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**RESULTS OF SURVEYS FOR RUNNING BUFFALO CLOVER - FERNALD
ENVIRONMENTAL MANAGEMENT PROJECT**

08/01/94

**RUST
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REPORT**

FERNALD ENVIRONMENTAL
MANAGEMENT PROJECT

RESULTS OF SURVEYS FOR
RUNNING BUFFALO CLOVER

Prepared by:

RUST Environment & Infrastructure Inc.
Project No. 72740.000

August 1, 1994

August 1, 1994

Ms. Becky Bixby
FERMCO
P.O. Box 398704
Cincinnati, Ohio 45239-8706

Regarding: Field Surveys for Running Buffalo Clover at the FEMP Site
Project No. 72740.000

Dear Ms. Bixby:

RUST Environment & Infrastructure, Inc. (RUST) has completed field surveys at the Fernald Environmental Management Project (FEMP) property in order to determine the presence or absence of Running Buffalo Clover (*Trifolium stoloniferum*), a federally endangered species. Under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) regulations (Section 121); FEMP must meet the substantive requirements of the Federal Endangered Species Act of 1973, the Ohio Revised Code of 1975, the Ohio Division of Wildlife Order of 1976, and the Ohio Endangered Plant Law of 1978. The survey was conducted in accordance with our proposal number CP-3205 dated March 24, 1994.

RUST identified two suspected populations of Running Buffalo Clover at the FEMP property. Both of these populations are located in the pasture areas west of Paddys Run, near small groves of trees. These populations were notable due to their heart-shaped leaves and light green leaf color, both identifying features of Running Buffalo Clover. The size of one population consisted of approximately two individual plants, covering an area of approximately one square foot. The second population covered an area of approximately 10 square feet.

Due to severe weather at the time of the survey of this larger population, a positive identification could not be made in the field. As a result, both suspected populations were photographed for further identification and analysis in the office. Based on these photographs, the populations

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FERMCO

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identified at the FEMP property were determined by RUST not to be Running Buffalo Clover. This decision was based on the fact that the flowering stalk of the FEMP populations did not arise from a pair of aerial leaves, a distinguishing characteristic of Running Buffalo Clover. The FEMP site populations were subsequently identified as White Clover (*Trifolium repens*), a common species that has variable leaf shapes, sizes and colors.

RUST has appreciated this opportunity to provide environmental services to FERMCO for this project. Should you have any questions or comments regarding any of the information provided in this report, please feel free to contact the undersigned.

Respectfully submitted,

RUST Environment & Infrastructure, Inc.



Karen A. Combs
Staff Biologist

Reviewed by:



Allan M. Hale, Ph.D.
Senior Ecologist

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1.0 INTRODUCTION

Running Buffalo Clover (*Trifolium stoloniferum*) is a federally endangered plant species that is known to occur in southwestern Ohio. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations (Section 121), the Fernald Environmental Management Project (FEMP) property must meet the substantive requirements of the Federal Endangered Species Act of 1973, the Ohio Revised Code of 1975, the Ohio Division of Wildlife Order of 1976, and the Ohio Endangered Plant Law of 1978. As such, RUST Environment & Infrastructure, Inc. (RUST) has completed field surveys at the FEMP property in order to determine the presence or absence of Running Buffalo Clover at the property.

Running Buffalo Clover blooms in May and June and grows best in well-drained soil with filtered sunlight and limited competition from other herbaceous species. Most of the recently discovered populations are in areas receiving at least some disturbance such as that caused by grazing and mowing. Such habitats exist at the FEMP property in the woodlands located north of the production area and in the pasture areas along Paddys Run (a stream flowing along the western boundary of the property). Surveys for Running Buffalo Clover were conducted by three biologists from RUST on May 18 and 19, 1994 and June 15 and 16, 1994.

2.0 SURVEY METHODS

Prior to conducting the field sampling, each of the team members were given taxonomic descriptions of Running Buffalo Clover and identifying characteristics of the species. Examples of this information are provided in Appendix I. On May 18, 1994, the northern portion of the site was surveyed for the presence of Running Buffalo Clover in conjunction with a similar

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Results of Surveys for Running Buffalo Clover*

survey conducted for Spring Coral-root (*Corallorhiza wisteriana*), a state-listed threatened species of orchid. A total of ten transects (oriented from east to west) were walked by RUST in the woodlands north of the production area. Additionally, RUST walked the perimeter of the northern pine plantation. Despite the presence of suitable habitat near the northern woodlands, Running Buffalo Clover was not observed at any of the locations surveyed. All transect locations are shown on Figure 1.

On May 19, 1994, areas along Paddys Run, the northeastern woodland, the southern pine plantation, and the southeastern woodland were surveyed by RUST. A portion of land along Paddys Run was inaccessible due to the presence of the Inactive Flyash Pile (a radiologically controlled area) and was not included in the survey. Three suspected populations of Running Buffalo Clover were found in the pasture areas west of Paddys Run. All three of the populations had similar identifying characteristics however, none of the populations were in flower. These locations were flagged for future reference for re-evaluation during the June survey period.

On June 15, 1994, the northern woodland area, both pine plantations and the three previously marked locations were surveyed again for the presence of Running Buffalo Clover (Figure 1). Running Buffalo Clover was not observed in the northern woodland or in either of the pine plantations. Two of the three previously marked locations had been disturbed and the suspected populations could not be relocated. One of the areas had been recently mowed, while the other location had been disturbed by a soil infiltration study currently being conducted in the area. No other suspected populations of Running Buffalo Clover were identified near these locations. The third area was re-located and is shown on Figure 1. This area is heavily grazed by dairy cattle and is located in a semi-shaded area near a large sycamore tree. Two specimens, suspected to be Running Buffalo Clover, were identified. These specimens were photographed for further analysis in the office and these photographs are presented in Appendix II. Based on

these photographs, it was subsequently decided that this suspected population is White Clover (*Trifolium repens*) and not Running Buffalo Clover because the flower stalks arise directly from the creeping stem. In Running Buffalo Clover, the flower stalk arises from a pair of aerial leaves. White Clover is a common species that has variable leaf forms, which may be similar to those of Running Buffalo Clover. Since the two disturbed populations had similar identifying characteristics to this population, they are also believed to have been White Clover.

On June 16, 1994, the Inactive Flyash Pile and the southern portion of the west pasture were surveyed for Running Buffalo Clover. No Running Buffalo Clover was identified in the Inactive Flyash Pile. One suspected population of Running Buffalo Clover was identified in the southern portion of the west pasture (Figure 1), occupying approximately 10 square feet. Due to severe weather conditions at the time of the survey, a thorough identification of this population was not conducted, however, the population was photographed for further study in the office (Appendix II). As a result, this population was also determined to be White Clover and not Running Buffalo Clover due to the way the flower stalks arise directly from the creeping stem. Running Buffalo Clover was not identified in any of the other areas surveyed.

3.0 RESULTS AND CONCLUSIONS

Two suspected populations of Running Buffalo Clover were identified during the field surveys conducted at the FEMP property. Both of these populations are located in the pasture areas west of Paddys Run, near small groves of trees. These populations are small and isolated, with one population consisting of approximately two individuals (occupying one square foot) and the other suspected population consisting of several individuals and occupying an area of approximately 10 square feet. Locations of these populations are shown on Figure 1 and photographs of these populations are presented in Appendix II. Two other suspected populations of Running Buffalo

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Clover were also identified during the field surveys; however, both areas were disturbed before the populations could be re-examined for a positive identification while they were in flower. However, both of these disturbed populations had similar identifying characteristics as the two other populations; therefore, they are all believed to be the same species.

As shown by the photographs, the FEMP populations have the characteristic heart shaped leaves and the light green leaf color of Running Buffalo Clover. However, the flower stalks of the individual plants do not arise from a pair of aerial leaves, a distinguishing characteristic of Running Buffalo Clover. Therefore, these suspected populations were subsequently identified as White Clover, a common species that has a variable leaf shape and form. No other suspected populations of Running Buffalo Clover were identified at the FEMP property.

RUNNING BUFFALO CLOVER

Trifolium stoloniferum Muhl. ex A. Eaton

FAMILY: Fabaceae

STATUS: Endangered, Federal Register, July 6, 1987

DESCRIPTION: Running buffalo clover is a glabrous perennial that forms long stolons that root at the nodes. The plant's erect, flowering stems, typically 3 to 6 inches tall, with two leaves near the summit, are topped by a round flower head (Brooks 1983). Flowering occurs from mid-April to June. The plant is easily propagated from cuttings (Campbell *et al.* 1988).

RANGE AND POPULATION LEVEL: Historically the species occurred in Arkansas, Illinois, Indiana, Kentucky, Missouri, Nebraska, Ohio, and West Virginia. Until the rediscovery of two small populations of the species in West Virginia in 1985 (Bartgis 1985), running buffalo clover was believed to be extinct. Intensive searches for remnant populations throughout most of the historic range have revealed several additional sites. The currently known distribution is:

Arkansas	- 0 populations
Illinois	- 0 populations
Indiana	- 2 populations
Kentucky	- 23 populations
Missouri	- 1? population
Nebraska	- 0 populations
Ohio	- 12 populations
West Virginia	- 8 populations

These sites vary in size from a few individuals covering a few square feet to hundreds of individuals over a quarter of an acre.

HABITAT: The original habitat for the species is believed by Campbell (1985) to have been areas of rich soils in the ecotone between open forest and prairie. These areas are believed to have been maintained by the disturbance caused by the buffalo. Most of the recently discovered populations are in areas receiving at least some disturbance such as that caused by grazing and mowing.

REASONS FOR CURRENT STATUS: The causes for the long-term decline of running buffalo clover are not definitely known. However, they are believed to be directly related to the disappearance of large herbivores from the plant's habitat. This species appears to have been dependent upon the woodland disturbance created by large animals, especially the buffalo. Many of the species' old records were in close proximity to buffalo licks and trails. Present threats to the running buffalo clover include trampling.

MANAGEMENT AND PROTECTION: Since the species was listed, intensive searches have been conducted for remnant populations. The positive results of these efforts are reflected in the increase in the number of known sites from two in 1985 to 46 in 1991. Additional searches are needed, especially in Indiana, Missouri, Arkansas and Nebraska. Material from wild populations has been placed into cultivation to ensure that the genetic material represented by the species is not lost. The potential economic value of running buffalo clover has lead the U.S. Department of Agriculture to conduct horticultural studies. The recovery plan's criteria for downlisting the plant to threatened status includes the discovery or establishment of 30 secure, self-sustaining populations. Although more than 30 populations are now known, few can be considered secure and self sustaining.

REFERENCES:

- Bartgis, R. L. 1985. Rediscovery of Trifolium stoloniferum Muhl. ex A. Eaton. Rhodora 87:425-429.
- Brooks, R. E. 1983. Trifolium stoloniferum, Running buffalo clover: Description, distribution and current status. Rhodora 85:343-354.
- Campbell, J. J. N. 1985. The land of Cane and Clover: Pre-settlement vegetation in the so-called Blue Grass Region of Kentucky. Unpublished manuscript, Herbarium, University of Kentucky, Lexington.
- Campbell, J. J. N., M. Evans, M. Medley, and N. L. Taylor. 1988. Buffalo clovers in Kentucky (Trifolium stoloniferum and T. reflexus): Historical Records, Pre-settlement, Environment, Rediscovery, Endangered Status, Cultivation and Chromosome Number. Rhodora 90: 399-418.

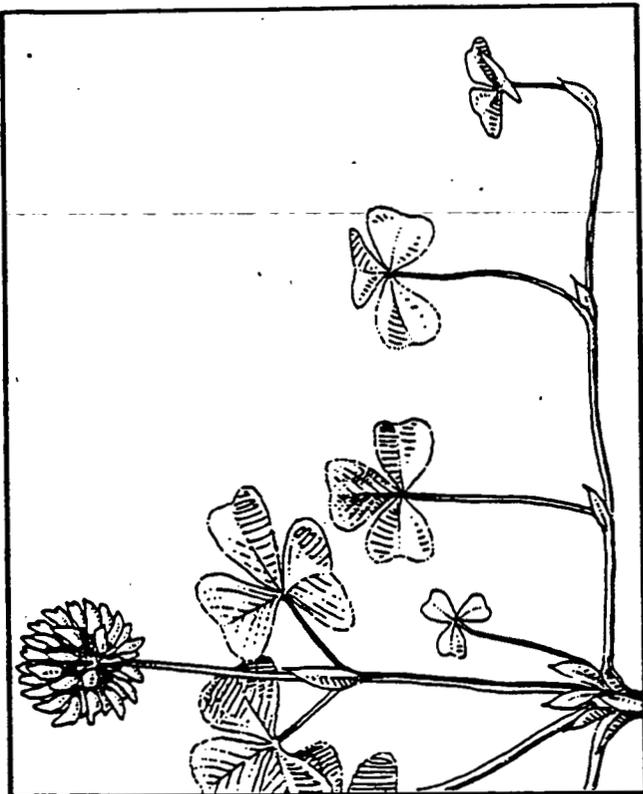
For more information please contact:

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Running Buffalo Clover

Trifolium stoloniferum

Stems upright, not branching from the base; creeping runners (stolons) also arising from the base; white flower heads arising from a pair of aerial leaves; entire plant 4-19.5 inches high.



A Federally Endangered Plant

once known from Ohio

Might Be Rediscovered

If Ohio Naturalists and Botanists

Search Appropriate Habitat

From Mid-May to Mid-June

ODNR

**OHIO DEPARTMENT OF
NATURAL RESOURCES**

Division of Natural Areas & Preserves

Fountain Square, Bldg. F-1

Columbus, Ohio 43224

(614) 265-6453 (Voice) or 265-6994 (TDD)

Richard F. Celeste Joseph J. Sommer
Governor Director

**HELP US FIND
THIS PLANT!**

6 8 6 1

Problem:

Running Buffalo Clover resembles the common European white clover found throughout Ohio. It grows in a variety of disturbed woodland habitats that are not attractive to naturalists and botanists. It may be found in grazed woodlots, mowed paths and steep, weedy ravines. Southwest Ohio has abundant suitable habitat which is rarely visited by people searching for rare species or attractive natural areas.

Solution:

The Ohio Natural Heritage Program in the Department of Natural Resources, Division of Natural Areas and Preserves (DNAP) has received support from the U.S. Fish and Wildlife Service, Office of Endangered Species, to conduct an intensive search for Running Buffalo Clover in May and June, 1988 in southwestern Ohio. We are seeking volunteers to assist in the search for this plant. Anyone interested should contact Robert McCance, Jr., Natural Heritage Program Administrator, at (614) 265-6466, or write the Division of Natural Areas and Preserves, Fountain Square, Columbus, OH 43224.

Anyone who believes they have found Running Buffalo Clover should immediately call DNAP and report the discovery. Please do not collect the plant until an accurate population assessment can be made by Ohio Natural Heritage Program staff. A photograph showing the distinguishing characters is appropriate documentation for any size population. Landowners should always be asked for permission to visit their property before conducting field investigations.

Old, vague historical records for the plant include the following:

Clermont - "Miamiville", "Loveland"

Hamilton - "Sugar Grove", "near Cincinnati", "College Hill"

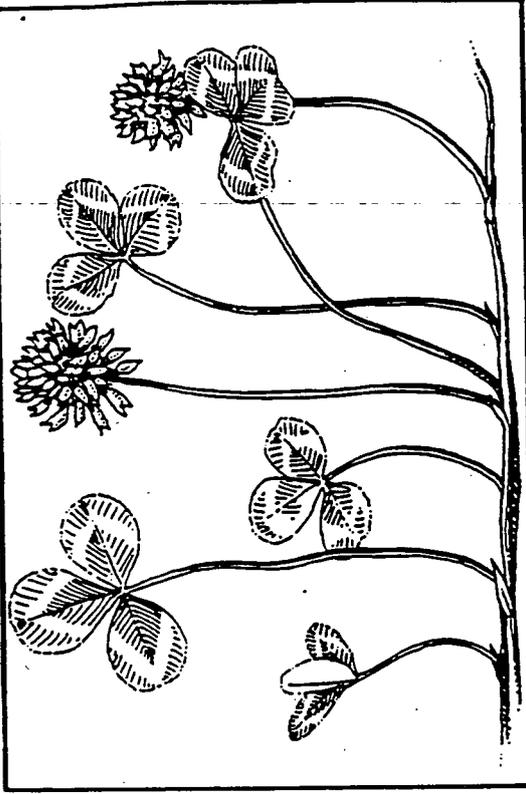
Clinton - "Wilmington"

Habitat descriptions for the plant, which was rediscovered in Kentucky and Indiana in 1987, include the following:

"grazed, wooded ravine"; "mowed, rich opening in a woodland"; "floodplain".

It is generally believed that the plant grows best in poor, well-drained soil or gravel (but not in acid soil) with filtered sunlight (not in full sun or full shade) and with limited competition from other herbaceous species. Associated trees include black locust and red maple.

Note: Also, please notify DNAP if you find *T. reflexum* since it is on the Ohio rare plant list.



Trifolium repens—White Clover, Dutch Clover, Shamrock

Stems prostrate, creeping; white flower heads on naked stems arising directly from the creeping stems; flower stalks 2-8 inches long.



Trifolium reflexum—Buffalo Clover

Stems upright, branching from the base; flower heads pinkish or occasionally white, arising from a pair of aerial leaves, entire plant 4-19.5 inches high.

Note: leaves of all three species identical, although leaves of *T. repens* average slightly smaller than those of the other two species.



Photo 1: Specimen from population 1. Note how the flower stalk branches directly from the creeping stem identifying this plant as White Clover (*Trifolium repens*).

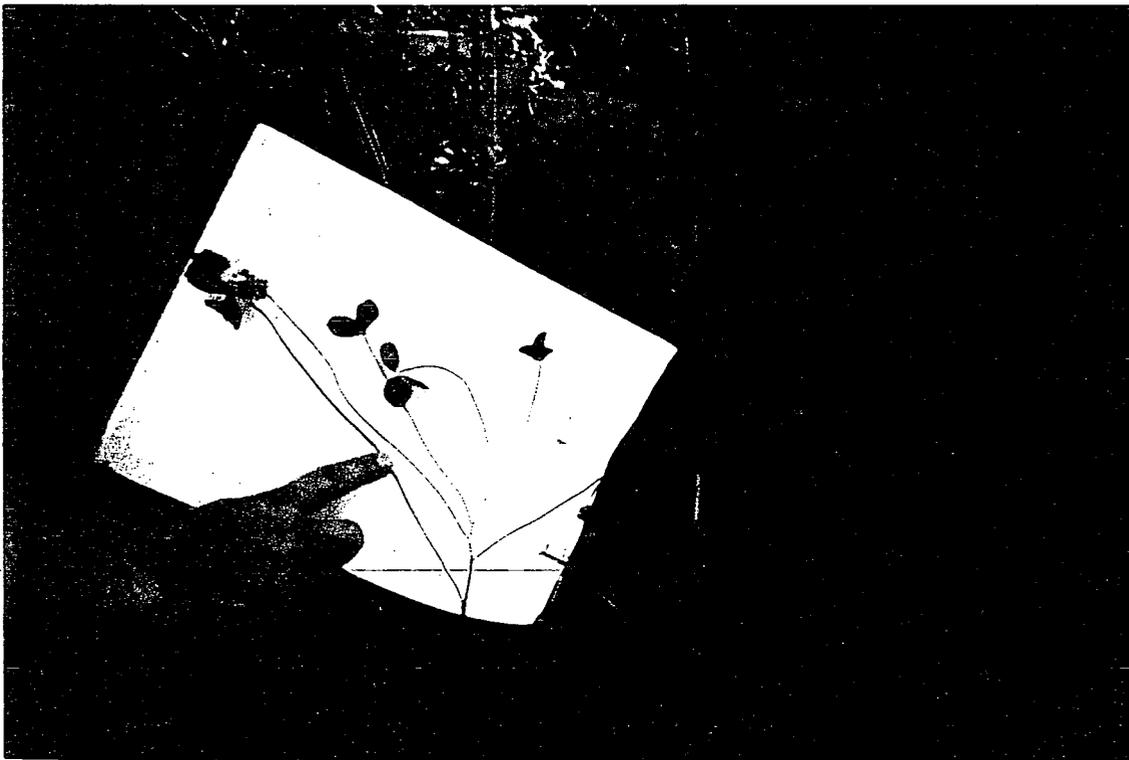


Photo 2: Specimen from population 1. Despite the notched leaves and large size, this specimen was identified as White Clover based on the flower stalk arising from the creeping stem.



Photo 3: Specimen from population 2. This specimen was identified as White Clover because of the flower stalk branching from the creeping stem.



Photo 4: A population of Running Buffalo Clover (*Trifolium stoloniferum*), located in Shawnee Lookout Park, which is approximately 10 miles southwest of the site.



Photo 5: Close-up view of Running Buffalo Clover. Note the heart-shaped leaves and light green color. This photograph was taken at Shawnee Lookout Park.

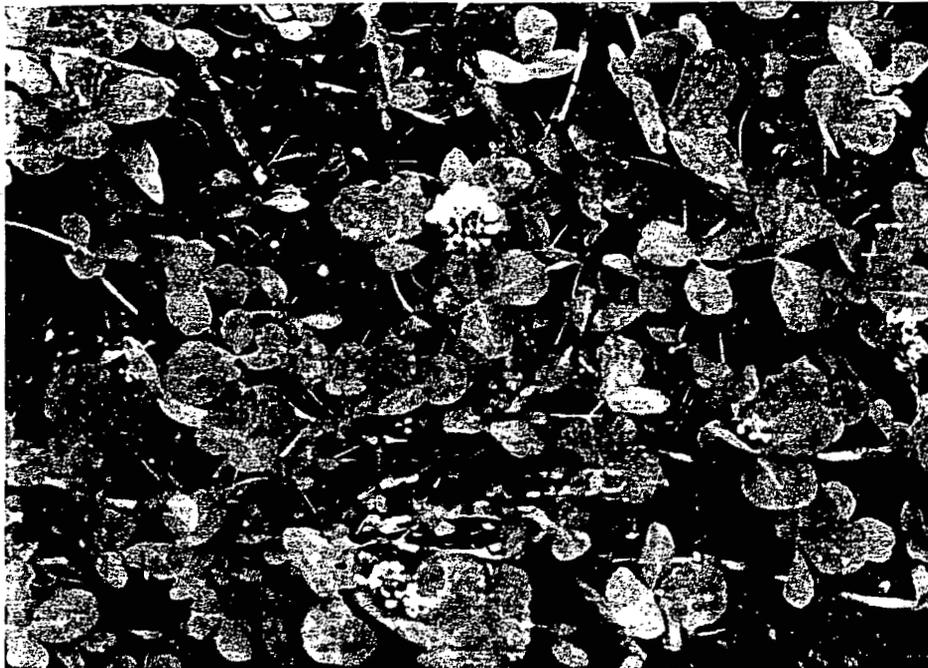


Photo 6: Running Buffalo Clover in flower. Note how the flower stalk arises from a pair of aerial leaves.



Photo 7: Close-up view of Running Buffalo Clover, showing the pair of aerial leaves.