

Inventory and Status Report for Eustoma  
OSMP Studies

4547

Study



Jennings, William

**Inventory and Status Report for  
Eustoma Grandiflorum  
2001 Final Report**

**William Jennings**

JENNINGS  
2001

Clarice,

Note:

Herbarium specimens

are in the OSMP

Herbarium

2001 FINAL REPORT  
 INVENTORY AND STATUS REPORT FOR  
EUSTOMA GRANDIFLORUM  
 PREPARED BY WILLIAM JENNINGS, INDEPENDENT CONSULTANT

Section 1: Abstract

The results of the second year of a proposed three-year study of Eustoma grandiflorum on City of Boulder Open Space/Mountain Parks land are presented.

Eustoma grandiflorum was seen on two Open Space/Mountain Parks parcels: the Fell Property and the Teller Lake #5 Property, but only a few plants were found compared with last year. However, it also occurs in abundance on the Weiser and the Ertl properties, upon which the city has conservation easements. No plants were seen on the Kolb property, where plants had been seen in abundance in the 1980's.

There appears to be one extended population on the Boulder Creek floodplain encompassing primarily Ertl, Weiser, and Fell and bisected by the Union Pacific railroad tracks. Thousands of plants were seen in this area during 2001. Both Ertl and Weiser had been summer grazed prior to the gentain count, but no grazing occurred on Fell or Teller Lake #5. Last year, it was suggested that the controlling factor was soil moisture, but all properties examined had adequate soil moisture this year. Greatest growth of blooming plants was on Ertl and Weiser where grazing had occurred prior to the gentain count. It now appears that some disturbance is not only tolerated, but is required, for good gentian growth. Grazing or haying in June to reduce the competition from tall graminoids may be necessary for good gentian growth. Further monitoring of the population and continued searches for other populations are recommended.

Section 2: Statement of Objective and Hypothesis

Eustoma grandiflorum is a rare or uncommon plant species that is known to occur on City of Boulder Open Space/Mountain Parks lands. While this species is not afforded federal or state protection, it is uncommon enough to be of some concern within the Colorado botanical community. The species is present in greater numbers on the more eastern and moister parts of the Great Plains (eastern Kansas, eastern Nebraska, etc.), but is rare at the base of the Front Range, the western limit of its range.

Eustoma grandiflorum is an indicator of alkaline wetlands, and has been known for many years to occur on the Boulder Creek floodplain east of 75th Street. The species is on the Colorado

Natural Heritage Program list of plant species of concern. The list carries no weight of law behind it, but most land use planners at all levels in Colorado are aware of the list and generally take pains to avoid impacting plants on the list, whenever possible.

It was proposed that Eustoma grandiflorum should be surveyed to determine the location of populations, the numbers of blooming plants, and the changes that occur in these populations over a three-year period. It was suggested that such a multi-year study of status and changes should provide information that could be beneficial to land managers. This species is an indicator of good quality moist prairie habitat. Changes in soil moisture, irrigation practices, grazing, and competition will likely impact these species to a noticeable degree. If it appears that populations are being impacted by current land use practices, recommendations for change can be formulated. If it appears that populations are thriving or increasing, this would be an indication that land use practices are reasonable.

### Section 3: Description of Methods

A review of the available literature and herbarium collections was undertaken during the first year of the study. The details will not be repeated, but in general, the author of this report did a study in 1989 and the plant was adopted by volunteers in the early 1990's. All these workers sought to recover historical populations and to find new ones. These searches failed to uncover any populations in Boulder County beyond the one known on the Boulder Creek floodplain east of 75th Street.

That population was documented as early as 1972 (Brown 459, CS). The exact location where the specimen was taken is not known, as the collection locality is given only as "Ertl Property of Flatirons Project." It is probably safe to assume that it was taken in an area later mined for gravel and the collection locality is now destroyed. If so, it would have been taken north of the UP railroad tracks.

Gentians were seen on Kolb as early as 1986 and City of Boulder volunteers monitored the Kolb site from 1988 through 1992. While numerous plants were seen in 1988 and 1989, only 2 were found in 1990, none in 1991, and 12 in 1992. There is a specimen from this population (Smith 403, COLO and Boulder Open Space/Mountain Parks herbarium).

The gentians on the Weiser property have been known for decades (at least to Ms. Weiser), but the only specimen found from the site dates from 1990 (Weber & Weiser 18070, COLO).

An article by Lloyd Shinnars on the genus Eustoma (Southwestern

Naturalist, v. 2 p. 38-53, 1957) gives a report of a collection by Darwin Andrews in 1904 from "near Boulder" (specimen reported to be at US). Since Andrews also collected the rare fern (Asplenium adiantum-nigrum) at White Rocks, it may be that this specimen was collected on what is now either the Ertl or Weiser properties.

During 2000, much of the South Boulder Creek and main Boulder Creek floodplains were walked, searching for the gentian. Plants were found only on the floodplain of Boulder Creek from 75th to 95th streets.

With the above in mind and considering habitat requirements, specific sites on Open Space and on the conservation easements on Boulder Creek were targeted for study during the summer blooming season of 2001. This species tends to have mid- to late-summer blooming seasons (July-August). Targeted areas were walked during the period July 16 to September 7, 2001.

When known populations were visited or new populations were found, notes were taken regarding the condition of the population in general. Counts of blooming plants were made for Eustoma grandiflorum.

#### Section 4: Results

##### Eustoma grandiflorum

One extended population is known for Open Space lands, east of 75th street and west of 95th Street, on the Boulder Creek floodplain. A second population in this area, but not on the floodplain, is at Teller Lake #5.

##### 1) Fell Property (T1N R70W sec 24)

One plant of Eustoma grandiflorum was seen on the first visit to this site on July 16, 2001. Two plants were seen on the second visit on August 3, 2001. These two plants were flagged and their locations were paced from the north and east boundary fences. Although Spiranthes diluvialis is known from the site, no plants were found. The Fell property was not grazed during the summer of 2000. Vegetation could only be described as lush. Soil moisture was adequate, as observed by opening the soil with a hand-held trowel at several locations. An uncommon species of willowherb (Epilobium leptophyllum) was seen and a specimen taken. This was also seen on Manchester and Ertl.

##### 2) Weiser Property (T1N R69W sec 18)

The City of Boulder does not own this tract, but does have a conservation easement.

Last year, about 25 plants were seen just inside the Weiser property line fence from the Kolb property on August 6, 2000, in the extreme southwest corner of the Weiser property. This year, no plants were seen from the same vantage point on July 16 or August 3.

A very large population of Eustoma grandiflorum was seen on August 1, 2001. Ms. Weiser personally took us to the site as she did last year. She showed us a bouquet in her kitchen, indicating that the plants were found lying on the ground. Apparently, the cattle had nipped off plants, but then spit them out without chewing them. As Ms. Weiser had said, quite a few such plants were found during the survey. Both purple and white-flowered plants were seen and photographed. The base of the petals on both color forms are a very dark purple.

The Weiser population was counted on August 1, 2001. On that date, 1,905 plants (in bloom or fruit or generally obvious) were counted. Plants in rosette stage or sterile plants were not counted. Last year, the Weiser population was counted at 1,988 plants. The difference is not considered to be significant. All plants were in the southern portion of the property, south of a slough that crosses from west to east, in a pasture (South Pasture) grazed by cattle. On the day of the survey, only two bulls were present in this pasture. Plants were localized near low spots that were a little more moist than the rest of the field. The pasture was being irrigated, but not as heavily as it was last year when some areas were flooded to a depth of an inch or two. As with last year, the largest concentrations of plants were in the topographically lowest areas, near a stand of cattails. The plants were in essentially the same locations as last year. However, in the southwestern corner of the property, the plants found were in the eastern portion of the patches seen last year. A sketch map of the Weiser population is provided as figure 1.

### 3) Ertl Property (T1N R69W secs. 19 and 20)

On September 7, 2001, the area south of the Union Pacific tracks was searched with Dr. David Buckner (ESCO Associates) and Lynn Riedel and Linda Vandewort (Open Space/Mountain Parks). Open Space/Mountain Parks does not own this property, but a conservation easement is held. A series of wet meadows exists, extending westerly from the vicinity of the East Boulder - White Rocks trail (near an old farmstead), to a lake just east of the Sullivan residence. These meadows are in the NW 1/4 NW 1/4 section 20, T1N R69W and NE 1/4 NE 1/4 section 19 T1N R69W. The prairie gentian was found in great abundance in these meadows

(2,021 plants counted), generally in association with such showy plants as Helenium autumnale, Helianthus nuttallii, and Epilobium leptophyllum, as well as cattails and various grasses and sedges not personally identified. These meadows are very wet in some spots; dry in others. In general, the prairie gentian does best at the margins of the wet areas, in places where the competing vegetation is not too thick. Although no cattle were observed, the fields had obviously been grazed, as potholes from cattle hooves breaking through the turf were common, and difficult to walk through without tripping.

As with the Wieser property, both the purple and white color forms were encountered. However, the white-flowered plants lack the deep purple center to the corolla, and actually are pale yellow in the center. In the Shinners article mentioned above, he cites a yellow-flowered specimen taken "near Denver."

In the field in NW 1/4 NW 1/4 section 20, 1,028 plants were counted in three discrete areas. In the southeastern portion of the field, beginning about 226 feet west of the east fence line and extending from there westerly for about 167 feet and north about 128 feet is a nice patch of 321 gentians. A second larger patch is in the northwestern corner of this field, where 701 plants were counted in an area about 300 feet east-west and 126 feet north-south. A small group of 6 plants occurs in the southwestern corner of this field. A sketch map (figure 2) has been compiled. Locations are based on pacing from fence lines, which should be accurate enough to plot on a formal map.

In the field in NE 1/4 NE 1/4 section 19, 993 plants were counted in two areas. Eighty-six plants were found in a seepy area just south of a large cattail marsh, and just west of the eastern fence line of this field. A huge patch of 907 plants occurs near the north fence and just west of the cattail marsh. Plants were so dense, with numerous senescent plants, that the number of plants present is probably undercounted. This occurrence of prairie gentian seems to be the densest clump in the Boulder Valley. Other populations noted in this and previous work are much more dispersed. Locations were not paced, but should be locatable based on the fence lines, ditches, and the margin of the cattail marsh. A sketch map is provided as figure 3.

Last year, plants were seen in the NW1/4 NW 1/4 section 19, by looking over the fence from Fell onto the western edge of Ertl. None were seen from this same vantage point this year on August 3. Similarly, none were seen by walking across the railroad tracks from Weiser on August 1 and looking over the fence to the south. That field had been grazed, but grasses were nearly as high as on adjoining Fell.

4) Teller Lake #5 (T1N R69W sec 20)

The margin of the lake was walked on August 1, 2001. Seven plants of Eustoma grandiflorum were found on Open Space/Mountain Parks property at the southeast corner of the lake, in a spot that had been disturbed in early 2000. Plants were known from this spot in years past but were not seen last year. In 2000, south of the lake, on private property just south of where the fence had been, 99 plants were counted. This year, the south boundary fence had been re-erected, but no gentians were found at this location. This site was not being grazed in the summer of 2000 or in 2001. On the east side of the lake, by looking over the (electric) fence, a few plants were seen not far from the fence, but not as many as last year. Most plants were near a ditch or were in low, moist spots. This pasture was very heavily grazed by horses.

Negative areas:

1) Sawhill and Walden Ponds (T1N R70W sec 24)

This area is on the floodplain of Boulder Creek, south of the creek and west of 75th Street. These are old gravel pits now used for fishing and for waterbird habitat. Nothing was seen on August 3, 2001. Water levels were low and the bottoms were muddy. Intervening areas at higher elevation where roads or trails occur were too dry. In my opinion, suitable habitat does not occur in this area.

2) Manchester Property (T1N R70W sec 24)

This is the area just west of the Fell property. Nothing was found on August 3, 2001. Habitat appeared to be identical to Fell. There was a lot of sowthistle present (Sonchus sp.). An uncommon species of willowherb was seen (Epilobium leptophyllum).

3) Kolb Property (T1N R70W sec 24)

The Kolb property east of 75th Street and north of the Union Pacific Railroad tracks was walked on July 16 and August 3, 2001. No sign of the prairie gentian was found. Low spots, which connect together to form an ancient creek channel had some standing water on July 16, but none on August 3. The vegetation was tall and lush, but somewhat weedy.

4) White Rocks Preserve (Ertl property and adjacent Weiser Property), north of Boulder Creek (T1N R69W sec 17 & 18)

These areas were visited on various dates during the summer in conjunction with a second grant from Open Space/Mountain Parks to

study the vegetation of the sandstone cliffs and sandy areas north of Boulder Creek. No Eustoma grandiflorum was seen in the moist areas at the base of the cliff, or growing in wet cracks, or along the creek.

5) Ertl Property (T1N R69W SW 1/4 sec 17 & SE 1/4 18)

The Ertl property south of Boulder Creek, north of the UP railroad tracks, west of the East Boulder/White Rocks Trail, and as far west as the Weiser property fence, was walked on August 21 and September 7, 2001. This is an area of old gravel pits, now reclaimed, but not yet close to natural except very locally. One likely area was found last year in a seepy area below the UP tracks, where the water table was very near the surface (probably a perched water table). Lots of Lobelia siphilitica, Agalinus tenuifolia, and Helenium autumnale were found, but no Eustoma grandiflorum. The same series of seeps was checked again this year, but no gentians were found. However, a new population of Spiranthes diluvialis was found. This was the subject of a report to David Buckner of ESCO Associates, who had been examining the botanical resources of the conservation easements held by the City. Considering the plants present, it seems inevitable that the gentian will eventually be found there, since it occurs only a couple hundred feet to the south, just across the railroad tracks.

6) Culver property (T1N R69W sec 17)

That portion of the Culver Property at the northern margins of the ponds just west of 95th Street was checked for Eustoma grandiflorum on August 10, 2001, but none was found. Some Lobelia siphilitica was found along the northwestern pond margin last year and these same areas were checked again this year.

Section 5: Conclusions

Eustoma grandiflorum was seen on two Open Space/Mountain Parks parcels (Fell and Teller Lake #5). However, it also occurs in abundance on the Weiser and Ertl properties, upon which the City has conservation easements. Further, a few plants were seen on private property just east of the Open Space/Mountain Parks property boundary, at the margins of Teller Lake #5.

No plants were seen on the Kolb property, where plants had been seen in abundance in the 1980's. No plants were found on those portions of the Ertl and Culver properties which have previously been mined for gravel. No plants have been found on the Manchester property, just west of Fell. There is at least some good habitat in all these areas, and gentians could eventually

occur or re-occur there. No plants were found at Walden and Sawhill Ponds and habitat is lacking.

There appears to be one extended population on the Boulder Creek floodplain, encompassing primarily Weiser, Fell, and Ertl and bisected by the Union Pacific railroad tracks. Thousands of plants were seen in this population during 2000 (1,988 on Weiser and 2,376 on Fell in flowering or fruiting condition). About the same number were seen during 2001, but at somewhat different localities (1,905 on Weiser; 2 on Fell; and 2,021 on Ertl).

Weiser was grazed during summer 2001, but no summer grazing occurred on Fell. That portion of Ertl south of the Union Pacific tracks was grazed in early and mid-summer, but grazing was moved to north of the tracks by late August and September. Similarly, no summer grazing occurred on Teller Lake #5 or on the private property adjacent to the south side of Teller Lake #5, but summer grazing did occur on private property east of the lake. The summer of 2000 was extremely hot and dry and it was concluded at that time that soil moisture was the critical factor in population vigor. The spring of 2001 was moist, and soil moisture appeared to be adequate on the properties examined. Those properties where the vegetation substantially overtopped normal gentian height, gentians were reduced or absent, even when found as recently as last year. It now appears that, while an adequate supply of moisture is important, some summer disturbance is necessary to reduce the competition from the overtopping graminoids. It may be necessary to graze as late as June or to hay the fields in mid/late-June to reduce the competition for Eustoma grandiflorum and Spiranthes diluvialis. Further monitoring of the population and continued searches for other populations are recommended for 2002.

During the course of the study, the following specimens were taken, to be placed in an appropriate herbarium. The specimens have been given to Open Space/Mountain Parks.

Epilobium leptophyllum, moist meadows on the Open Space/Mountain Parks Fell Property, associated with graminoids, T1N R70W sec 24, elevation 5110 feet, August 3, 2001, Jennings 1332.

Solanum triflorum, dry soil of prairie dog town, northwest of the large easterly lake, on the Ertl property, T1N R69W SW 1/4 sec 17, elevation 5070 feet, August 21, 2001, Jennings 1334.

Helenium autumnale, moist soil of seeps, about 500 feet east of a worm-shaped lake and 75 feet north of the service road paralleling the north side of the railroad tracks, in the southwestern portion of the Ertl property, associated with Verbena hastata, Lobelia siphilitica, Agalinis tenuifolia, and Spiranthes diluvialis, T1N R69W SE 1/4 sec 18, elevation 5070 feet, August 21, 2001, Jennings 1335.

Agalinis tenuifolia, moist soil of seeps, about 500 feet east of a worm-shaped lake and 75 feet north of the service road paralleling the north side of the railroad tracks, in the southwestern portion of the Ertl property, associated with Helenium autumnale, Verbena hastata, Lobelia siphilitica, and Spiranthes diluvialis, T1N R69W SE 1/4 sec 18, elevation 5070 feet, August 21, 2001, Jennings 1336.

Lobelia siphilitica, moist soil of seeps, about 500 feet east of a worm-shaped lake and 75 feet north of the service road paralleling the north side of the railroad tracks, in the southwestern portion of the Ertl property, associated with Helenium autumnale, Verbena hastata, Agalinis tenuifolia, and Spiranthes diluvialis, T1N R69W SE 1/4 sec 18, elevation 5070 feet, August 21, 2001, Jennings 1337.

Hibiscus trionum, moist meadow, Ertl property, west of East Boulder - White Rocks trail and south of railroad tracks, only two plants seen, NW 1/4 NW 1/4 section 20, T1N R69W, elevation 5080 feet, September 7, 2001, Jennings 1353.

During the course of the study, photographs were taken of the specified plants at the localities indicated. Photographs have been given to Open Space/Mountain Parks.

Eustoma grandiflorum, Weiser Property, August 1, 2001 (typical pale purple color form)

Eustoma grandiflorum, Weiser Property, August 1, 2001 (white with purple center color form)

Eustoma grandiflorum, Ertl Property, September 7, 2001 (white with yellow center color form)

Spiranthes diluvialis, Ertl Property, August 21, 2001; same plant, September 7, 2001.

William F. Jennings  
Botanical Consultant  
P.O. Box 952  
Louisville, CO 80027  
303-666-8348

September 13, 2001

Dr. David L. Buckner  
ESCO Associates, Inc.  
P.O. Box 18775  
Boulder, CO 80308

Dear Dave,

As you have requested, I have completed a survey of a portion of the Ertl property searching for populations of the plant species Eustoma grandiflorum, popularly known as prairie gentian.

On August 21, 2001, the area north of the Union Pacific Railroad tracks, in the vicinity of the old gravel pits, was searched but no plants of the prairie gentian were found. In 2000 that area had been searched as part of another project, but again nothing was found. On both occasions, a strip along the southern border of the lakes was found to be the best habitat. There is a line of seeps between an access road that parallels the UP tracks and the southern margin of the lakes. In these wet areas, such species as Helenium autumnale, Agalinis (Gerardia) tenuifolia, and Lobelia siphilitica were found in abundance. These species are usually indicators of high-quality wetlands. It seems just a matter of time until the gentian is found here.

On September 7, 2001, the area south of the Union Pacific tracks was searched. A series of wet meadows exists, extending westerly from the vicinity of the East Boulder - White Rocks trail (near an old farmstead), to a lake just east of the Sullivan residence. These meadows are in the NW 1/4 NW 1/4 section 20, T1N R69W and NE 1/4 NE 1/4 section 19 T1N R69W. The prairie gentian was found in great abundance in these meadows (2,021 plants counted), generally in association with such showy plants as Helenium autumnale, Helianthus nuttallii, and Epilobium leptophyllum, as well as cattails and various grasses and sedges not personally identified. These meadows are very wet in some spots; dry in others. In general, the prairie gentian does best at the margins of the wet areas, in places where the competing vegetation is not too thick. Although no cattle were observed, the fields had obviously been grazed, as potholes from cattle hooves breaking through the turf were common, and difficult to walk through

without tripping.

In the field in NW 1/4 NW 1/4 section 20, 1,028 plants were counted in three discrete areas. In the southeastern portion of the field, beginning about 226 feet west of the east fence line and extending from there westerly for about 167 feet and north about 128 feet is a nice patch of 321 gentians. A second larger patch is in the northwestern corner of this field, where 701 plants were counted in an area about 300 feet east-west and 126 feet north-south. A small group of 6 plants occurs in the southwestern corner of this field. A sketch map (figure 1) has been compiled. Locations are based on pacing from fence lines, which should be accurate enough to plot on a formal map.

In the field in NE 1/4 NE 1/4 section 19, 993 plants were counted in two areas. Eighty-six plants were found in a seepy area just south of a large cattail marsh, and just west of the eastern fence line of this field. A huge patch of 993 plants occurs near the north fence and just west of the cattail marsh. Plants were so dense, with numerous senescent plants, that the number of plants present is probably undercounted. This occurrence of prairie gentian seems to be the densest clump in the Boulder valley. Other populations noted in this and previous work are much more dispersed. Locations were not paced, but should be locatable based on the fence lines, ditches, and the margin of the cattail marsh. A sketch map is provided as figure 2.

This letter and the sketch maps should provide you with the information you need to make management decisions regarding these properties.

Sincerely,

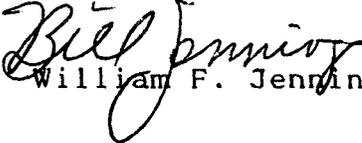
  
William F. Jennings

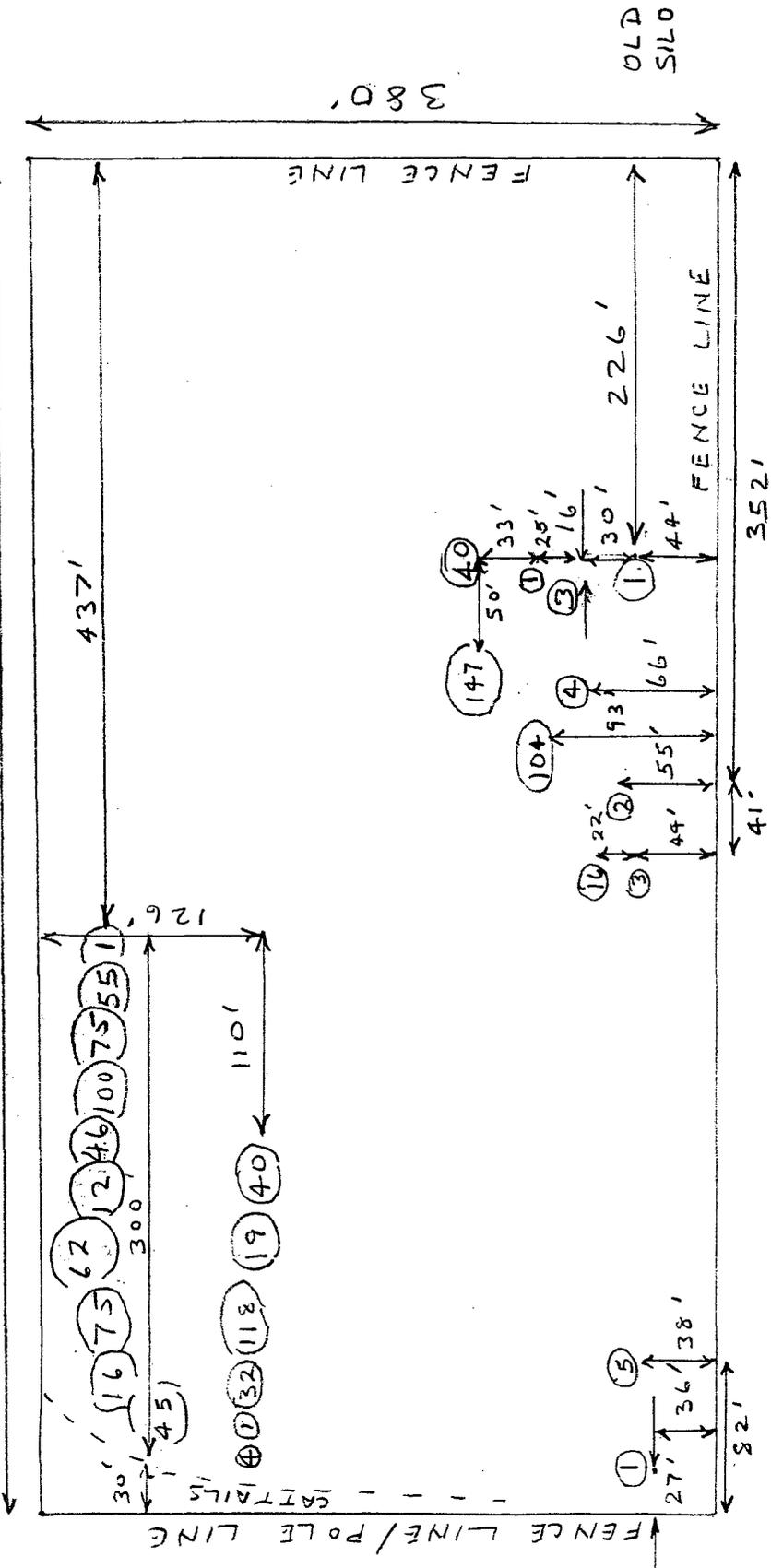
FIGURE 1  
TIN R69W

NW 1/4 NW 1/4 SEC. 20

EUSTOMA GRANDIFLORUM

N

FENCE LINE 767' RAILROAD TRACKS



321, LOWER RIGHT 701, UPPER LEFT 6, LOWER LEFT

1028 PLANTS COUNTED 9/7/01

SCALE 1" = 100' DISTANCES MEASURED BY PACING

FIGURE 2  
T1N R69W

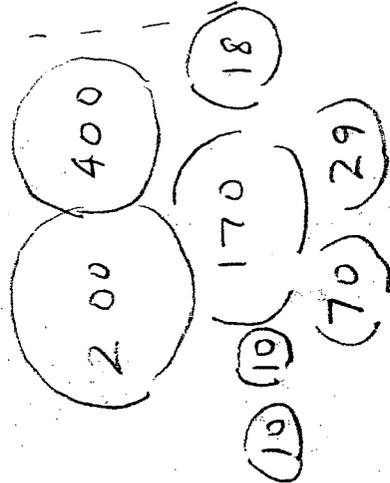
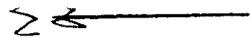
NE 1/4 NE 1/4 SEC. 19

EUSTOMA GRANDIFLORUM

RAILROAD TRACKS

FENCE LINE

DITCH

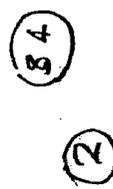


BIG  
CATTAIL  
MARSH

FENCE LINE / POLE LINE

HEAVILY  
VEGETATED  
SWALE

DITCH



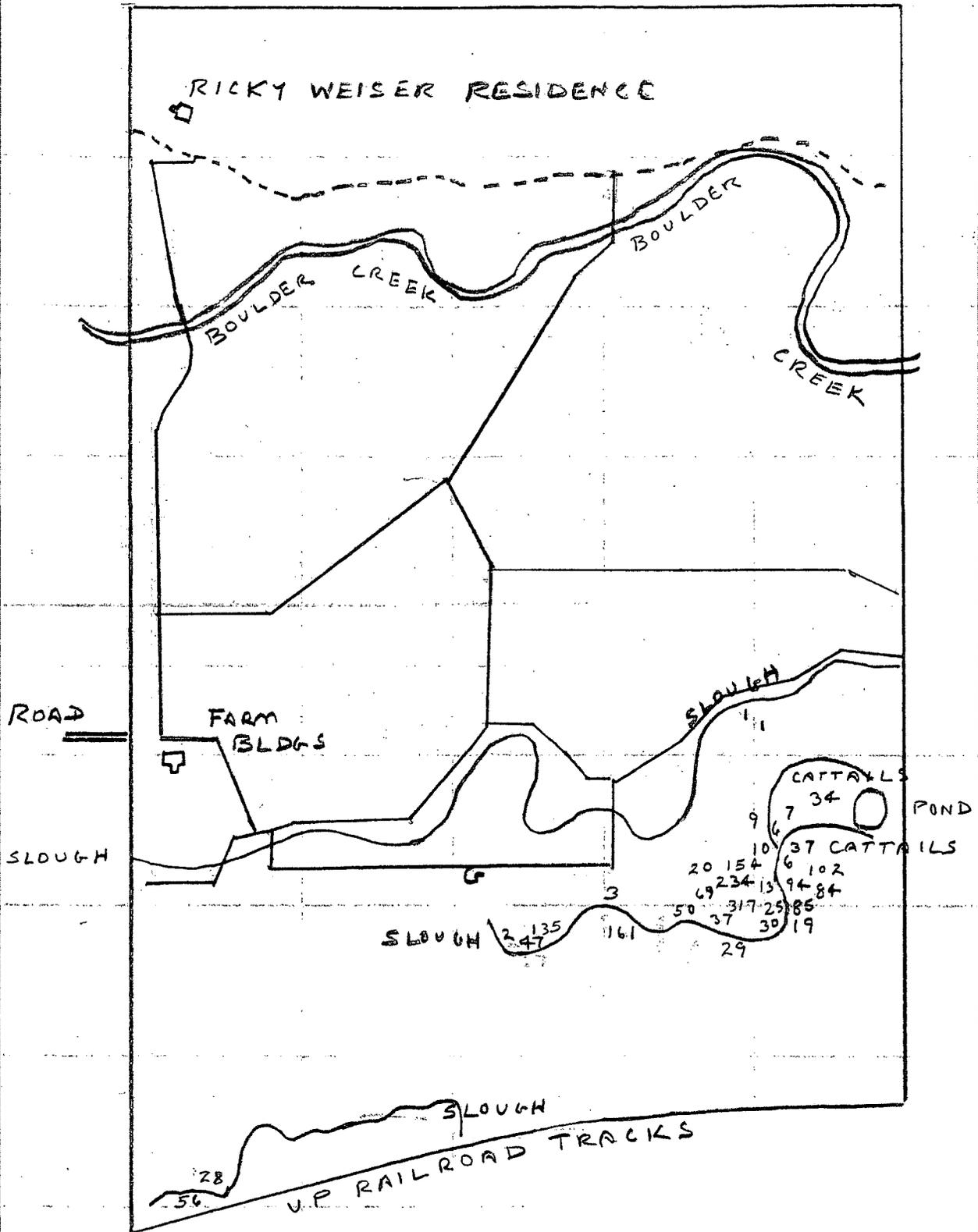
SCALE 1" = 100' LOCATIONS APPROXIMATE, NOT PLOTTED

907, NORTH 86, SOUTH 993 PLANTS COUNTED 9/7/01

WEISER PROPERTY

FIGURE 1

LOCATION OF PRAIRIE GENTIAN, 8/1/01



1821 PLANTS, EASTERN  
SLOUGH AREA

84 PLANTS, SW. COR.

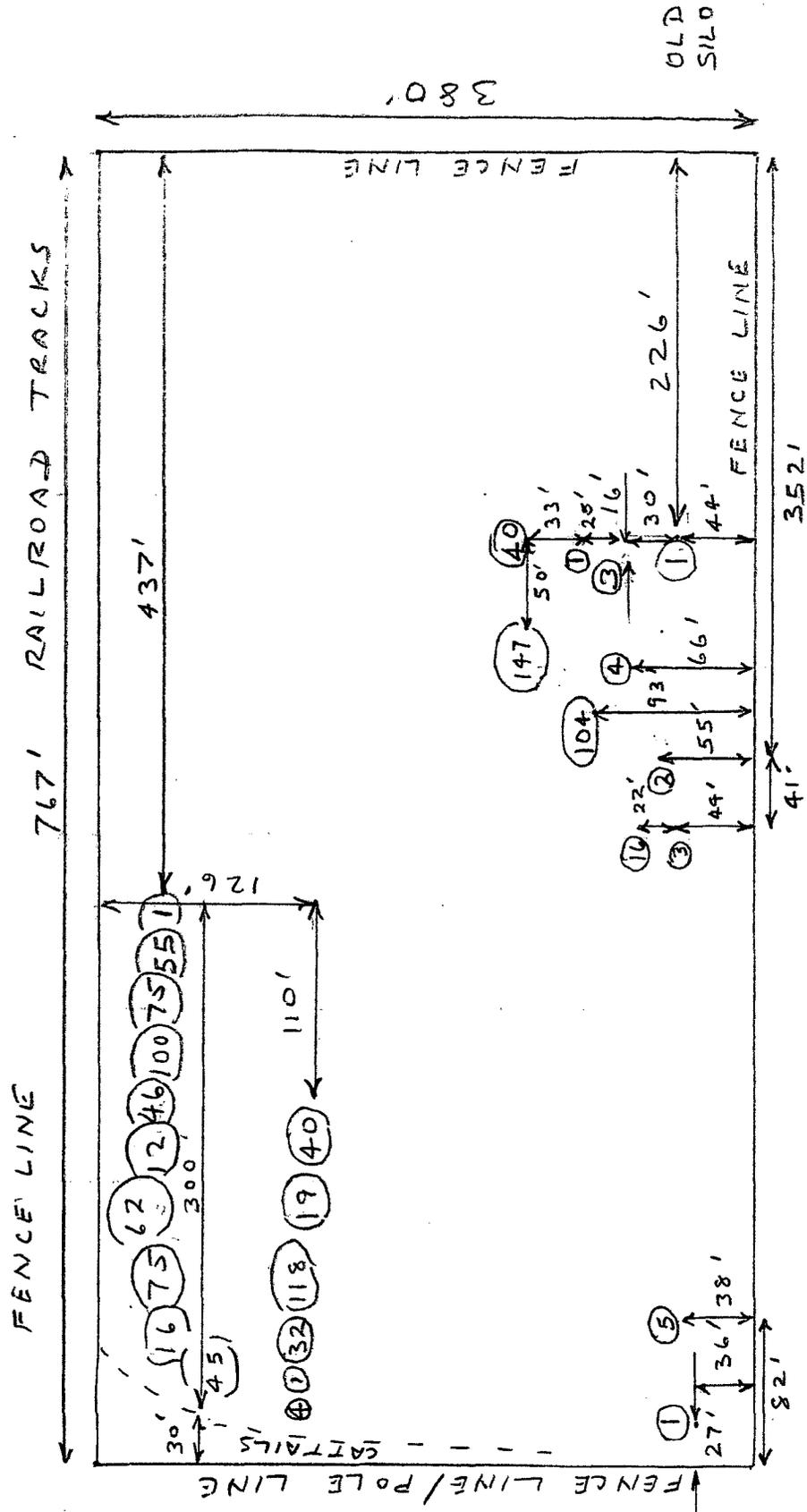
FIGURE 2

TIN R69W

NW 1/4 NW 1/4 SEC. 20

EUSTOMA GRANDIFLORUM

N



321, LOWER RIGHT 701, UPPER LEFT 6, LOWER LEFT  
1028 PLANTS COUNTED 9/7/01

SCALE 1" = 100' DISTANCES MEASURED BY PACING

FIGURE 3.

T1N R69W

EUSTOMA GRANDIFLORUM

NE 1/4 NE 1/4 SEC. 19

RAILROAD TRACKS

FENCE LINE

DITCH

BIG  
CATTAIL  
MARSH

FENCE LINE / POLE LINE

(200) (400)

(10) (10) (170) (18)

(70) (29)

HEAVILY  
VEGETATED  
SWALE

DITCH

(84)

(2)

SCALE 1" = 100' LOCATIONS APPROXIMATE, NOT PLOTTED

907, NORTH

86, SOUTH

993 PLANTS COUNTED 9/7/01