptera*	Dry - Wet
Hoary Vervain *Verbena stricta*	Dry, Medium
Ironweed *Vernonia fasciculata*	Wet
Joe Pye Weed *Eupatorium maculatum*	Wet
Lead Plant *Amorpha canescens*	Dry
Marsh Milkweed *Asclepias incarnata*	Wet
Meadow rue *Thalictrum dasycarpum*	Wet
Mountain Mint *Pycnanthemum virginianum*	Wet
New England Aster *Aster novae-angliae*	Wet
Panicled Aster *Aster simplex*	Wet
Pasque-flower *Anemone patens*	Dry
Prairie Coreopsis *Coreopsis palmata*	Dry, Medium
Prairie Larkspur *Delphinium virescens*	Dry
Prairie Rose *Rosa setigera*	Medium
Prairie Smoke *Geum triflorum*	Dry, Medium
Purple Prairie Clover *Petalostemum candidum*	Dry, Medium
Pussy Toes *Antennaria neglecta*	Dry
Red Stalked Aster *Aster puniceus*	Wet
Rough Blazing Star *Liatris aspera*	Medium
Showy Goldenrod *Solidago speciosa*	Medium
Showy Penstemon *Penstemon grandiflorus*	Dry
Silky Aster *Aster sericeus*	Dry
Sky Blue Aster *Aster azureus*	Dry, Medium
Slender Penstemon *Penstemon gracilis*	Dry
Smooth Aster *Aster laevis*	Dry, Medium
Sneezeweed *Helenium autumnale*	Medium, Wet
Spiderwort *Tradescantia ohiensis*	Medium
Stiff Goldenrod *Solidago rigida*	Medium, Wet
Stiff Sunflower *Helianthus laetiflorus*	Dry - Wet
Stiff White Aster *Aster ptarmicoides*	Dry
Turk's Cap Lily *Lilium superbum*	Wet
Turtlehead *Chelone glabra*	Wet
Western Sunflower *Helianthus occidentalis*	Dry, Medium
White Prairie Clover *Petalostemum candidum*	Dry, Medium
White Wild Indigo *Baptisia leucantha*	Dry - Wet
Wild Geranium *Geranium maculatum*	Medium, Wet
Wild Senna *Cassia hebecarpa*	Wet
Whorled Milkweed *Asclepias verticillata*	Dry
Yellow Coneflower *Ratibida pinnata*	Dry - Wet

Explore *Minnesota* Wildflower Routes



Nearly one third of Minnesota was once a sea of waving grasses dotted with islands of blooming wildflowers; this was our native prairie. Unfortunately, now less than 1% of it is left. Much of the native prairie that remains today is found in areas that were unsuitable for agriculture, such as cemeteries, steep bluffs, and along rights-of-way. Rights-of-way have been recognized historically as refuges for native vegetation communities. This is particularly true of shared highway and railroad rights-of-way. Back in the 1800's & 1900's when railroads were first built, they transected the virgin tallgrass prairie of the upper Midwest. After tracks were laid down the surrounding prairie vegetation re-established back into the railroad right-of-ways that were disturbed by construction. Subsequently, many highways followed these early transportation routes and were built adjacent to railroad tracks. Frequently, long narrow corridors of prairie were isolated and protected in their shared rights-of-way. These corridors were left undisturbed by agriculture, while most of the rest of the surrounding prairie disappeared. Periodic fires along railroad rights-of-way have enabled the fire-adapted prairie species to maintain a foothold there.

Minnesota is unique in that it contains two other major vegetation types; Eastern deciduous hardwood forest and Northern coniferous forest. Deciduous forests contain trees such as maple, basswood and oak. Prairie/hardwood forest transition areas often contain a mixture of bur oaks and prairie species and are known as oak savannahs. In

addition to the type of trees for which they are named, both the deciduous hardwood forest and the coniferous forest are home to many different blooming wildflowers. Some of these plants are prairie species that have found homes in forest openings and others are unique only to the forest. Many of these wildflowers and grasses can be seen blooming in forest openings along Minnesota highways throughout the spring, summer and fall.

Minnesota Wildflower Routes are highways that have remnant patches of native grasses, wildflowers, trees and shrubs growing along the roadside. Many of Minnesota's best Wildflower Routes contain prairie grasses and flowers such as T.H. 56, 212, 10 and 9. However T.H. 218 has oak savannah along it and T.H. 11 transects the prairie/forest transition zone and abounds with orchids blooming in the spring. Highway 56 was designated a Wildflower Route in 1989 and contains a Department of Natural Resources Scientific & Natural Area where many rare and unusual plants still grow.

More Wildflower Routes will be dedicated this summer and in the future. Those to be dedicated this summer are T.H. 218 from Owatonna to Lansing Corners, T.H. 10 from Becker to St. Cloud, T.H. 212 from Olivia to Stewart, T.H. 9 from Benson to Breckenridge and T.H. 11 from Baudette to Greenbush. All of these routes contain remnant native plant communities, some of which are prairie and some of which are a mix of species from the prairie/forest transition areas. Eventually a whole Wildflower Route system will be formed throughout the state. Roadsides that contain intermittent patches of native grasses and wildflowers will be enhanced by connecting the patches with plantings of the same species. The Department of Transportation, Department of Natural Resources, County Highway Departments and communities can work together in achieving this goal.

The Departments of Transportation and Natural Resources are currently working together to begin managing to enhance the native vegetation along the prairie routes using prescribed burns. By using fire as a management tool, the native prairie species are given a "competitive edge" over weeds and non-native species that may be growing there, because they are adapted *to survive* fires. Not only do the prairie plants survive fires, they like to be burned. Fire burns up dead thatch and recycles nutrients back into the soil for the plants to use. After a fire, many prairie plants grow larger, flower more profusely and produce more seed than normal. Rotating burn units along a route once every three to five years promotes the growth of the prairie plants there. The Department of Transportation has found that burning can substitute for herbicides and mowing in some cases as well. All in all, burning provides an alternative to traditional vegetation management techniques that is environmentally sound and less costly over the long-term.

Wildflower Routes can mean many things to many different people. . . . . beautiful roadsides, enhanced wildlife habitat, less chemical use, preservation of a disappearing natural resource, native seed sources for future planting projects, lowered roadside maintenance costs and the protection of rare features such as endangered plants. The designation of T.H. 56 as Minnesota's first Wildflower Route is testimony to the fact that the goals of the Department of Transportation, the Department of Natural Resources and conservation groups can all be met; while at the same time the travelling public benefits by seeing part of Minnesota's natural heritage flourishing once again along Minnesota's roadsides.

For more information, contact:

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