FORT SCOTT NATIONAL HISTORIC SITE

PRAIRIE RESTORATION PRODJECT SUMMER 1994

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TABLES, FIGURES, AND GRAPHES

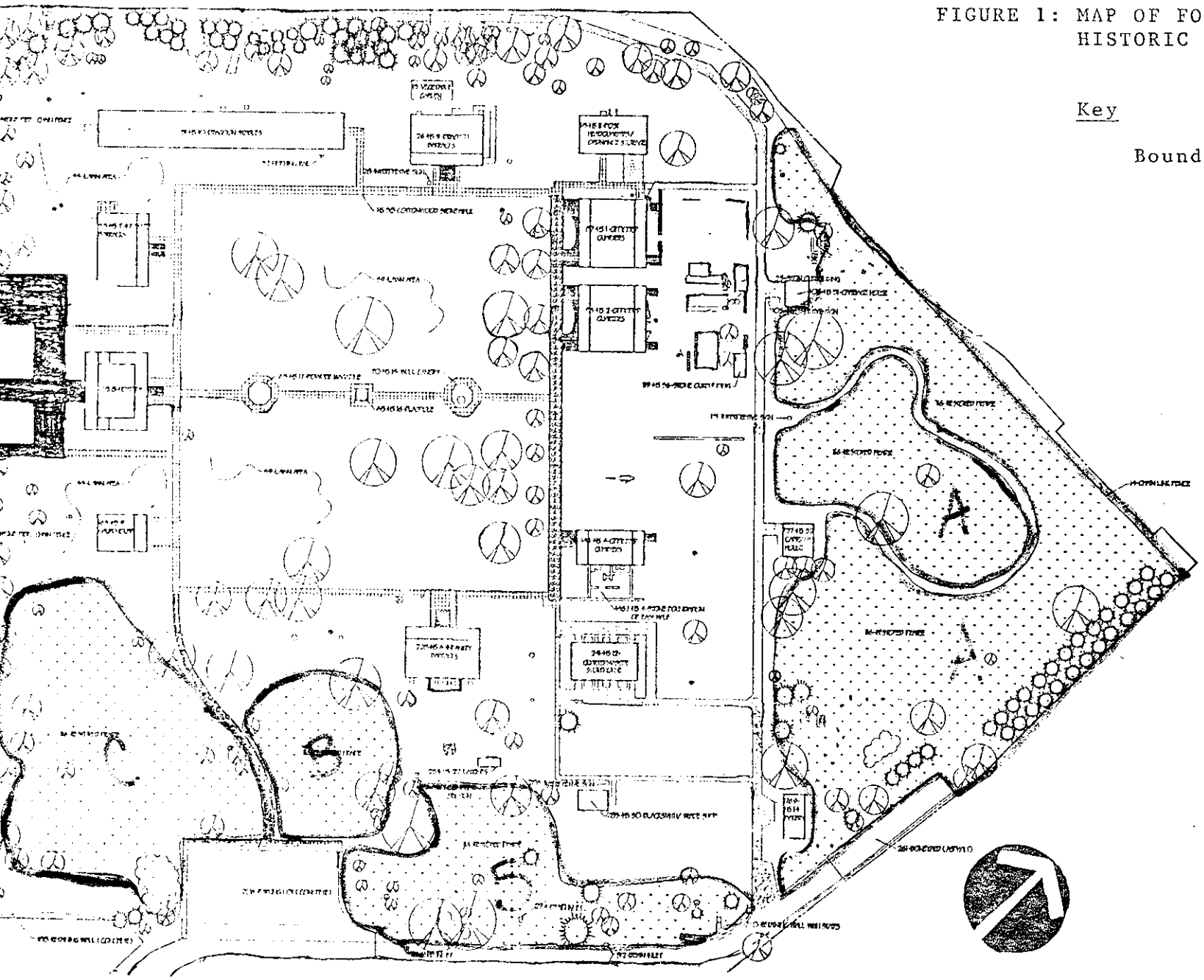
The focus of the prairie restoration at Fort Scott National Historic Site (FSNHS) for the summer of 1994, was the removal of exotic vegetation, removal of woody vegetation, locating native forbs, and collecting of native forbs seeds for propagation.

Before prairie restoration begun in the summmer 1994, the prairie was photographed for documentation and identification purposes. The 5 acres of prairie was divided into 3 units (Figure 1). The largest is Unit A, located North of Officers Row numbered HS-1 to HS-4 (Figure 1) and contains 2.2 acres. Unit B is located to the East of the Infantry Barracks (HS-6) and is seperated from Unit C by a brick path. The corner to the Southeast of the Guardhouse (HS-9) is the location of Unit C. The slide photographs represent how each unit appeared before and after the removal of exotic and woody vegetation. These slides may be found in the Prairie Restoration 1980-1994 slide notebook, labeled Prairie Restoration Unit A (PRA), PRB, and PRC. The series number indicates a before (PRA 1) or after (PRA 2) photograph of the prairie. Some of the slides were damaged at the processing center, these include: PRC 1-1-1 to PRC 1-4-5, PRB 1-1-1 to PRB 1-5-8, PRA 1-1-1 to PRA 1-6-1, and PRA 1-13-1 to PRA 1-14-29. The damaged slides still give a general idea on the amount of vegetation pressent but no detail for indentification of the vegetation.

TARGET VEGETATION

The target vegetation for removal in summer of 1994 included exotic forbs and some woody vegetation (Table 1). The main target vegetation of the exotic forbs were Securigera veris,

FIGURE 1: MAP OF FORT SCOTT NATIONAL HISTORIC SITE PRAIRIE UNITS



Melilotus officinalis, and Sorghum halapense because of the extensive invasion of these plants (Figure 2).

Table 1: Fort Scott National Historic Site Target Vegetation for Removal in the Summer of 1994.

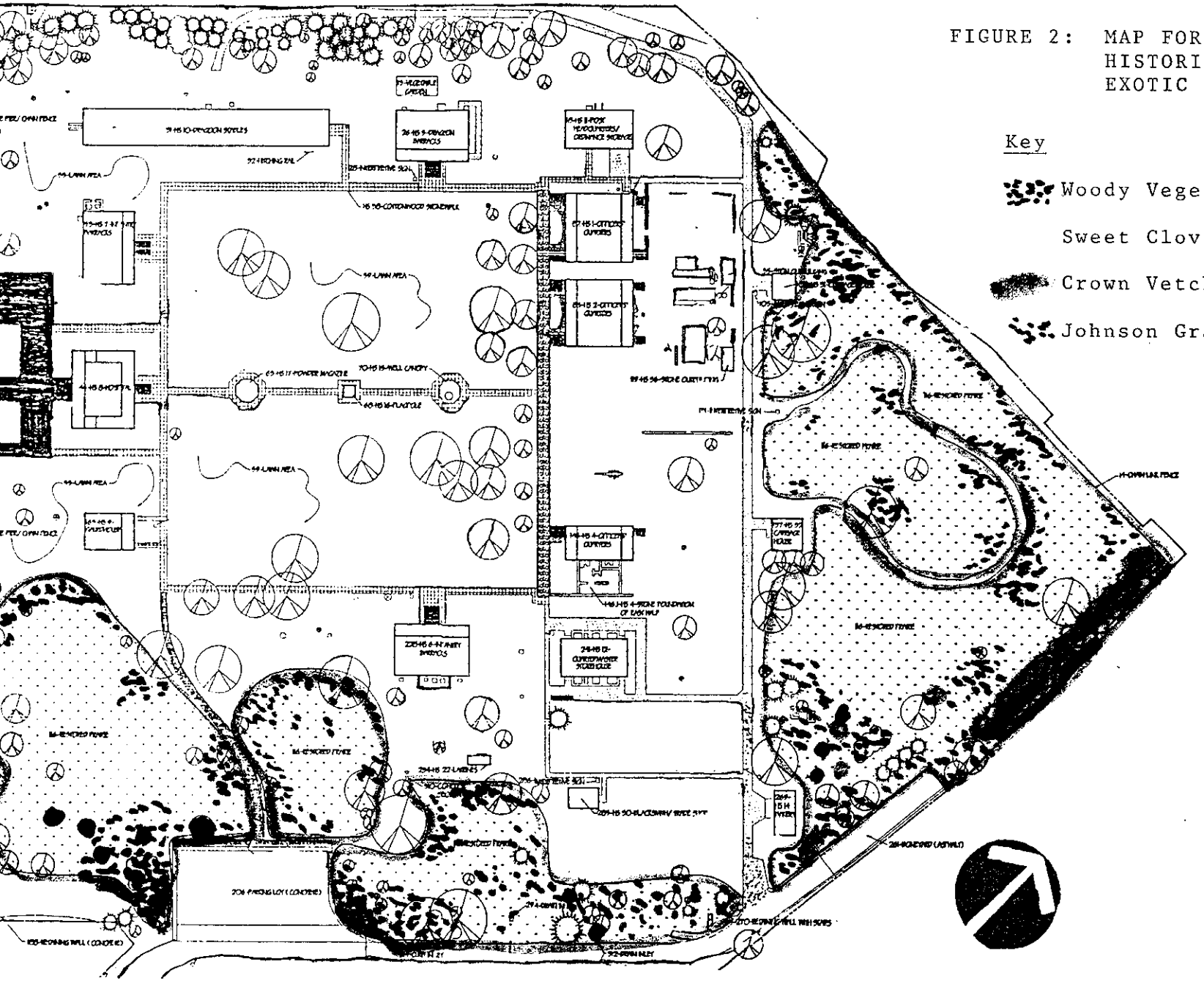
Scientific Name	Common Name	Unit Location
Exotic Vegetation		
Securigera varia	Crown Vetch	A,C
Melilotus officinalis	Yellow Sweet Clover	A,B,C
Sorghum halapense	Johnson Grass	A,B,C
Festuca arundinacea	Tall Fescue	A,B,C
Lathyrus latifolius	Sweet Peas	B
Campsis radicans	Trumpet Vine	A,B
Bromus tectorum	Downy Brome	A,B,C
Bromus inermis	Smooth Brome	A,B,C
Woody Vegetation		
Robinia pseudo-acacia	Black Locust	A
Prunus americana	Wild Plum	A,C
Cercis canadensis	Redbud	B,C
Quercus borealis	Red Oak	C
Morus alba	White Mulberry	C
Ulmus americana	American Elm	A,B
Juglans nigra	Black Walnut	A,B,C

TARGETED EXOTIC VEGETATION

Securigera varia (Crown Vetch) was well established in the Austrian Pines (Pinus Nigra) along the NE border of Unit A (Figure 2). It was also located in 3 small areas within Unit A, N and SE of HS-14, and 50 yds. into the prairie S of the Austrian Pines. Unit C contained a small area of Securigera varia on the East side along the RV Parking lot and the Service Road.

Melilotus officinalis (Yellow Sweet Clover) had invaded much of Unit C, and Unit B. Unit A contained a few plants of

FIGURE 2: MAP FORT SCOTT NATIONAL HISTORIC SITE TARGETED EXOTIC AND WOODY VEGETATIO



this exotic (Figure 2) behind HS-14 and HS-31. The northwest border of Unit B was extensively invaded with yellow sweet clover as well as two large areas within the unit. The heaviest invation was found on Unit C. Melilotus officinalis had invaded 20 yds. into the prairie on the southern border of Unit C. There was also two small areas along the N border located by the Brick Path and the trees.

The invation of Sorghum halapense (Johnson Grass) was not as extensive as Melilotus officinalis. Sorghum halapense was located in random locations throughout all 3 units (Figure 2). In Unit A Sorgham halapense invaded from the Northeast corner behind HS-14 to the East side and up to the Austrain Pines. The large Hackberry tree on the Southeast side of the prairie trail in Unit A had a limited amount of invasive Sorghum halapense around the trunk. Unit B had the most invasion by Sorghum halapense on the North corner behind HS-30 to the Service Road. This area behind HS-30 was also extensively colonized by Lathyrus latifolius (Sweet Pea), and Campsis radicans (Trumpet Vine). The E and S border of Unit B and the RV Parking Lot, along with the N border of the Picnic Area were invaded by Sorghum halapense. Unit C contained 2 areas of invasion of Sorghum halapense, the largest of these was the NE border along the RV Parking Lot. The other included two small areas by the trees along the N border and the Brick Path.

The borders of all prairie units contained a limited distrubution of Festuca arundinacea (Tall Fesue), Bromus tectorum (Downy Brome), and Bromus inermis (Smooth Brome).

TARGETED WOODY VEGETATION

The majority of the woody vegetation was small sprouted sucklings of Robinia pseudo-acacia (Black Locust), Prunus americana (Wild Plum), Morus alba (White Mulberry), Ulmus americana (American Elm), and Juglans nigrana (Black Walnut) (Table 1). In Unit A these sprouts were located along the Prairie Trail (Figure 2). The area behind HS-31, on Unit A, contained a large area of Robinia pseudo-acacia. The borders of Unit B that were affected included: the W border S of HS-30, the N border of the Picnic Area, the N border behind HS-6, the S border along the Brick Path, and the S border by the RV Parking Lot. Unit C was affected along the N border by the Brick Path, and the W border E of HS-9.

REMOVAL OF EXOTIC AND WOODY VEGETATION

The removal of exotic and woody vegetation at FSNHS during the summer of 1994, was accomplished by manual and mechanical methods.

EXOTIC VEGETATION REMOVAL

The removal of exotic vegetation was done manually and mechanically. The manual removal was done by handpulling of Melilotus officinalis (Yellow Sweet Clover), and Sorghum halapense (Johnson Grass) out of all three Units. The exotic's were handpulled at ground level when the ground was moist, to remove the root system. Handheld shears were used in the removal of the Securigera varia (Crown Vetch) on Unit A SE of HS-14, and Unit C on the E border by the RV Parking Lot. This method was found to be very labor intensive and extremely slow due to the amount of invasion. Fort Scott National Historic Site rented a

42" Troybuilt Walkbehind Sickle Bar Mower from Hartzler Equipment Company in Neveda, Missouri to complete the removal of Securigera varia. The mower was used on Unit A to remove Securigera varia from the Austrian Pines and the slope E of HS-14 (Figure 2). Unit B was mowed to erradicate Melilotus officinalis, Sorghum halapense, Lathyrus latifolius, and Campsis radicans from the N corner of the unit behind HS-30. A section about 20 yds. wide along the S border of Unit C was mowed to remove Melilotus officinalis, and Sorghum halapense.

WOODY VEGETATION REMOVAL

All of the sprouted shrubby woody vegetation (Table 1) was erradicated manually with handheld tree shears. The woody vegetation was cut at ground level. The trees located within Unit B and C were pruned up to 6ft. Two Prunus americana (Wild Plum) thickets were removed but have the potential to resprout due to the nature of the species. The first thicket was located on the E side of Unit C by the RV Parking Lot and the second was found behind HS-14 on Unit A. A chainsaw was used to remove small trees 6 inches in diameter or smaller on Unit A and C. Five Ulmus americana were removed from Unit A on the E side. Three Quercus borealis trees were removed from the south side of Unit C.

NATIVE FORB IDENTIFICATION AND LOCATION

The forb enhancement goal for FSNHS is to increase the diversity of the native forbs on the prairie. The forbs located on the Little Osage Prairie was used as a guideline for enhancement of FSNHS prairie.

FORB IDENTIFICATION

The forbs that were targeted (Table 2) are of good quality and have a coeffiecient of conservatism (Missouri Flora) over 5 except for Achillea millefolium (Yarrow), Rudbeckia triloba (Brown Eyed Susan) and R. hirta (Black Eyed Susan). (See references for books used in identification.)

TABLE 2 : Native Prairie Forbs that were targeted for collection for FSNHS in the Summer 1994.

Scientific Name	Common Name	Quality	Coef
Tephrosia virgininana	Goat's Rue		5
Asclepias tuberosa	Butterfly Milkweed	high	5
Ratibida columnifera	Yellow Prairie Coneflower	low	5
Ratibida pinnata	Grayhead Prairie Coneflower	low	5
Echinacea pallida	Purple Coneflower	high	7
Amorpha canescens	Lead Plant	very high	8
Eryngium yuccifolium	Rattlesnake Master	medium	8
Liatris pycnostachya	Prairie Blazing Star	high	6
Liatris aspera	Button Blazing Star	medium	10
Liatris scariosa	Large Blazing Star	high	10
Dodecatheon meadia	Shooting Star	high	5
Baptisia pendula	White Wild Indigo	medium	6
Baptisia australis	Blue Wild Indigo	medium	8
Linum sulcatum	Grooved Yellow Flax		5
Petalostemum candidum	White Prairie Clover	very high	8
Petalostemum purpurea	Purple Prairie Clover	very high	8
Polytaenia nuttallii	Prairie Parsley		8
Rudbeckia triloba	Brown Eyed Susan	low	4
Rudbeckia hirta	Black Eyed Susan	low	1
Silphium laciniatum	Compass Plant	high	6
Achillea millefolium	Yarrow	very low	1
Schrankia nutalii	Catclaw Sensitive Brier		6

FORB LOCATION

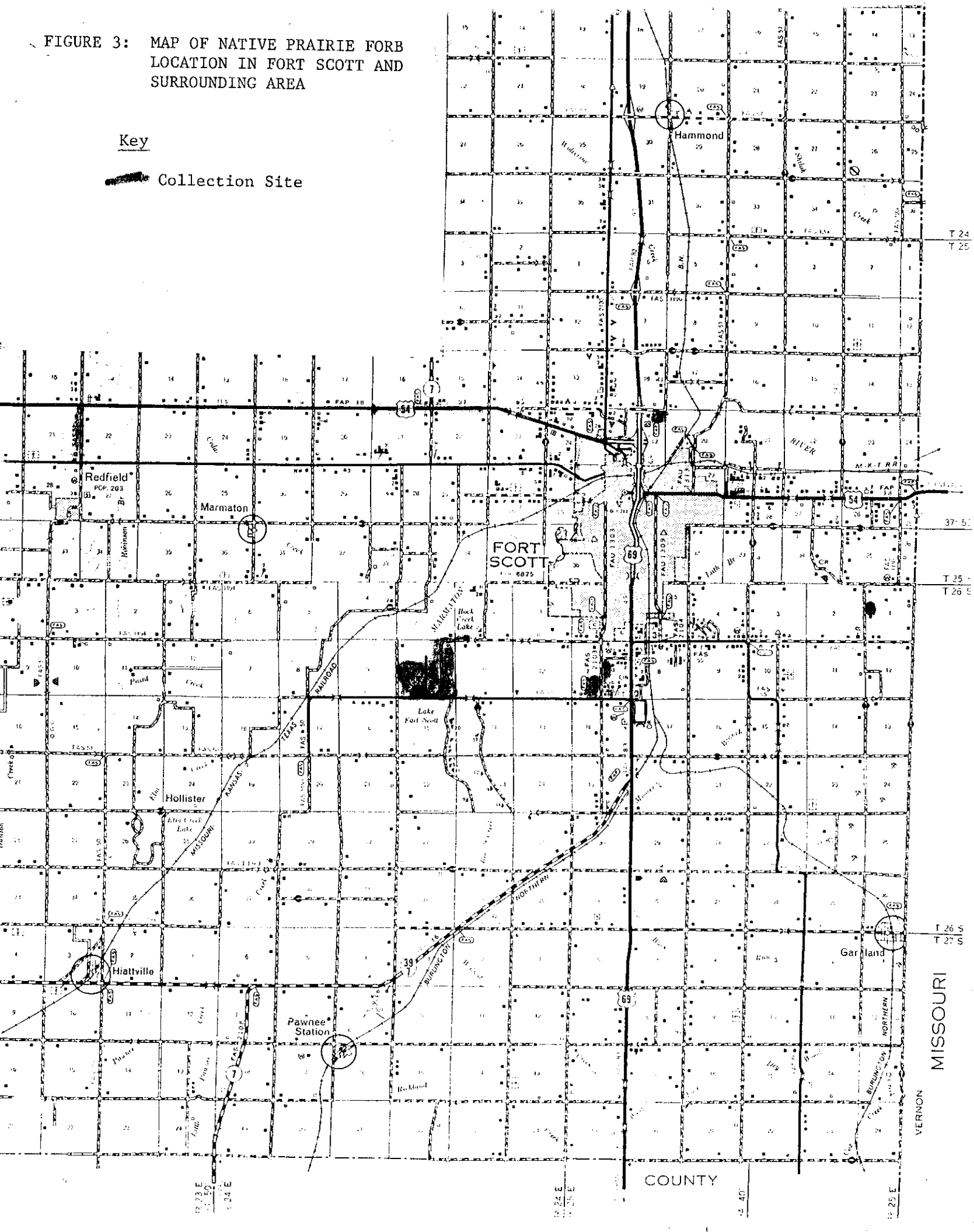
The location of seed producing forbs for the enhancement of FSNHS prairie was limited to 50 miles from Fort Scott. This

limit was used to focus on the forb species (Table 2) that are native to the Fort Scott area. The target forb species were located in 8 areas. Three of these areas were undistrubed native prairies that are baled for hay each year. The largest of the three, 200 acres, is located east of Fort Scott close to the Missouri State Line and owned by Les Seaver, of Fort Scott (Figure 3). Part of the Seaver's prairie was pastured to cattle (160 acres) and the remaining 40 acres was undistrubed. The diversity of the Seaver prairie was excellent, the forbs identified were: Prairie Parsley, Compass Plant, Grayhead Coneflower, Yellow Grooved Flax, Purple Coneflower, Butterfly milkweed, Yarrow, White and Purple Prairie Clover, White and Blue Wild Indigo, and Black Eyed Susan. The Purple and White Prairie Clover was well established as well as the Compass Plant.

The Fort Scott Airport (Figure 3) is surrounded by another excellent example of native prairie. This prairie was also diverse in species but not as much as the Seaver Prairie. The Airport Prairie was one of the two locations that contained Catclaw Sensitive Brier (Schrankia nutalii). The other species that were identified included the Butterfly Milkweed, Purple Coneflower, Yarrow, White Wild Baptisa, Purple Prairie Clover and White Prairie Clover. The gravel road to the East of the Airport had a lot of Compass Plant growing in the ditches.

The last undistrubed native prairie was part of the Evergreen Cemetary south of Fort Scott near Highway 69 (Figure 3). This prairie also contained a rich diversity of forbs. The

FIGURE 3: MAP OF NATIVE PRAIRIE FORB LOCATION IN FORT SCOTT AND SURROUNDING AREA



forbs identified at the Evergreen Cemetary were the same as the Airport with the addition of Grayhead Coneflower, Prairie Parsley, Black and Brown Eyed Susan.

Highway 54 (H-54) west of Fort Scott had three roadside areas that contained that targeted forbs. The north and south roadside east of the junction of Highway 7 (H-7) was well established with Prairie Blazing Star (Liatris pycnostachya) and Catclaw Sensitive Brier (Schrankia nutalii). The large prairie, located south of the roadside with the Prairie Blazing Star and Catclaw Sensitive Brier, had a high diversity of native forbs. Compass Plant (Silphium laciniatum) was located south of H-54 west of the junction of H-7 and also on H-54 east of the Ranch House Hotel. The road that turned south to Redfield from H-54 had the Yellow Coneflower growing along both sides near the bridge. The Yellow Coneflower and the Grayhead Coneflower were also located all along the Cat School Road south east of Fort Scott.

NATIVE FORB COLLECTION

All but three of the native prairie forbs that were targeted for seed collection in the Summer 1994 were collected (Table 2). The three that were not collected are Goat's Rue (Tephrosia virginiana), Butterfly Milkweed (Asclepias tuberosa), and Rattlesnake Master (Eryngium yuccifolium). Tephrosia virginiana and Eryngium yuccifolium were not collected because the prairie was baled before they had matured. The Butterfly Milkweed was either baled for hay or had already dispersed its' seeds.

Three different methods were used for the collection of the forb seeds, they are stripping, clipping, and shaking. The stripping method was used on Silphium, Polytaenia, Petalostemum, and Amorpha (Table 2) because they would shatter when touched. This method involved the collector placing their hand around the stem of the plant just below the seedhead, and carefully pulling upward over the seedhead. The seeds that are mature will shatter and fall into a paper or cloth bag that is held below the seedhead.

The clipping method was done with the aid of scissors or a specially made pair of handheld shears. The handheld shears had a 36 inch circular wire frame welded onto the bottom blade with the top of the frame extending upward at an angle. The top blade had a 2 inch piece of steel rivited onto the top of it, with the steel having the same angle as the wire frame. The steel was used as a deflector to push the forb seedheads into the cloth bag that is connected to the wire frame. The genera that required the clipping method are Achillea, Rudbeckia, Baptisia, Liatris, Echinacea, and Ratibida (Table 2). The clipping method is done by simply cutting the whole seedhead or seedpod from the stem.

The shaking method requires only a paper or cloth bag to shake the seeds into. The Grooved Yellow Flax (Linum sulcatum) readily shed its' seed and some seedpods into the bag when agitated.

NATIVE FORB SEED DRYING AND CLEANING

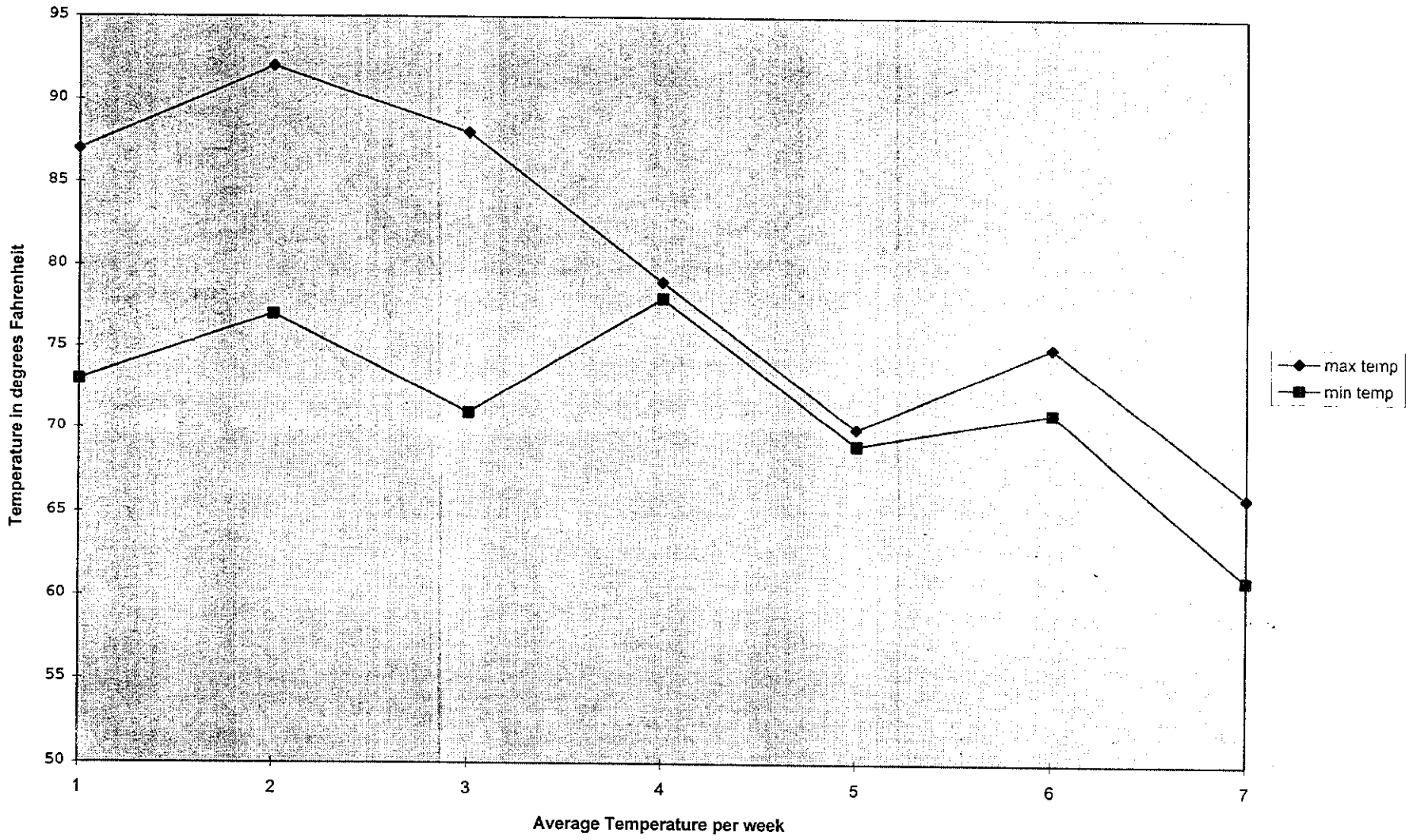
The collected native forb seeds were cleaned of chaff and hulls to obtain pure seed for propagation in the spring of 1995. All of the seed cleaning was done by manual labor, after a two week drying period.

DRYING OF SEEDS

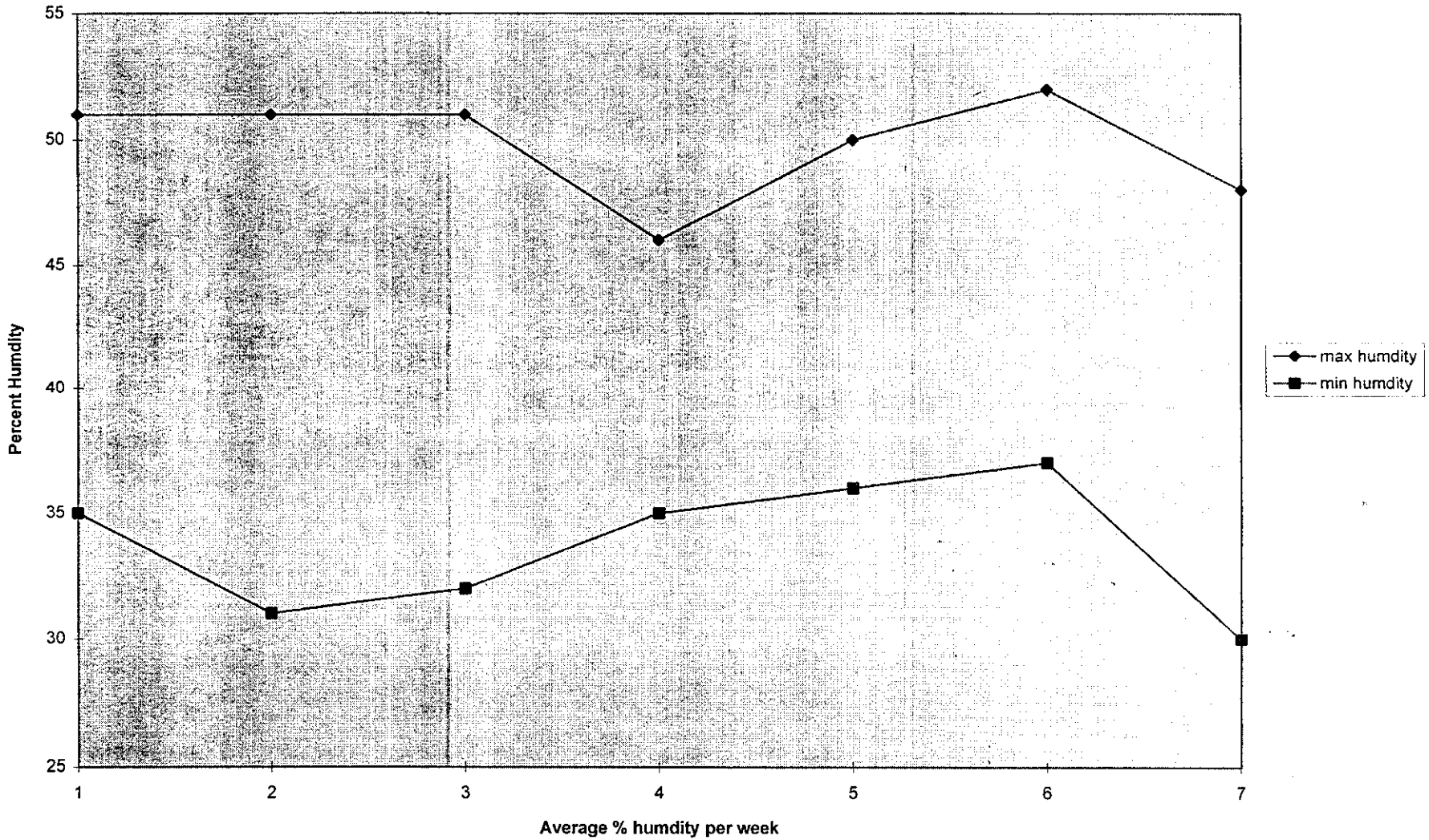
The drying of seeds is a the result of the relative humidity and the moisture contained within the seeds. The attic of HS-12 was used to lower the relative humidity because of the high temperatures, ability to moniter the airflow, and room to spread the seeds out, exposing them to the airflow. The relative humidity is decreased by increasing the temperature that increases the seed to air moisture gradient resulting in drying of the seeds.

The drying of the collected seeds was accomplished by spreading the seeds out in shallow boxes, that were on tables, in the attic of HS-12. The temperature and humidity was monitered by a hygrothermograph for the period of seven weeks that native forb seeds were dried. Caution was taken to not raise the temperature to high because it could kill the seeds especially if the seed moisture content is high. A temperature of 95-100 F is considered the maximum for drying of seeds (Bader,1992). The temperature maximum week average was 92.2 F and the minimum week average was 61 F (Graph 1). Humidity had a maximum week average of 61.2% and minimum week average of 31% (Graph 2).

Maximum and Minimum Temperature in HS-12 for a seven week period



Maximum and Minimum Humdity in HS-12 for a seven week period



CLEANING OF SEEDS

The of the native forb seeds were hand cleaned by a combination threshing, screening and sorting. The method of threshing involves the use of a rolling pin or glass jar to break the seeds loose from the inflorescenses of the seed pod. The collected seeds that required threshing include Yellow Prairie Coneflower, Grayhead Coneflower, Purple Coneflower, Grooved Yellow Flax, Brown Eyed Susan, Black Eyed Susan, and Yarrow.

Screening involved the use of a glass quart jar, lid, and netting of various sizes. A small amount of seeds were placed in the jar and netting was then secured over the top of the lid. Seeds were screened through the various sizes of netting to remove the chaff, dust, and immatured seeds. The seeds would fall through the netting onto a paper plate leaving the waste in the jar. All of the seeds went through the screening proccess exceptCompass Plant, White Prairie Clover, Lead Plant, and Purple Prairie Clover.

The sorting method was accomplished by seperating the seeds from small chaff with a paint brush or removing large seeds out of the chaff by hand. Sorting was used on Compass Plant, White Prairie Clover, White Wild Indigo, Lead Plant, Purple Prairie Clover, and Blue Wild Indigo.

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