Habitat Assessment & Survey

Ute Ladies' Tresses Orchid & Colorado Butterfly Plant Hogan Pancost Property

Boulder County, Colorado

prepared for:

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1.0 Introduction

BCC, LLC has plans to develop a portion of the Hogan Pancost property located southwest of the East Boulder Community Park in unincorporated Boulder County (Figure 1). The project site is bisected by 55th Street, creating a 2.73 acre East Parcel and a 19.09 acre West Parcel. Specifically, the property is located in parts of Sections 3 and 4 of Township 1 North and Range 70 West in Boulder County, Colorado (Figure 2).

To aid in project planning, Western Ecological Resource, Inc. completed a wetland delineation in August 2016 (WER, 2016). The delineation identified 15 wetlands on the West Parcel and one on the East Parcel (Figure 3). The U.S. Fish & Wildlife Service has identified wetlands in Boulder County as potential habitat for two federally listed plants: the Ute ladies' tresses orchid *(Spiranthes diluvialis),* and the Colorado butterfly plant *(Gaura neomexicana ssp. neomexicana)*. To evaluate the potential for the project site to support these two rare plants, a habitat assessment and survey were completed during the blooming period for the orchid on August 1 and 22, 2016. This report describes the wetland and upland habitats present on the project site and assesses their suitability to support these plants, and also documents the results of the survey.

Previous studies on the project site have addressed the potential to support the Ute ladies' tresses orchid, and none have been found. William F. Jennings has completed four surveys for Ute ladies' tresses orchid on this project site, and for each survey he concluded that the orchid was not present and that suitable habitat for this orchid is limited on this property. The U.S. Fish & Wildlife concurred with his determination. His last survey was completed in 2008.

2.0 Environmental Setting

The Hogan Pancost project site is undeveloped except for several small sheds located on the West Parcel. Historically, the property has had an agricultural land use which likely extends back to the settlement era in the late 1800's (Hogan, 2008). Horses currently graze on the West and East Parcels, however the grazing has been much more intense on the West Parcel and has significantly affected the vegetation composition in both the wetland and upland habitats, reducing plant cover, and increasing the abundance of weeds and unpalatable species.

The West Parcel ranges in elevation from a high of 5,325 feet in the south to a low of 5,312 feet in the northwest. This parcel contains numerous small north- to northwest-trending swales and man-made laterals which were historically used to irrigate the site. Dry Creek Ditch #2 (Ditch) parallels the western boundary of the West Parcel, and is lined by wetlands. The CD Bodam Lateral occurs along the south boundary of the West Parcel and is filled by water diverted from Dry Creek Ditch #2. The CD Bodam Lateral was historically used to irrigate the West Parcel, but this was terminated in 2008 and a PVC liner was installed, which precludes wetland growth in the lateral. The Super-Phostical Lateral also crosses the eastern portion of the West Parcel and a small area of the northwestern corner. The Super-Phostical Lateral has an earthen bottom and is lined by wetlands.

The East Parcel has a relatively flat topography that extends from a high of 5,325 feet in the southwest to a low of 5,319 feet in the north along 55th Street. The Super-Phostical Lateral bisects the East Parcel, and South Boulder Creek is located approximately 180 feet east of the East Parcel. A small portion of the irrigation water storage pond on the Kent Property to the south extends into the southern portion of the East Parcel.

Historically, the entire project site was extensively flood irrigated beginning with settlement in the late 1800's (Hogan, 2008). Flood irrigation on the project site and seepage from the associated irrigation laterals, ditches and ponds, as well as irrigation of the surrounding landscape, has contributed to an elevated groundwater table and to the development of numerous wetland areas, particularly on the West Parcel.

As described above, flood irrigation practices were terminated on the West Parcel prior to the 2008 growing season. Irrigation of the East Parcel has not been terminated, and occurred during the 2016 growing season. Specifically, the East Parcel is irrigated twice per growing season for about two weeks each time in conjunction with irrigation of the land south of the East Parcel (Bodam, 2016).

The vegetation of the project area is characterized by an upland pasture with heavy grazing impacts on the West Parcel, lightly grazed pasture areas on the East Parcel, dense weed infestations, man-induced wetlands as described below in Section 4.0, and a stand of plains cottonwood trees *(Populus deltoides)* on the east end of the East Parcel.

The upland pasture areas on the West Parcel are best developed in the swales just north of the CD Bodam Lateral where they have been historically flood irrigated, and likely still receive occasional overflows from the CD Bodam Lateral. These pasture areas have become drier following the termination of flood irrigation, with reduced vegetation cover and an increased abundance of weeds. The vegetation in these areas consists of a mixture of upland and facultative wetland plants. Some of the common graminoids include meadow fescue *(Festuca pratensis),* quackgrass *(Elytriga repens)*, redtop *(Agrostis gigantea),* Baltic rush *(Juncus arcticus subsp. ater),* timothy *(Phleum pratense),* Canada bluegrass *(Poa compressa),* and orchard grass *(Dactylis glomerata)*. Introduced forbs are abundant, including chicory *(Cichorum intybus),* narrow-leaf birds-foot trefoil *(Lotus tenuis),* curly dock *(Rumex crispus),* lanceleaf plaintain *(Plantago lanceolata)*, and red clover *(Trifolium pratense).*

Some small areas directly adjacent to the CD Bodam Lateral support hydrophytic vegetation that extends up onto the elevated bank of the ditch berm, but lack a wetland hydrology and are instead supported by overspray from sprinklers on the CD Bodam property.

Weedy areas occur in the slightly higher elevations of the West Parcel where prairie dogs have created disturbed habitats, as well as in mesic areas on the East Parcel. The weedy areas have significantly increased in size due to the termination of flood irrigation and the increased prairie dog activity on the West Parcel. These weed-dominated areas have a low vegetation cover composed of a diversity of Colorado state-listed noxious weeds and other introduced plants. Some of the most abundant weeds in the West Parcel include Scotch thistle *(Onopordum acanthium),* teasel *(Dipsacus fullonum)*, alyssum *(Alyssum parviflorum)*, Canada thistle *(Cirsium arvense),* field bindweed *(Convolvulus arvensis)*, chicory, and mullein *(Verbascum thapsus).* The East Parcel contains large stands of teasel intermixed with the wetland plants, as well as stands of Canada thistle and a few Russian olive *(Elaeagnus angustifolia)* trees.

Finally, a small stand of plains cottonwood trees occurs in the eastern portion of the East Parcel. The understory is comprised of upland and facultative plants such as smooth brome *(Bromus inermis),* meadow fescue, Canada goldenrod *(Solidago canadensis),* and goldenbanner *(Thermopsis divaricarpa).* Table 1 lists the plant species observed on the project site during the wetland delineation in August 2016.

3.0 Ute Ladies' Tresses Orchid Habitat Characteristics

The Ute ladies' tresses is a federally threatened perennial, terrestrial orchid endemic to moist soils in mesic or wet meadows near springs, lakes, or perennial streams (USFWS, 1995; Jennings, 1990). In Colorado, the elevational range of known orchid populations is between 4,500 and 6,800 feet (Spackman et al., 1997). The orchid prefers sites with permanent sub-irrigation such as floodplains where the water table is near the surface throughout the growing season and into the late summer or early autumn (USFWS, 1995; Jennings, 1990).

The current distribution of Ute ladies' tresses orchid includes populations in Colorado, Wyoming, Utah, Montana, and Nevada. Colorado supports the easternmost populations of the Ute ladies'

tresses orchid, located in relict tallgrass prairie and irrigated pastures near South Boulder Creek in Boulder County, and in mesic meadows in the riparian woodland understory along Clear Creek in Jefferson County. The South Boulder Creek population represents the largest known occurrence of the orchid. Smaller populations have been identified adjacent to St. Vrain Creek near Hygiene in Boulder County and near the Cache La Poudre River at the northwest edge of Fort Collins in Weld County, Colorado. Historic collections from Colorado were made in 1856 from the South Platte River and in 1896 from Camp Harding near Colorado Springs in El Paso County.

The Ute ladies' tresses orchid is relatively intolerant of competition, and is found primarily in communities where the vegetation is open and not overly dense or overgrown (USFWS, 1995; Jennings, 1990). It cannot compete with emergent species such as cattails *(Typha sp.)* or aggressive species that form dense monocultures such as Canada thistle and reed canarygrass *(Phalaris arundinacea)* (USFWS, 1995). Common associates in Colorado's Front Range populations include redtop, marsh milkweed *(Asclepias incarnata)*, bluejoint reedgrass *(Calamagrostis sp.)*, horsetail *(Equisetum sp.)*, lobelia *(Lobelia siphilitica)*, blue-eyed grass *(Sisyrinchium sp.)*, goldenrod *(Solidago sp.)*, arrowgrass *(Triglochin sp.)*, and blue vervane *(Verbena hastata)* (USFWS, 1995).

The Ute ladies' tresses orchid prefers soils ranging from fine silt and sand to gravels and cobbles. Occasionally, populations occur on highly organic or peaty soils. Soils composed of heavy or tight clay are typically unsuitable for this species. In addition, the orchid is not found in extremely saline or alkaline soils (pH > 8.0) (USFWS, 1995).

The orchid frequently colonizes early-successional riparian habitats including point bars, sand bars, and low lying gravelly, sandy, or cobbly edges. These preferred habitat characteristics suggest that this species requires early to mid-seral riparian habitats created and maintained by streams active within their floodplains (USFWS, 1995).

4.0 Colorado Butterfly Plant Habitat Characteristics

The Colorado butterfly plant *(Gaura neomexicana ssp. coloradensis)* is a federally threatened, short-lived perennial herbaceous plant. This threatened subspecies is distinguished from the New Mexico butterfly plant *(Gaura neomexicana ssp. neomexicana)* based upon differences in pubescence and its disjunct range (Rocky Mountain Heritage Task Force, 1987).

This subspecies occurs primarily on subirrigated alluvial soils on level or slightly sloping floodplains and drainage bottoms at elevations between 5,000-6,400 feet (USFWS, 2000). The butterfly plant requires early- to mid-successional riparian habitat, and colonies are often found in low depressions or along bends in wide, active, meandering stream channels a short distance upslope of the actual channel (USFWS, 2000). The Colorado butterfly plant appears to require shallow subsurface water, and it is not found where streams are deeply incised (Rocky Mountain Heritage Task Force, 1987).

All of the known populations of the Colorado butterfly plant occur within a small, 17,000 acre area in southeast Wyoming, western Nebraska, and north-central Colorado (USFWS, 2000). In Colorado, historic collections have been made in Boulder, Weld, Douglas, and Larimer Counties (Colorado Natural Heritage Program, 1995). However, the only natural populations of the butterfly plant presently known in Colorado are at Meadow Springs Ranch and the adjacent Soapstone Ranch near Fort Collins, Colorado.

5.0 Habitat Assessment Methods and Dates

5.1 Previous Investigations

William Jennings, a botanical consultant, visited the Hogan Pancost property six times between 1994 and 2008 to conduct surveys and/or habitat assessments for the Ute ladies' tresses orchid (See

Appendix A). He completed formal surveys for the orchid on July 26, 1994; August 17, 1994; July 28, 2003; July 25, 2007; and April 1, 2008, and also visited the site on July 25, 2008. No individuals or populations of the orchid were identified on the project site during any of the six visits. Mr. Jennings stated that the suitable orchid habitat on the project site was minimal, and that it is too heavily disturbed to support the orchid. Furthermore, he commented that the increase in weedy species observed during his field reconnaissance indicates the quality of the plant community seems to be declining, further reducing its suitability for the orchid.

5.2 2016 Habitat Assessment and Survey

Heather Houston of Western Ecological Resource, Inc. completed the Habitat Assessment and Survey on August 1 and 22, 2016, during the blooming period of the orchid. Heather is certified by the U.S. Fish & Wildlife Service to conduct surveys for the Ute ladies' tresses orchid. See Section 7.0.

Prior to conducting the survey on August 1, Heather visited a known population of the orchid along South Boulder Creek in Boulder to confirm that it was in flower and to observe plant community characters in known orchid habitat (Photos 1 & 2).

To determine if wetlands on the Hogan Pancost property supported the orchid, a pedestrian survey was conducted of all wetland and mesic habitats. In addition, a habitat assessment was completed to characterize each wetland community and determine whether it could potentially support the orchid or the Colorado butterfly plant. The habitat characterizations focused on plant community descriptions, site geomorphology, soil surveys, hydrologic characteristics, ecological condition, and land use history.

6.0 Habitat Assessment and Survey Results

The potential habitat for Ute ladies' tresses orchid and Colorado butterfly plant on the project site includes the delineated wetlands and adjacent mesic habitats. Each wetland identified during the 2016 investigation is described below.

6.1 Wetlands A & B

6.1.1 Location, Hydrology & Vegetation

Wetlands A (0.06 ac) and B (0.03 ac) are located in shallow depressions in the southeastern corner of the West Parcel, just north of the CD Bodam Lateral (Photos 3 & 4).

The hydrology of Wetlands A and B is provided by a seasonally high groundwater table. These wetlands have persisted in the absence of active irrigation on the West Parcel due to an elevated groundwater table caused by irrigation of the surrounding landscape and seepage from ditches and an unlined ornamental pond.

Common species in Wetlands A and B include the native forbs Macoun's buttercup, white panicle aster *(Aster lanceolatus ssp. hesperius)* and largeleaf avens *(Geum macrophyllum);* introduced grasses including meadow fescue, redtop and Canada bluegrass *(Poa compressa)*; and native graminoids such as Emory sedge *(Carex emoryi)*, clustered field sedge *(Carex praegracilis)*, Nebraska sedge *(Carex nebrascensis)* and Baltic rush. Weedy forbs including narrow-leaf birdsfoot trefoil, prickly lettuce *(Lactuca serriola)*, Canada thistle, and curly dock are also present near the wetland margin.

6.1.2 Ecological Condition & Management History

Horses have heavily grazed Wetlands A and B and the margins support weedy forbs. Since flood irrigation was terminated in 2008, vegetation cover has been reduced.

6.1.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified in Wetlands A & B. These wetlands have the appropriate soil types and have some degree of subirrigation caused by irrigation of the surrounding landscape. However, due to the number of years of agricultural use, followed by heavy grazing in the absence of irrigation, they are too degraded to provide suitable habitat.

6.2 Wetlands C & D

6.2.1 Location, Hydrology & Vegetation

Wetlands C (0.26 ac) and D (0.01 ac) are located in a swale north of the CD Bodam Lateral, and west of Wetlands A and B (Photos 5 & 6).

Similar to Wetlands A and B, the hydrology of Wetlands C and D is provided by a seasonally high groundwater table. These wetlands have persisted in the absence of active irrigation on the West Parcel due to an elevated groundwater table caused by irrigation of the surrounding landscape and seepage from ditches and an unlined ornamental pond. The swale could also collect a small volume of precipitation and snowmelt in Wetland C.

Some of the dominant species in these wetlands include redtop, Macoun's buttercup, meadow fescue, Emory sedge, quackgrass *(Elytriga repens)*, Nebraska sedge, white panicle aster, Baltic rush, field mint *(Mentha arvensis)*, curly dock, curly top knotweed *(Persicaria lapathifolia)*, and northern willowherb *(Epilobium ciliatum)*.

6.2.2 Ecological Condition & Management History

Horses have heavily grazed wetlands C and D. Since flood irrigation was terminated in 2008, vegetation cover has been reduced and the cover of weeds has increased across the entire pasture area.

6.2.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified in Wetlands C and D. These wetlands have the appropriate soil types and have some degree of subirrigation caused by irrigation of the surrounding landscape. However, due to the number of years of agricultural use, followed by heavy grazing in the absence of irrigation, they are too degraded to provide suitable habitat.

6.3 Wetland E

6.3.1 Location, Hydrology & Vegetation

Wetland E (0.07 ac) is located in a depression north of the swale containing Wetland C (Photo 7).

The hydrology of Wetland E is provided by a seasonally high groundwater table which is affected by irrigation water and the presence of nearby ditches and ponds. The depression likely collects a small volume of snowmelt and precipitation runoff, and water from the swale to the south would be conveyed into the depression containing Wetland E.

Water smartweed is the dominant species in Wetland E, growing with Nebraska sedge, foxtail barley *(Hordeum jubatum)*, redtop, birdsfoot trefoil *(Lotus corniculatus)*, red clover, and Macoun's buttercup.

6.3.2 Ecological Condition & Management History

Horses have heavily grazed the pasture including Wetland E. Since flood irrigation was terminated in 2008, vegetation cover has been reduced and the abundance of weeds has increased across the entire pasture area.

6.3.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified in Wetland E. This wetland has the appropriate soil type and some degree of subirrigation caused by irrigation of the surrounding landscape. However, due to the number of years of agricultural use, followed by heavy grazing in the absence of irrigation, it is too degraded to provide suitable habitat.

6.4 Wetlands F & G

6.4.1 Location, Hydrology & Vegetation

Wetlands F and G are small herbaceous wetlands (100 and 119 square feet, respectively) located in a man-made swale north of the CD Bodam Lateral (Photos 8 & 9). This swale was likely used to convey irrigation water from the CD Bodam Lateral to the West Parcel.

These two wetlands are likely influenced by irrigation of the property to the south and leakage from the ornamental pond on the property to the south. In addition, if water overtops the CD Bodam Lateral, it would collect in the swale containing Wetlands F and G.

Showy milkweed *(Asclepias speciosa)*, redtop and curly dock are the dominant vegetation in Wetlands F and G, where they grow with American yellowrocket *(Barbarea orthoceras)*, white panicle aster, Emory sedge, and Nebraska sedge.

6.4.2 Ecological Condition & Management History

Similar to the other wetlands described above, Wetlands F and G are highly disturbed due to years of livestock grazing, followed by the termination of flood irrigation in 2008.

6.4.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified in Wetlands F and G. These wetlands have the appropriate soil types and have some degree of subirrigation caused by irrigation of the surrounding landscape. However, due to the number of years of agricultural use, followed by heavy grazing in the absence of irrigation, they are too degraded to provide suitable habitat.

6.5 Wetland H

6.5.1 Location, Hydrology & Vegetation

Wetland H (0.04 ac) is located in a swale north of the CD Bodam Lateral on the West Parcel (Photo 10).

This wetland is located near the southern property line, and is likely influenced by irrigation of the property to the south and leakage from the ornamental pond on the property to the south. The gravelly sandy clay loam soil texture is conducive to groundwater movement, which could allow water applied to the property to the south, and irrigation of the surrounding landscape, to influence the hydrology of Wetland H on the West Parcel. In addition, if water overtops the CD Bodam Lateral, it would collect in the swale containing Wetland H.

Wetland H is vegetated by redtop, water smartweed, Emory sedge, Macoun's buttercup, horehound *(Marrubium vulgare)*, narrowleaf plantain, showy milkweed, and American yellowrocket. Orchard grass, naked spike ragweed *(Ambrosia psilostachya)*, narrowleaf birdsfoot trefoil, crown vetch *(Coronilla varia)*, prickly lettuce, and chicory are also common at the margins.

6.5.2 Ecological Condition & Management History

Similar to the other wetlands described above, Wetland H has been degraded by years of livestock grazing, followed by the termination of flood irrigation in 2008.

6.5.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified in Wetland H. This wetland has the appropriate soil type and some degree of subirrigation caused by irrigation of the surrounding landscape. However, due to the number of years of agricultural use, followed by heavy grazing in the absence of irrigation, it is too degraded to provide suitable habitat.

6.6 Wetland I

6.6.1 Location, Hydrology & Vegetation

Wetland I (0.49 ac) is located on a swale extending north from a topographically low area in the southwestern corner of the West Parcel, near the intersection of the CD Bodam Lateral and Dry Creek Ditch #2 (Photo 11).

Wetland I is supported by a man-induced wetland hydrology due to seepage from Dry Creek Ditch #2 and by overflows from the CD Bodam Lateral. In addition, the flood irrigation that occurs south of the Boulder Commons property elevates groundwater levels in this wetland.

The lowest lying areas of the wetland are dominated by water smartweed and Macoun's buttercup, which are both obligate wetland plants. In the slightly higher topographic areas of the wetland, meadow fescue, Baltic rush, redtop, Nebraska sedge, jewelweed *(Impatiens capensis)*, field mint, and white panicle aster occur. Near the northern end of the wetland is a stand of sandbar willow *(Salix exigua).* Common introduced plants and weeds in the wetland include horehound, Canada thistle, Kentucky bluegrass, and prickly lettuce.

6.6.2 Ecological Condition & Management History

Similar to the other wetlands described above, Wetland I has been degraded by years of livestock grazing, followed by the termination of flood irrigation in 2008.

6.6.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified in Wetland I. This wetland has the appropriate soil type and some degree of subirrigation caused by irrigation of the surrounding landscape. However, due to the number of years of agricultural use, followed by heavy grazing in the absence of irrigation, it is too degraded to provide suitable habitat.

6.7 Wetland J

6.7.1 Location, Hydrology & Vegetation

Wetland I (0.49 ac) is located on a swale extending north from a topographically low area in the southwestern corner of the West Parcel, near the intersection of the CD Bodam Lateral and Dry Creek Ditch #2 (Photo 12).

Wetland I is supported by a man-induced wetland hydrology due to seepage from Dry Creek Ditch #2 and by overflows from the CD Bodam Lateral. In addition, the flood irrigation that occurs south of the Boulder Commons property elevates groundwater levels in this wetland.

The lowest lying areas of the wetland are dominated by water smartweed and Macoun's buttercup, which are both obligate wetland plants. In the slightly higher topographic areas of the wetland, meadow fescue, Baltic rush, redtop, Nebraska sedge, jewelweed *(Impatiens capensis)*, field mint,

and white panicle aster occur. Near the northern end of the wetland is a stand of sandbar willow *(Salix exigua).* Common introduced plants and weeds in the wetland include horehound, Canada thistle, Kentucky bluegrass (*Poa pratensis),* and prickly lettuce.

6.7.2 Ecological Condition & Management History

Wetland J has been degraded by years of livestock grazing, followed by the termination of flood irrigation in 2008.

6.7.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified in Wetland J. This wetland has the appropriate soil type and some degree of subirrigation caused by irrigation of the surrounding landscape. However, due to the number of years of agricultural use, followed by heavy grazing in the absence of irrigation, it is too degraded to provide suitable habitat.

6.8 Wetland K

6.8.1 Location, Hydrology & Vegetation

The 0.02 acre Wetland K is located in a topographical depression just west of Dry Creek Ditch #2 and north of Wetland I (Photo 13).

Wetland K is supported by a man-induced wetland hydrology due to seepage of water from the unlined Dry Creek Ditch #2, which is augmented by stormwater and sump-pump flows from the Keewaydin Meadows residential neighborhood. Precipitation also contributes to the hydrology of this wetland, but plays a relatively minor role.

Some of the common species in Wetland K include redtop, Baltic rush, meadow fescue, Nebraska sedge, Macoun's buttercup, and showy milkweed. The noxious weeds Canada thistle, quackgrass, and one small Russian olive tree are also present near the wetland margin.

6.8.2 Ecological Condition & Management History

Wetland K has been degraded by years of livestock grazing, followed by the termination of flood irrigation in 2008.

6.8.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified in Wetland K. This wetland has the appropriate soil type and some degree of subirrigation caused by irrigation of the surrounding landscape. However, due to the number of years of agricultural use, followed by heavy grazing in the absence of irrigation, it is too degraded to provide suitable habitat.

6.9 Dry Creek Ditch #2

6.9.1 Location, Hydrology & Vegetation

The 0.24 acre Dry Creek Ditch #2 Wetland occurs along the western edge of the project area and flows to the north (Photos 14 & 15).

Dry Creek Ditch #2 conveys water from a headgate on South Boulder Creek near Marshall to Middle Boulder Creek near Valmont Butte. Seasonal irrigation flows create saturated soil conditions and shallow ponded water in the Ditch. In addition, the Ditch receives groundwater from sump-pumps and stormwater runoff from the adjacent Keewaydin Meadows neighborhood. It has an earthen bottom which allows seepage, contributing an elevated groundwater table on the West Parcel and to the hydrology of nearby wetlands.

Vegetation along the Ditch is comprised of both herbaceous and shrubby areas. The most common wetland forbs in the saturated soil habitat include Macoun's buttercup, water speedwell *(Veronica anagalis aquatica),* northern willowherb, jewelweed, and yellow flag iris *(Iris pseudacorus).* Common wetland graminoids include clustered field sedge, Nebraska sedge and American mannagrass *(Glyceria grandis).* Riparian shrubs and trees occur along portions of the ditch and include plains cottonwood, crack willow *(Salix fragilis),* sandbar willow, chokecherry *(Prunus virginiana ssp. melanocarpa),* wild plum *(Prunus americana)*, Woods' rose *(Rosa woodsii),* and green ash *(Fraxinus pensylvanica).* Other common forbs along the wetland margin include weeds such as burdock, teasel and Canada thistle, and the introduced species crown vetch and horehound.

6.9.2 Ecological Condition & Management History

Livestock have access to this ditch and it is not fenced from the landscape to the east, which is currently and has historically been grazed by livestock. The ditch is also subject to excavation to clean debris and facilitate the flow of irrigation water.

6.9.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified in the Dry Creek Ditch #2 Wetland. Much of the vegetation in this area is tall and dense, and the areas of sandbar willow would preclude their growth. The disturbed plant community in this area is not suitable habitat for these two rare plants.

6.10 Wetlands L & M

6.10.1 Location, Hydrology & Vegetation

Wetlands L and M occur adjacent to the Super-Phostical Lateral on the West Parcel. These small wetlands measure 461 and 158 square feet, respectively (Photos 16 & 17).

There is an area of shallow ponded water in Wetland L where water flows into a plastic irrigation pipe that conveys flows from the Super-Phostical lateral over Dry Creek Ditch # 2, that supports broadleaf arrowhead *(Sagittaria latifolia)*, nodding beggar tick *(Bidens cernua)*, and broadleaf cattail *(Typha latifolia)* (Photo 16). Other species in the area include American mannagrass, softstem bulrush *(Scirpus validus),* woolly sedge *(Carex lanuginosa),* jointed rush *(Juncus articulatus),* and northern willowherb. The eastern portion of this wetland is comprised of a dense stand of sandbar willows. Wetland M is dominated by Emory sedge.

6.10.2 Ecological Condition & Management History

Livestock heavily graze the West Parcel, but the vegetation of Wetlands L an M is tall and dense, and includes areas of sandbar willow.

6.10.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified in Wetlands L and M. The shallow ponded water in Wetland L is not suitable habitat, and these plants do not occur in areas of sandbar willow or other tall vegetation. Wetlands L and M are not suitable for either of these two rare plants.

6.11 Super-Phosticle Lateral Wetland

6.11.1 Location, Hydrology & Vegetation

The 0.09 acre Super-Phostical Lateral Wetland is located on the segment of the Super-Phostical Lateral that that flows through the eastern portion of the West Parcel (Photo 18).

The Super-Phostical Lateral receives water from the Howard Ditch near its diversion from South Boulder Creek located southeast of the project area. This water flows from the headgate on the Howard Ditch to a small pond on the Kent property, south of the East Parcel. The lateral flows

northwesterly from the pond and bisects the East Parcel, passes under 55th Street, and continues northwesterly across the northeast corner of the West Parcel onto East Boulder Community Park. The lateral turns southwesterly and crosses the West Parcel again at the northwest corner, where it flows into a culvert and crosses over Dry Creek Ditch No. 2 and then into underground vaults for irrigation water for the athletic fields at the Manhattan Middle School. Finally, the lateral may travel north to some private properties. The Super-Phostical Lateral appears to have a small volume of water most of the year, and the earthen bottom allows water to seep from the ditch, contributing to the groundwater.

The Super-Phostical Lateral in this area is approximately two feet wide and is bordered by wetland plants such as American mannagrass, water smartweed, nodding beggar tick, Macoun's buttercup, northern willowherb, reed canarygrass, and woolly sedge. The noxious weed teasel is abundant at the wetland margin and in the adjacent moist soil habitats.

6.11.2 Ecological Condition & Management History

The small portions of this lateral on the West Parcel are used by livestock for drinking, and there are heavy grazing impacts and areas of low vegetation cover. In addition, the adjacent moist soil is dominated by tall, dense stands of the noxious weed teasel. This lateral is subject to regular maintenance activities including excavation.

6.11.3 Results

Heavy grazing and the presence of noxious weeds have significantly degraded the Super-Phostical Lateral Wetland within the West Parcel. No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified. This wetland is not suitable habitat.

6.12 Wetland N

6.12.1 Location, Hydrology & Vegetation

The 0.22 acre Wetland N is located on the East Parcel, and encompasses a segment of the Super-Phostical Lateral and the low areas adjacent to the lateral, as well as the wetland at the margin of the small pond (Photos 19 & 20).

This wetland has a man-induced wetland hydrology provided by flows in the Super-Phostical Lateral and active irrigation during the growing season. In addition, the Super-Phostical Lateral is unlined, which allows irrigation water to seep out and elevate groundwater levels adjacent to the lateral.

Some of the dominant species in Wetland N include Nebraska sedge, redtop, Emory sedge, meadow fescue, Baltic rush, and the noxious weed teasel. Near the small pond at the southern boundary, the native forb Canada goldenrod grows with abundant redtop in the saturated soil habitat. Mature stands of crack willow also occur along the southern boundary of the East Parcel, where a few native plains cottonwood trees also occur. Plains cottonwoods are the dominant species in the upland area at the easternmost end of the East Parcel.

6.12.2 Ecological Condition & Management History

The East Parcel was historically part of a farming operation and is actively flood irrigated. It is grazed by horses, but grazing has been light and the vegetation cover is high. Most of the vegetation is tall and dense and there are abundant weeds, including teasel.

6.12.3 Results

No individuals or populations of the Ute ladies' tresses orchid or Colorado butterfly plant were identified on the East Parcel. This area has the appropriate soil type and hydrology, but the tall dense growth of sedges and the noxious weed teasel limit the habitat suitability for these rare plants. At best, the East Parcel could be considered marginal habitat, since the orchid is known to occur south of the project site, on Boulder County Open Space south of South Boulder Road.

7.0 Qualifications of Surveyor

7.1 Plant Ecologist

Heather Houston received her Master's Degree from the University of Colorado in Environmental, Population and Organismic Biology in December, 2000. As an ecologist for Western Ecological Resource, Ms. Houston has gained expertise in wetland ecology, botanical inventories and monitoring, rare plant surveys, habitat creations and restorations, NEPA compliance, and permitting.

During her fifteen years with Western Ecological Resource, Ms. Houston has completed numerous threatened and endangered species surveys as well as habitat assessments for federally listed and sensitive species. She is certified by the U.S. Fish and Wildlife Service to conduct surveys for the Ute ladies' tresses orchid *(Spiranthes diluvialis)*, a federally listed threatened plant, and has completed surveys and visited populations of the orchid in both eastern and western Colorado. She has reviewed the taxonomic, ecological, and distribution literature, in addition to examining all specimens at the University of Colorado Herbarium. She has regularly visited a known population of the orchid in Boulder to monitor its phenology and observe plant community characters.

7.2 Company

Western Ecological Resource, Inc. has approximately three decades of experience conducting threatened, endangered, and rare plant surveys. Below is a list of Habitat Assessments and Surveys for the Ute ladies' tresses orchid and the Colorado butterfly plant completed by Western Ecological Resource, Inc.

Amber Homes
Amber Creek Subdivision
Spiranthes diluvialis & *Gaura neomexicana ssp. coloradensis* Habitat Assessment
Adams County, CO – 2003

Centex Homes
Miramonte Farms Report
Spiranthes diluvialis Habitat Evaluation
Boulder County, CO – 1993

City of Estes Park
Cascade Reservoir
Spiranthes diluvialis & *Gaura neomexicana ssp. coloradensis* Survey
Boulder & Larimer Counties, CO – 1986

City of Fort Collins
2009 Trails & Parks
Spiranthes diluvialis & *Gaura neomexicana ssp. coloradensis* Habitat Assessment
Larimer County, CO – 2009

2010 Trails & Parks
Spiranthes diluvialis & *Gaura neomexicana ssp. coloradensis* Habitat Assessment
Larimer County, CO – 2010

2011 Trails & Parks
Spiranthes diluvialis & *Gaura neomexicana ssp. coloradensis* Habitat Assessment
Larimer County, CO – 2011

City of Littleton
Big Dry Creek Project
Spiranthes diluvialis Survey
Arapahoe County, CO – 1994

City of Westminster
Water Point Bellio & City Park Projects
Spiranthes diluvialis Survey
Adams County, CO – 1992

Countryside #13 Open Space Property
Spiranthes diluvialis Habitat Evaluation
Jefferson County, CO – 1993

Big Dry Creek Trail Project
Spiranthes diluvialis Habitat Evaluation
Boulder County, CO – 1994

Big Dry Creek Trail Project
Spiranthes diluvialis & *Gaura neomexicana ssp. coloradensis* Habitat Assessment & Survey
Adams County, CO – 2004

General Land Development Company
Ridge Land Project
Spiranthes diluvialis Habitat Evaluation
Weld County, CO – 2001

Hector Johnson
Bell Tower Events Center
Spiranthes diluvialis Habitat Assessment
Weld County, CO – 2002

Hurst and Associates
Bullhead Gulch Project
Spiranthes diluvialis Habitat Evaluation
Boulder County, CO – 1993

Meadowview Residential Development
Spiranthes diluvialis Habitat Evaluation
Boulder County, CO – 1993

Vojita Property
Spiranthes diluvialis Survey
Boulder County, CO – 1993

James Company
Bell Grove Project
Spiranthes diluvialis Survey
Boulder County, CO – 1992

Johnson Development Corporation
Canyon Creek Subdivision Project
Spiranthes diluvialis Habitat Evaluation
Boulder County, CO – 2000

Canyon Creek Filings 7 & 8
Sprianthes diluvialis Habitat Assessment & Survey
Boulder County, CO – 2006

KB Homes of Colorado, Inc.
Aspen Knolls Property
Spiranthes diluvialis Survey
Larimer County, CO – 2001

Lakeview Development Corporation
Lakeview Development
Spiranthes diluvialis & *Gaura neomexicana ssp. coloradensis* Habitat Assessment & Survey
Larimer County, CO – 2003

McStain Enterprises
Kubat Property
Spiranthes diluvialis & *Gaura neomexicana ssp. coloradensis* Habitat Assessment
Boulder County, CO – 2003

Northern Colorado Water Conservancy District
City of Boulder Conservation Easement Project
Spiranthes diluvialis Survey
Boulder County, CO – 1994

Southern Water Supply Project
Spiranthes diluvialis Survey – 1992-93
Larimer, Boulder, Weld, & Adams Counties, CO

PrideMark Development Company
Aspen Knolls Property
Spiranthes diluvialis Survey
Larimer County, CO – 1997

Ralston Development Corporation
Westwood Center
Spiranthes diluvialis Habitat Assessment & Survey
Jefferson County, CO – 2002, 2003

Sollenberger Companies
Kechter Farm Project
Spiranthes diluvialis & Gaura neomexicana ssp. coloradensis Habitat Assessment
Larimer County, CO – 2007

Superior Metropolitan District No. 1
Rock Creek Development
Spiranthes diluvialis Survey

Town of Erie
Anderson Housing Project
Spiranthes diluvialis Survey
Weld County, CO – 1995

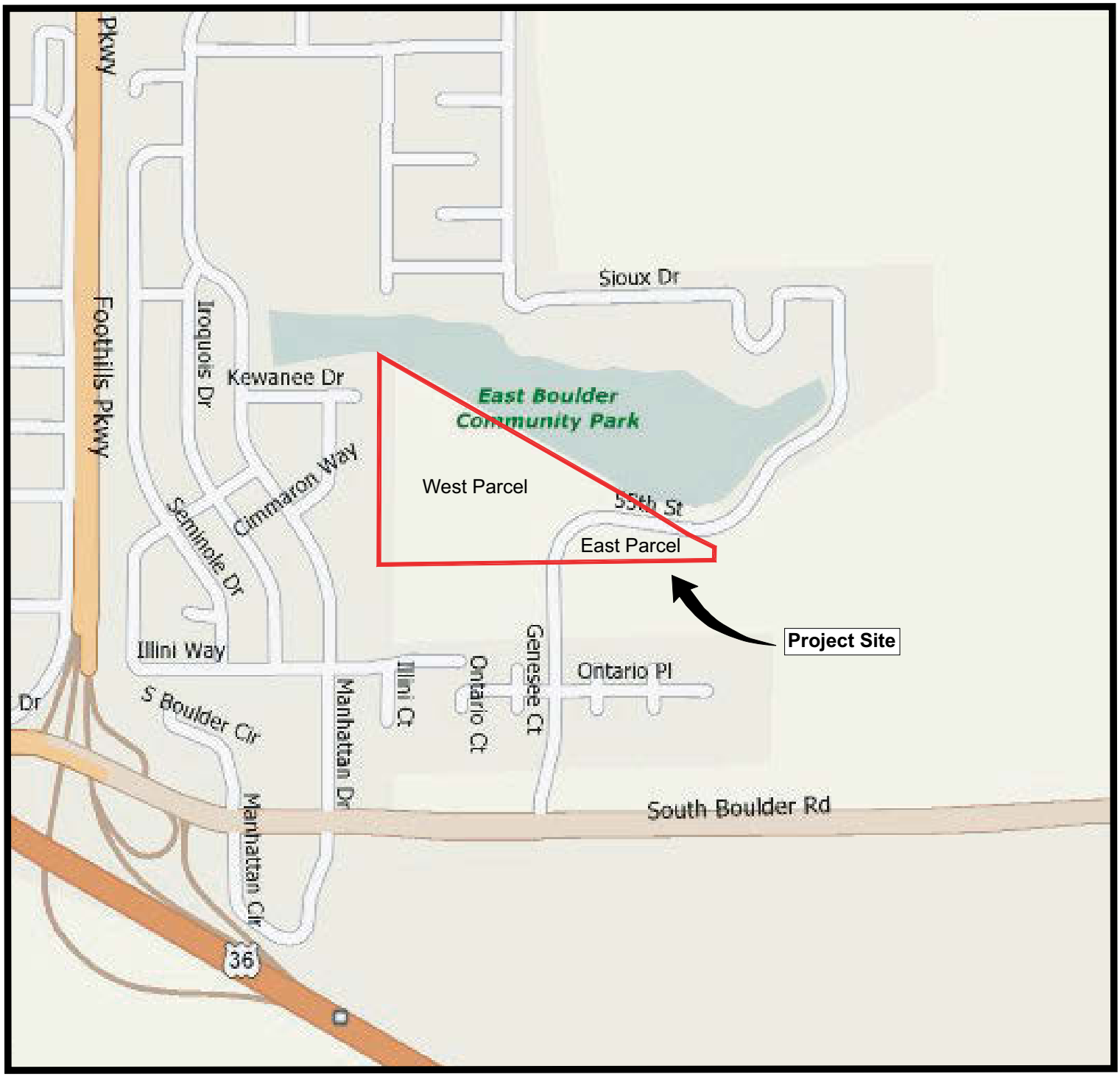
Lumry Housing Project
Spiranthes diluvialis Survey
Weld County, CO – 1995

Northridge Subdivision
Spiranthes diluvialis Survey
Weld County, CO – 1995

Floodplain Project
Spiranthes diluvialis Habitat Evaluation
Weld County, CO – 1995

Western Area Power Administration
Flatiron – Erie Transmission Line
Spiranthes diluvialis Survey
Boulder, Larimer, & Weld Counties, CO – 1994

8.0 Figures



BASE: Map Data Mapquest 2008 NAVETQ or TeleAtlas

FIGURE 1. Vicinity Map
Hogan Pancost Property

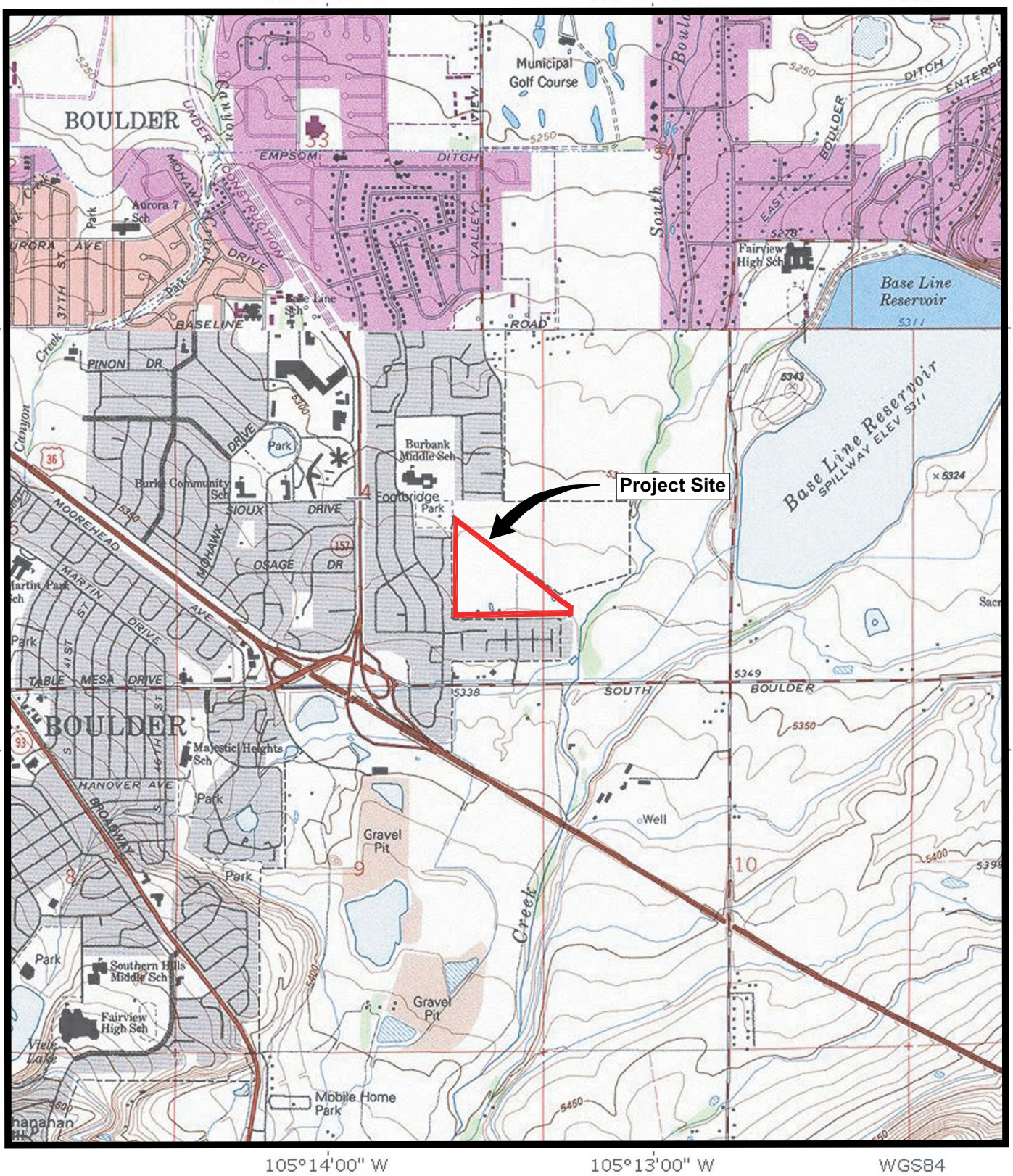
N

Scale 1" = 600'

WESTERN ECOLOGICAL RESOURCE, INC.
711 Walnut Street • Boulder, CO 80302

R 70 W

105°14'00" W 105°13'00" W WGS84



BASE: USGS 7.5 Minute Louisville, Colorado Quadrangle
Photorevised: 1990

FIGURE 2. Project Location Map
Hogan Pancost Property

Map Location

WESTERN ECOLOGICAL RESOURCE, INC.
711 Walnut Street • Boulder, CO 80302

N

Scale 1" = 2000'
Contour Interval = 10'

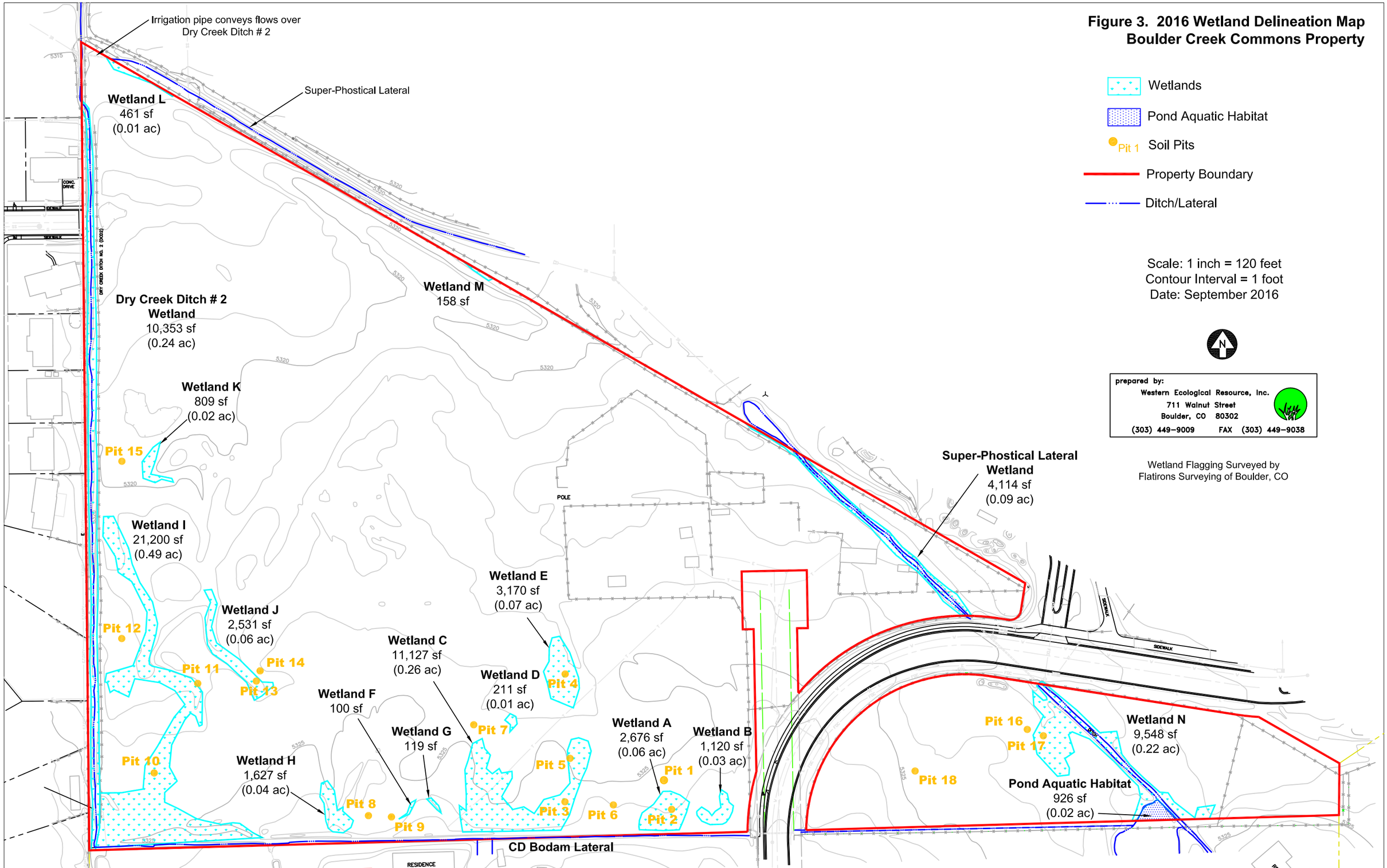


Figure 3. 2016 Wetland Delineation Map
Boulder Creek Commons Property

9.0 Photos

Photo 1. Ute ladies' tresses orchid in bloom near South Boulder Creek in Boulder, Colorado. (8/1/16).

Photo 2. Ute ladies' tresses orchid habitat near South Boulder Creek in Boulder, Colorado. (8/1/16).

Photo 3. Wetland A is located near the southeastern corner of the pasture in the West Parcel, just north of the CD Bodam Lateral. (8/22/16).

Photo 4. Wetland B is just north of the CD Bodam Lateral. (8/22/16).

Photo 5. Dense growth of Macoun's buttercup in Wetland C, located in a swale extending north from the area of the CD Bodam Lateral. (8/22/16).

Photo 6. Wetland D. (8/22/16).

Photo 7. Wetland E is in a depression dominated by water smartweed. (8/22/16).

Photo 8. Wetland F is in a narrow man-made irrigation diversion ditch just north of the CD Bodam Lateral. (8/22/16).

Photo 9. Wetland G is in the same small ditch just east of Wetland F. (8/22/16).

Photo 10. Wetland H is just north of the CD Bodam Lateral, in a swale once used to convey irrigation water. (8/22/16).

Photo 11. This area of Wetland I is dominated by the native shrub sandbar willow, and is located just east of Dry Creek Ditch #2.

Photo 12. Wetland J is in a swale that once conveyed irrigation water through the pasture on the West Parcel. (8/22/16).

Photo 13. Wetland K is in a swale downgradient of Wetland J and east of Dry Creek Ditch #2. (8/22/16).

Photo 14. Dry Creek Ditch # 2 is lined by wetlands and has an earthen bottom that allows seepage, contributing to the groundwater near the ditch. (8/22/16).

Photo 15. Stand of sandbar willows along Dry Creek Ditch # 2 near the western boundary of the West Parcel. (8/22/16).

Photo 16. The Super-Phostical Lateral in Wetland L has a small ponded area where it flows into an irrigation pipe near the northwestern corner of the West Parcel. (8/22/16).

Photo 17. Wetland M is in a low area that is supported by seepage from the Super-Phostical Lateral. (8/22/16).

Photo 18. The Super-Phostical Lateral Wetland on the West Parcel is bordered by dense stands of the noxious weed teasel. (8/22/16).

Photo 19. A small pond is partially located on the East Parcel and is surrounded by wetlands. This area bordering the pond is a part of Wetland N. (8/22/16).

Photo 20. The Super-Phostical Lateral through Wetland N on the East Parcel is lined by dense stands of the noxious weed teasel. (8/22/16).

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Appendix A. Previous Spiranthes Surveys

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

July 25, 2008

Tom Finley
MacKenzie House LLC
7887 East Belleview Avenue
Suite 800
Englewood CO 80111

Dear Mr. Finley:

As requested, I have visited the Hogan and Pancost properties on 55th Street at the southeast edge of the city of Boulder, Boulder County, Colorado. This letter report updates four previous surveys of these properties for the federally threatened plant species *Spiranthes diluvialis* (Ute ladies'-tresses orchid). The properties were visited on July 25, 2008, and had previously been surveyed for the orchid on April 1, 2008, July 25, 2007, July 28, 2003; and July 26, 1994 (Hogan) and August 17, 1994 (Pancost). Prior surveys (except for the April 1, 2008 survey) were performed during the period when the orchid is in bloom. The current survey was completed when the orchid is in bloom. In prior surveys, no orchids were found on the properties. In the current survey, no orchids were found and suitable habitat is minimal.

The two properties are in T1S R70W section 4 S1/2 and are shown on the Louisville USGS 7.5' Quadrangle map. The site is on 55th Street, north of South Boulder Road and immediately southwest of the East Boulder Community Park and Recreation Center.

The orchid blooms in July and August, usually starting bloom around July 20. By September it is in fruit. When in bloom, the porcelain-white flowers immediately call attention to the plant. During the winter and spring, the orchid is usually not detectable, except by the presence of dead standing stems from the prior year. On the day prior to the survey, the well-known population on City of Golden Open Space, along Clear Creek just west of the US 6 bridge, was visited. At that site, 32 orchids were observed in bloom, in bud, and vegetative. This population, first observed in 1980, is a reliable indicator of the condition of the orchid. If the orchid were present on the Hogan and Pancost properties, it should have been in bloom, but no orchids were found there.

As observed in prior surveys, the Hogan and Pancost properties are heavily disturbed by grazing, overseeding of exotic grasses for forage improvement, weeds, and prairie dogs. The site is nearly surrounded by urban development. In general, the properties can be divided into three areas: a pasture to the west; ranch outbuildings and corrals in the center, and an eastern pasture across 55th Street. The area had been used as pasture for horses sometime in the not too distant past, as droppings were seen, but no livestock was seen on the day of the July 2008 survey. Horses and a donkey were seen in 2007. No livestock was seen in 2003. In 1994, 25 cattle and one horse were present.

As noted in previous surveys, the vegetation of the western pasture is composed of exotic species, most notably: smooth brome (*Bromus inermis*), timothy (*Phleum pratense*), lotus (*Lotus tenuis*) and red clover (*Trifolium pratense*). At the time of the current survey, no grazing had been done for some time and grasses and other plants were easily identifiable. Much of the area is dry and weedy. Scotch thistle (*Onopordum acanthium*), diffuse knapweed (*Acosta diffusa*), musk thistle (*Carduus nutans*), chicory (*Cichorium intybus*), mullein (*Verbascum thapsus*), and curly dock (*Rumex crispus*) were identifiable weeds during the current survey. In the drier parts of the property, prairie dogs have dug burrows and prickly-pear cactus (*Opunita macrorhiza*) is present. A ditch lateral follows the south property boundary west from 55th Street and then follows the west property boundary north. The south-side ditch had been noted as having been excavated deeper in April 2008. A fence has been built north of the south-side ditch. Both of these ditches were flowing during the current survey. The west-side ditch was choked with vegetation and no orchid habitat is present. A ditch parallels the northeast property boundary, but mostly outside the fence and apparently on land owned by the City of Boulder. This ditch was flowing. No ditch diversions were being made into the western pasture, although some low areas were moist. Low, moist areas can be orchid habitat, but no orchids were found.

The central area is composed of ranch outbuildings and corrals. The natural vegetation is no longer present; only weeds and other exotic species are present, or no vegetation is present at all. Prairie dog holes were noted. None of this area is suitable for orchid habitat, as it is too highly disturbed and too dry.

East of 55th Street, the pasture had not been grazed recently. Smooth brome and red clover were noted. In the area where 55th Street makes a sweeping curve to the east, the pasture is too dry to support orchids. The pasture is moister toward the center. Vegetation is similar to the area across 55th Street, but with a very bad infestation of teasel (*Dipsacus fullonum*) here, which has crowded out all other vegetation. Other weedy species were Canada thistle (*Cirsium arvense*) and ox-eye daisy (*Chrysanthemum leucanthemum*). The same ditch as parallels the northeast fence west of 55th Street crosses the property. No habitat remains for the orchid. The easternmost portion of this pasture is somewhat wooded with cottonwoods, but generally rather dry, and unsuitable for orchids.

In prior surveys, none of the plant species were seen that are commonly associated with the orchid (*Agalinis tenuifolia, Lobelia syphilitica, Verbena hastata, Asclepias incarnata*). If they had been present, they should have been in bloom or identifiable. In my opinion, the Hogan and Pancost properties are too heavily disturbed by livestock operations for them to be orchid habitat. In general, the quality of the site seems to be declining. The teasel and Scotch thistle were not present in 1994, but had become noticeable in 2003, and the teasel was overwhelming the eastern pasture in 2007, as well as in the current survey. The number of native species present seems to be declining and the number of weedy species seems to be increasing.

This letter should be of assistance in obtaining any permits needed from the US Army Corps of Engineers and the US Fish & Wildlife Service.

Sincerely

Bill Jennings

William F. Jennings

PLANT SPECIES PRESENT
HOGAN AND PANCOST PROPERTIES
BOULDER, COLORADO

Native trees & shrubs

Populus deltoides – plains cottonwood
Salix exigua – coyote willow
Prunus americana – wild plum
Prunus virginiana – chokecherry

Introduced trees & shrubs

Elaeagnus angustifolia – Russian-olive
Salix fragilis – crack willow
Ulmus pumila – Siberian elm

Native forbs

Alisma triviale – water-plantain
Ambrosia psilostachya – ragweed
Apocynum cannabinum - dogbane
Asclepias speciosa – showy milkweed
Erigeron sp. – fleabane; daisy
Glycyrrhiza lepidota – wild licorice
Grindelia squarrosa – gumweed
Maianthemum stellatum (smilacina stellata) – Solomon's-seal
Oenothera villosa – tall evening-primrose
Opuntia macrorhiza – pricklypear cactus
Potentilla norvegica - cinquefoil
Rosa arkansana – wild rose
Sagittaria cuneata – arrowhead
Solidago sp. – goldenrod
Thalictrum dasycarpum - meadowrue
Toxicodendron rydbergii – poison ivy

Introduced forbs

Achillea millefolium – yarrow
Acosta (Centaurea) diffusa – diffuse knapweed
Alyssum sp. – alyssum
Arctium minus – burdock
Asparagus officinalis – cultivated asparagus
Carduus nutans – musk thistle
Chrysanthemum leucanthemum – ox-eye daisy
Cichorium intybus – chicory
Cirsium arvense – Canada thistle

Convolvulus arvensis – bindweed
Conyza canadensis - horseweed
Coronilla varia – crown-vetch
Daucus carota – wild carrot
Dipsacus fullonum (Dipsacus sylvestris) – teasel
Erodium cicutarium – crane's-bill
Hecatonia sceleratа – blister buttercup
Impatiens capensis – jewelweed
Lactuca serriola – prickly-lettuce
Lepidium campestre - peppergrass
Lotus tenuis – lotus
Medicago sativa - alfalfa
Onopordum acanthium – Scotch thistle
Persicaria sp. – smartweed
Plantago major – plantain
Rumex crispus – curly dock
Tanacetum vulgare – tansy
Tragopogon dubius - salsify
Trifolium pratense – red clover
Trifolium repens – white clover
Verbascum thapsus - mullein

Native grasses and grass-like
Juncus arcticus – rush
Juncus interior – rush
Schoenoplectus lacustris (Scirpus lacustris) – tule
Spartina pectinata – prairie cordgrass
Typha latifolia - cattail

Introduced grasses
Bromus inermis – smooth brome
Festuca arundinacea – alta fescue
Phleum pretense – timothy

QUALIFICATIONS OF SURVEYORS

William F. Jennings

Education: B.S., M.S., University of Colorado, Boulder

Rare Plant Survey Experience (Representative): Spiranthes diluvialis, Boulder and Jefferson counties, Colorado, 1989-1992, 1999; Aletes humilis, Larimer County, Colorado, 1989, 1990; Limnorchis zothecina, Mesa, Montrose, and San Miguel counties, Colorado, 1991; Sisyrinchium pallidum, Park County, Colorado, 1990; Physaria bellii, Boulder and Larimer counties, Colorado, 1989; Penstemon harringtonii, Eagle County, 1997; various species, Guanella Pass, Park and Clear Creek counties, 1995-1996; Cottonwood Pass, Gunnison County, 1996; Eustoma grandiflorum, Boulder County, 2000, 2001; Survey of Winter Park ski area (Draba grayana; Botrychium spp.), 2004.

Familiarity with Spiranthes diluvialis: Observation of flowering populations in Jefferson County, most years since 1981. Observation of flowering populations in Boulder County all years since 1985. Also observed flowering and fruiting plants in Daggett County, Utah, 1981, 1989; Uintah County, Utah, 1989 (overwinter rosette, 1990); Wayne County, Utah, 1989; Garfield County, Utah, 1989, 2003. Research cited in USFWS Final Rule Listing Spiranthes diluvialis as a threatened species. Assistance acknowledged by C. J. Sheviak in original description of species (Brittonia 36: 8-14). Observation of sprouting individuals in Boulder County populations, October, 1989, February, 1990, and January to April 1992. Observation of sprouting individuals in Jefferson County populations, March to April, 1992.

Documentation of Familiarity: Spiranthes diluvialis: text and photos in Rare Plants of Colorado, Colorado Native Plant Society, 1989 (first edition); 1996 (second edition); figure 1 of this report

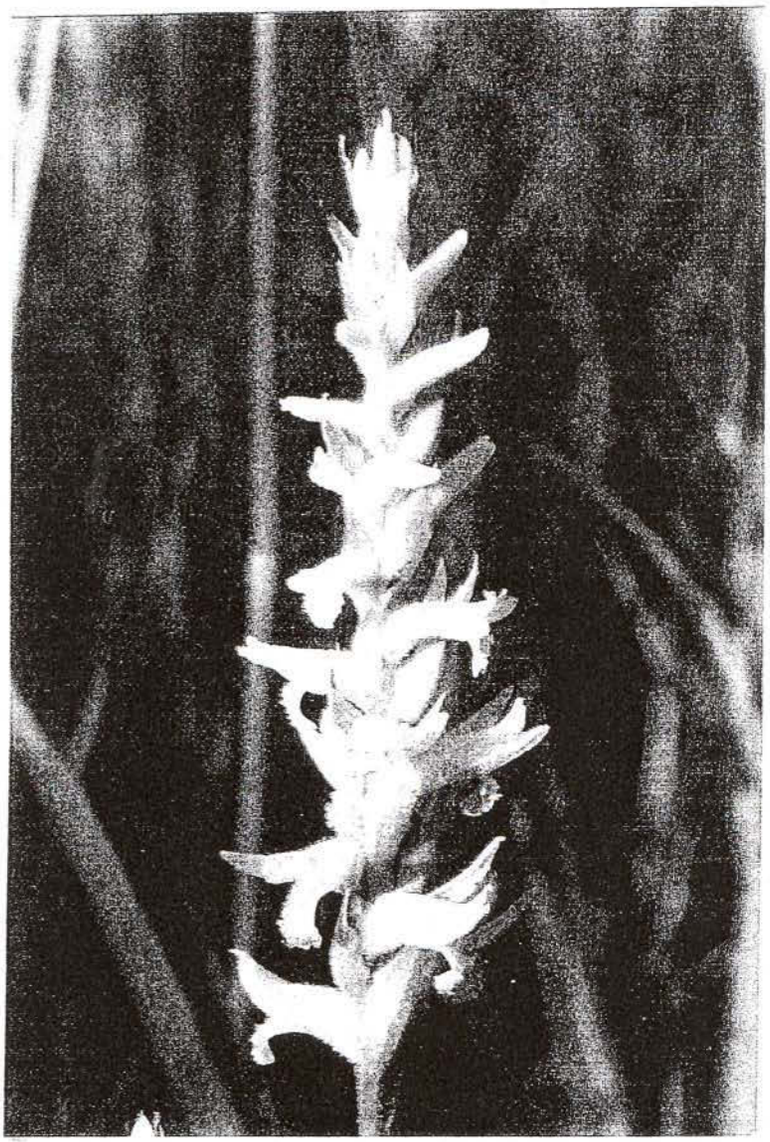

Figure 1

Spiranthes diluvialis (Ute ladies'-tresses orchid) in bloom, photographed July 26, 1994 in Van Vleet Field, Boulder Open Space, adjacent to US 36 in Boulder County. Note that the lowermost flowers are near prime while the uppermost flowers are in tight bud; typical of the plant and contributing to the long blooming season of the orchid.