Union Reservoir
Wetland Delineation and
Special Status Species Survey Update

Recommendations and Mitigation Measures
For the Union Reservoir Trail
Design and Implementation

Prepared for:

City of Longmont

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October 8, 2012

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Introduction

This report summarizes the wetland delineation and special status species surveys that were conducted in June and August of 2012. The purpose of the surveys was to follow up on the general habitat assessments that were conducted in 2011 (Walsh 2011) with more specific resource information. The survey information from 2012 will be applied in the design and implementation of the Union Reservoir Trail (Trail) so that resource impacts can be avoided to the extent possible. This report contains the findings of the following surveys:

1) Wetland delineation and determination of jurisdictional Waters of the U.S.
2) Surveys for special status species: bald eagle, burrowing owl, black-tailed prairie dog, northern leopard frog, and Ute ladies'-tresses orchid.
3) Surveys for raptor nests and waterfowl to update the status of avian activity. This includes any trees and wetlands used by these species within the project area.

Also included in this report are recommended buffer distances from wetlands, habitat areas, and nesting sites, and impact avoidance and mitigation measures specific to trail development.

Wetland Delineation

Overview

Union Reservoir is a 736-acre body of water managed by the City of Longmont (Figure 1). The Union Reservoir site comprises natural habitats including open water, shoreline, wetlands, cottonwood trees, and grassland areas, all of which provide wildlife habitat requirements that are otherwise limited in the general vicinity.

The primary land use surrounding the reservoir is agricultural, with scattered single family homes and farmsteads. Herbaceous vegetation dominates and is primarily cropland and non-native pasture grasses. Native herbaceous plants occur along the fringe of the northern half of the reservoir, but weeds are dominant in a band between the wetland fringe and agricultural lands on the northern and northwestern sides of the reservoir.

Scattered woody vegetation occurs along the reservoir shoreline and ditch banks, and consists primarily of plains cottonwood (*Populus deltoides*) and sandbar willow (*Salix exigua*).

The following areas were evaluated for the existence of wetlands (Figure 2):

- The entire reservoir fringe
- A pond adjacent to WCR 28 on the north side of the reservoir
- An unnamed tributary to the reservoir
- Two depressions on the northwest side of the reservoir
- A ditch segment adjacent to County Line Road, between East 17th Avenue and Jim Hamm Natural Area
- A pond at the convergence of three ditches adjacent to County Line Road
- A ditch segment adjacent to County Line Road, north of East 9th Avenue
- The Spring Gulch #2 Ditch and a lateral wetland south of Weld County Road (WCR) 26
- The Oligarchy Ditch
- The Union Reservoir Inlet Ditch
- The Union Reservoir Ditch

Methods

The wetland delineation was conducted on June 21, 22, 27, and 28, 2012. The delineation followed U.S. Army Corps of Engineers (USAC) methodology (USAC 2010). Dominant vegetation was recorded, representative hydrologic indicators were noted, and representative soil borings were taken in order to identify and document the presence of wetlands. Color photographs were taken to document the context and condition. Wetland boundaries were recorded using a mapping-grade, hand-held Trimble GPS unit. Wetland determination data forms were completed for four representative areas (Areas S-4, A, B, and C on Figures 3a and 3b). Plant taxonomy authority follows Weber and Wittman (2012).

On August 22, 2012 an on-site meeting was held with Mr. Terry McKee of the USAC Denver Regulatory Branch Office. The purposes of the meeting were to receive a preliminary determination of delineated wetlands over which the USAC has jurisdiction and to discuss delineation of the wetland boundary along the northwestern shoreline.

Wetland Delineation Results

The delineated wetland boundaries are shown on Figures 3a and 3b. Summary descriptions of each delineated wetland area are compiled in Table 1. Wetland determination data forms were submitted to USAC with the request for confirmation of jurisdictional determination.

While conducting the wetland delineation, Walsh determined that two potential wetland areas discussed in the Union Reservoir 2011 Natural Resources and Habitat Assessment Update (Walsh 2011) do not contain jurisdictional wetlands. These are two depressions, one on the northwest side of the reservoir (referred to as "Wetland 1" in the 2011 report), and a ditch segment adjacent to County Line Road, between East 17th Avenue and Jim Hamm Natural Area (referred to as "Wetland 2" in the 2011 report). The wetland characteristics of the depressions on the northwest side of the reservoir appear to be a result of the convergence of prior irrigation return flow, reservoir fluctuations, and micro-topography. Both areas are presently dominated by upland weeds and non-native grass: perennial pepperweed (*Lepidium latifolium*), common lambsquarters (*Chenopodium album*), hoary cress (*Cardaria draba*), Canada thistle (*Breea arvensis*) and smooth brome (*Bromopsis inermis*). Wetland vegetation and supporting hydrology are not present and therefore, these areas are not identified as wetlands. These three areas are not included in the wetland summary in Table 1, and were not included in the request for preliminary determination of jurisdictional wetlands.

The ditch segment adjacent to County Line Road, between East 17th Avenue and Jim Hamm Natural Area does not exhibit wetland hydrology or vegetation. On June 27, 2012 the ditch was dry. It is approximately 2- to 3-feet wide and 3- to 4-feet deep, with nearly vertical banks. Vegetation consists of wild lettuce (*Lactuca serriola*), knapweed (*Acosta* spp.*),* Canada thistle, field bindweed (*Convolvulus arvensis)*, kochia (*Bassia sieversiana*), and smooth brome. Weeds were growing in the ditch bottom. On August 17, 2012, there was water flowing in the ditch and vegetation on the ditch banks remained the same as seen in June.

The southern half of the reservoir fringe consists of a fee area where uses include shoreline fishing, an off-leash dog beach, and a boat launch. Much of the shoreline is flat, but there are also steep areas armored with riprap and concrete. The surface is predominantly bare ground, with scattered plains cottonwood, Russian-olive (*Elaeagnus angustifolia*), and green ash (*Fraxinus pennsylvanica*) trees, sandbar willow, and rubber rabbitbrush (*Chrysothamnus nauseosus*) shrubs.

Table 1. Jurisdictional Wetlands Delineated at Union Reservoir. June, 2012

Map Code	Area Name	Dominant Vegetation	Character, Condition, and Observations
S-2	Reservoir fringe/shore East side	Herbaceous: narrow-leaved cattail (*Typha angustifolia*), Emory sedge (*Carex emoryi*), common threesquare (*Schoenoplectus pungens*), foxtail barley (*Critesion jubatum*), and inland saltgrass (*Distichlis spicata*). Woody: Sandbar willow and plains cottonwood.	Wide band of dense emergent wetland vegetation heavily used by birds for breeding and roosting, with scattered patches of sandbar willow and young plains cottonwood. Grebe nests have been observed here.
S-3	Reservoir fringe/shore Northeast side	Herbaceous: broad-leaved cattail (*Typha latifolia*) mixed with softstem bulrush (*Schoenoplectus tabernaemontani)*, hoary cress, perennial pepperweed, and kochia. Woody: none	Band of dense emergent herbaceous wetland vegetation; transitional herbaceous and woody native plants are absent and areas are dominated by weeds.
S-4	Reservoir fringe/shore North side	Herbaceous: broadleaf cattail mixed with bulrush in shallow water. Upland is a mixture of weeds and inland saltgrass. Woody: none	Slightly more topographic diversity at shoreline than in S-3; more patches of inland saltgrass; seasonally-flooded bare ground areas good for shorebirds. Wetland boundary is variable but there is generally upland area between the wetland and WCR 28. Five drainages cross from the north. This is the eastern edge of the sensitive habitat/prime bird area.
S-5	Reservoir northwest cove	Herbaceous: narrowleaf cattail, cattail, bulrush, threesquare, and inland saltgrass. Woody: none	Sensitive habitat/prime bird area. Large contiguous patch of dense emergent wetland vegetation.
S-6	Reservoir fringe/shore West side	Herbaceous: narrowleaf cattail, cattail, bulrush, knapweed, hoary cress, perennial pepperweed, kochia, lambsquarters, and Canada thistle. Woody: sandbar willow, crack willow (*Salix fragilis*), peach-leaved willow (*Salix amygdaloides*), and plains cottonwood.	Band of dense emergent herbaceous wetland vegetation, with sporadic trees and shrub willows. Transitional herbaceous and woody native plants are absent. Very weedy between shoreline and agricultural fields. At the south end there are trash piles and two tamarisk trees.
A	Unnamed tributary to the reservoir	Herbaceous: Emory sedge, water sedge, broadleaf cattail, threesquare, alkali bulrush (*Schoenoplectus maritimus*), creeping spikerush (*Eleocharis palustris*), foxtail barley, Canada thistle, reed canarygrass (*Phalaroides arundinacea*) inland saltgrass. Woody: Russian olive.	Ditch approx. 2-feet wide and 2-feet deep with adjacent, seasonally-inundated area of inland saltgrass.
B	Pond adjacent to WCR 28	Herbaceous: broadleaf cattail, bulrush, Emory sedge, water	Small pond with steep sides, surrounded by agricultural

Map Code	Area Name	Dominant Vegetation	Character, Condition, and Observations
	on the north side of the reservoir	sedge (*Carex aquatilis*), smooth brome. Woody: Russian-olive.	fields and WCR 28.
C	Pond at convergence of three ditches	Herbaceous: broadleaf cattail, bulrush, Canada thistle, smooth brome. Woody: peach-leaved willow, sandbar willow, plains cottonwood.	Small pond with steep slopes and thick stands of young native riparian trees. Northern half has been used as a trash dump.
D-1	Spring Gulch #2 Ditch, North of WCR 26	Herbaceous: broadleaf cattail, bulrush, water sedge, reed canarygrass. Woody: plains cottonwood.	2-3'-wide ditch lined with native sedges and recently-planted cottonwood trees.
D-2	Spring Gulch #2 Ditch, South of WCR 26	Herbaceous: broadleaf cattail, Emory sedge, scouring-rush (*Hippochaete hyemalis*). Woody: None.	Broad, flat, flooded area dominated by cattails.
D-3	Lateral wetland south of WCR 27	Herbaceous: Emory sedge, water sedge, broadleaf cattail, threesquare, alkali bulrush, creeping spikerush, foxtail barley. Woody: Sandbar willow.	Drainage 6' wide at bottom and approximately 40' wide at top; 8-10 feet deep with steep sides. Native emergent wetland vegetation in saturated area at bottom, with patches of sandbar willow.
E	Ditch segment adjacent to County Line Road, north of East 9th Avenue	Herbaceous: Emory sedge, water sedge, reed canarygrass. Woody: sandbar willow, American plum (*Prunus americana*).	Excellent native vegetation; some willow appears to be dying from herbicide overspray. Mink sited here.
F-1	Oligarchy Ditch, west	Herbaceous: Emory's sedge, reed canarygrass, smooth brome. Woody: plains cottonwood, Russian-olive.	Herbaceous wetland vegetation extends 3' beyond top of ditch bank; occasional large cottonwood trees.
F-2	Oligarchy Ditch, central	Herbaceous: bluegrass (*Poa* spp.), Emory sedge Woody: sandbar willow, Siberian elm (*Ulmus pumila*), green ash, plains cottonwood.	Ditch bisecting parking lot and boat launch. Grasses are mowed and trees average 36" diameter. There are dense stands of sandbar willow.
F-3	Oligarchy Ditch, east	Herbaceous: Emory sedge, reed canarygrass, smooth brome. Woody: sandbar willow, American plum, Russian-olive, and plains cottonwood.	Herbaceous wetland vegetation extends to top of ditch bank and for approximately 4-10' beyond.
G	Union Reservoir Inlet Ditch	Herbaceous: Emory sedge, reed canarygrass, smooth brome.	Ditch banks are densely covered with sedge and reed canarygrass; patchy cottonwood and willow trees.

Map Code	Area Name	Dominant Vegetation	Character, Condition, and Observations
		Woody: plains cottonwood, peach-leaved willow, crack willow.	
H	Union Reservoir Ditch	Herbaceous: broadleaf cattail, smooth brome. Woody: plains cottonwood, peach-leaved willow, crack willow, Siberian elm, boxelder (*Negundo aceroides*), golden currant (*Ribes aureum*), and American plum.	Large drainage approximately 20 feet deep; 20-to30-feet bottom width with steep banks. Dense shrub layer and tree canopy. Trickle flow.

Jurisdictional Determination

On August 22, 2012, Mr. McKee of the USAC visited the site and determined that all of the wetland areas delineated within the environmental survey boundary are jurisdictional waters of the U.S., due to their surface connection to Saint Vrain Creek, which is a Water of the U.S. Waters of the U.S. include all navigable waters and their tributaries, all interstate waters and their tributaries, all wetlands adjacent to the these waters, and all impoundments of these waters.

Under Section 404 of the Clean Water Act administered by USAC, a permit is required for discharge of dredged or fill material into wetlands and other waters of the U.S. Any trail-related disturbance of delineated wetlands would require USAC notification, and disturbance between 0.1- and 0.25-acre would require a nationwide permit and mitigation.

Special Status Species, Raptor, and Migratory Bird Surveys

Overview

Union Reservoir contains potential habitat for four wildlife species designated by Colorado Parks and Wildlife (now CPW, formerly the CDOW, the Colorado Division of Wildlife) as State Endangered, Threatened and Species of Special Concern and one plant species, listed by the Endangered Species Act (ESA) as Threatened. These species are listed in Table 2.

Table 2. Potential State and Federal Special Status Species, 2012

Common Name	Scientific Name	Listing Status*
bald eagle	*Haliaeetus leucocephalus*	SC
burrowing owl	*Athene cunicularia*	ST
black-tailed prairie dog	*Cynomys ludovicianus*	SC
northern leopard frog	*Rana pipiens*	SC
Ute ladies'-tresses	*Spiranthes diluvialis*	Threatened (ESA)

On August 9, 2007, the bald eagle was removed (delisted) from the ESA, however it continues to be protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). It was removed from the Colorado State Endangered List in 2009 (CDOW 2010) but it continues to be a State of Colorado Species of Special Concern (a non-statutory status).

The burrowing owl is currently a State Threatened species due to the loss of preferred habitat, black-tailed prairie dog colonies. A State Threatened species is any species or subspecies of native wildlife which is not in immediate jeopardy of extinction but is vulnerable because it exists in such small numbers, is so extremely restricted throughout all or a significant portion of its range in Colorado, or is experiencing such low recruitment or survival, that it may become

endangered (CDNR 1999). The burrowing owl also receives Federal protection under the MBTA.

The black-tailed prairie dog is a State Species of Special Concern due to habitat loss, disease, poisoning and recreational shooting.

The northern leopard frog is State Species of Special Concern due to habitat loss, introduced species, and climatic conditions (Hammerson 1999).

Ute ladies' tresses orchid on the Federal list of Threatened species due to loss of habitat and competition from exotic weeds.

In Colorado, a State Species of Special Concern defined as any species or subspecies of native wildlife which (1) has been removed from the State Threatened or Endangered list within the last five years, (2) is a Federal Candidate or is a Federal Proposed for listing, and is not already state listed, (3) the best available data indicate a 5-year or more downward trend in numbers or distribution and this decline may lead to a threatened or endangered status, or (4) is otherwise determined to be vulnerable in Colorado (CDNR 1999).

Raptors and waterfowl bird species not designated Special Status Species, but protected by the MBTA, may also have potential habitat at Union Reservoir.

Methods

Walsh ecologists conducted the following site visits to Union Reservoir in the spring and summer of 2012:

- an assessment of two black-tailed prairie dog colonies, and a burrowing owl call survey including south and east of the Reservoir on June 6, 21, and 27;
- a qualitative tour and surveys of Union Reservoir's perimeter and the project area for waterfowl habitats and nesting raptors via boat, on foot, and truck on June 6, 21, and 27; and
- northern leopard frog surveys after dusk on June 6 and 21.
- The Ute ladies'-tresses orchid (*Spiranthes diluvialis*) survey was conducted on August 17, 2012, following the U.S. Fish and Wildlife Service protocol (USFS 1992).

During all site visits, the results of the previous assessment (Walsh 2011) were compared to current conditions. Ecological features of note were recorded, including use by raptors and other birds, bird nests, and potential or occupied habitat for special status species. In addition, Walsh ecologists procured a current Google Earth image of the area (Google Earth, 2011) to compare against aerial images integrated into the 2006 ERO assessment (ERO 2006 a & b).

CPW designates Union Reservoir as various winter habitats for bald eagle; therefore, Walsh reviewed any communal roosting observed by park rangers and any citizen observations to the Cornell Laboratory of Ornithology (CLO 2012).

Three surveys were conducted for the state threatened burrowing owl at two active black-tailed prairie dog towns (Walsh 2011) on June 6, 21, and 27. Methods followed CPW protocol (CDOW 2008b) which include:

- Conducting surveys between March 15 and October 31;
- Conducting surveys during early evening hours (two hours before sunset to one-half hour past sunset);
- Conducting surveys approximately three weeks apart;

- Conducting 10-minute broadcast call surveys using a portable wildlife caller and a digital file from CPW; and
- Locating survey points to obtain unobstructed views of the entire prairie dog town.

Following protocol developed by the U.S. Geological Survey (Droege 2010), call surveys for northern leopard frog were conducted on June 6 and 21 along a series of predetermined stops in appropriate habitats, 30 to 60 minutes after sunset during three site visits. After a minute of waiting to reduce disturbance, a five minute listening period began. The observers recorded any presence with a calling index value to determine abundance.

Walsh conducted a nesting raptor and waterfowl survey to update the status of avian activity in 2012. This included any trees and wetlands used by these species within the project area. Three surveys were conducted by boat, on foot, and by truck in June to assess appropriate habitats. Areas of nesting and congregation were noted. An informal meeting was convened with nearby residents to collect any additional observations of birds at the reservoir.

Areas surveyed for Ute ladies'-tresses orchid included those identified in the Union Reservoir 2011 Natural Resources and Habitat Assessment Update (Walsh 2011) and four additional areas that were identified in June of 2012 as containing potential habitat.

Weather conditions for all field surveys were ideal with low winds, above average temperatures, and good visibility.

Results and Discussion

A review of publically submitted citizen records during the winter of 2011/2012, and discussions with park rangers, did not reveal concentrations of bald eagles at Union Reservoir. High counts of five birds were documented twice during the winter. This is below the threshold of 15 birds required by CPW to be considered as a communal roost. Bald eagle roosts are unlikely at the Union Reservoir considering the heavy recreational use and the lack of large trees.

No burrowing owls were detected during the three surveys conducted at the two existing prairie dog colonies. This is an expected result given the topography and small size of the colonies are generally not favorable for burrowing owls.

Call surveys for northern leopard frog did not detect any individuals. Three commonly occurring species were detected during the survey: Woodhouse's toad, western chorus frog, and bullfrog. Active stocking of predatory fish (large-mouth bass, striper, and walleye) and the introduced bullfrog severely limit the ability of northern leopard frog to inhabit Union Reservoir.

No Ute ladies'-tresses orchids were observed at any of the six sites surveyed.

Two raptor nests were identified within the survey area in 2012. An osprey nest continues to be active on a human-made platform on the eastern edge of the reservoir (N40.181630°, W105.028418°). Another raptor nest, with characteristics of a re-tailed hawk nest, was observed in a line of cottonwood trees east of the reservoir (N40.182523°, W105.021872°). The nest did not appear to be active during the 2012 nesting season.

As during the single survey conducted in 2011, American white pelicans, gulls, and shorebirds were noted congregating along the northwest reservoir shoreline, a sandy edge free of vegetation, during the three surveys in 2012. Additional documentation by the public (CLO 2012) indicates that this shoreline is a commonly used area for roosting.

A colony of western and Clark's grebes has been observed using flooded emergent vegetation for their floating nests along especially in the emergent wetlands along the east shore (Jim

Welsch, pers. comm.) These wetland-dependent species have not been observed to nest on other city-controlled properties (CLO 2012).

Recommended Protective Measures for Union Reservoir Trail Design, Construction, and Management

Impact Avoidance

Walsh reviewed several documents including the Natural Resources and Habitat Assessment Update, Review of Master Plan Actions and Recommendations (Walsh 2011), considerations for nesting grebes (Ivey 2004), and the Wildlife Management Plan (Longmont 2005) to determine recommended buffer distances from wetlands, habitat areas, and nesting sites. Included in this analysis are reviews of guidance from CPW, USFWS, and relevant laws such as the ESA and the MBTA. The resulting summary of recommended trail buffer distances, seasonal closure periods, and best management practices related to the Trail is provided below and shown on Figure 4.

Recommended Buffer Distances

The following are a compilation of guidance on protective buffers for wetland resources and wildlife habitat:

- Northeast reservoir perimeter (area S-2 on Figure 3a): Protect the active western/Clark's grebe wetland nesting area with a buffer of 150 feet from on-the-ground disturbance (Ivey 2004). The recommended buffer for grebe nests screened from foot traffic by vegetation is 150 feet. In areas where the nests are not screened by vegetation, a 300-foot buffer is recommended. Portions of the nesting area are screened from view from the shore and it is recommended that additional native willows and trees (sandbar willow, plains cottonwood, and peach-leaved willow) be planted to create a continuous vegetative buffer. Consider adding fencing and signage to protect the area from trail users and dogs.

- West reservoir perimeter (area S-6 on Figure 3a): The trail should be set back from the edge of the wetlands 20 to 50 feet, as practicable.

- Northwest cove area (area S-5 on Figure 3a): If it is necessary to place the trail in this area, align it adjacent to the road, and add fencing and signage to protect the area from trail users and dogs. In portions west and south of WCR 28, keep the trail 50 to 100 feet from the wetland edge, and add protective fencing.

- For the active osprey nest, Colorado Parks and Wildlife (CPW) recommends no surface occupancy (beyond that which historically occurred in the area) within 0.25 mile radius of active nests and a seasonal restriction to human encroachment within 0.25 mile radius of active nests from April 1 through August 31 (CDOW 2008a). During 2012, Walsh noted an alarmed response of the osprey to surveys conducted near their nest. Although urban-adapted ospreys generally have a high degree of tolerance in relation to human encroachment near their nest (Poole et al. 2002), this rural pair could abandon their nest if construction/trail activity is too close. To ensure that the nest will not be

disturbed by future Trail activities, an option would be for CPW to move the nest as soon as possible prior to the 2013 nesting season.

Seasonal Closures and Adherence to Migratory Bird Treaty Act

- All native birds are afforded protection under the MBTA.

- In order to remain compliant with the MBTA, nest sweeps to prevent destruction or disturbance of nests should occur prior to trail construction. Avoid removal or destruction of vegetation in any native habitat—including riparian woodlands, riparian shrublands, native grasslands, and wetlands—during the typical small-bird nesting season (April 1 through July 31).

- For trail segments on the east side of the reservoir: for any construction activities occurring between mid-February and October 31, conduct pre-construction nest sweeps for raptors. If an active nest is present, delay the portion of the project within 0.25-mile of the raptor nest until after the nesting season.

- To the extent practicable, avoid construction or major maintenance projects in areas of large trees (>12 inches in diameter) along streams, ditches, or lake margins during the raptor nesting season (March 1 through July 31). If this season cannot be avoided, conduct a raptor nesting survey within 0.25-mile of the site prior to initiation, and avoid construction around active nests if any are found.

- There was no burrowing owl activity noted in the two prairie dog colonies in 2011 and 2012. However, additional surveys for the owls are recommended if trail construction occurs between mid-March and October 31. Any development occurring in prairie dog towns after October 31 and before March 15 would avoid any need for additional clearances. (Note: If burrowing owls occupy the area in the future, CPW recommends a 150-foot buffer from occupied burrows.)

- Any hazard trees considered for removal must be inspected for nesting raptors and songbirds. Nesting must be allowed to complete under protections of the MBTA to prevent any unintended destruction of active bird nests.

Additional Recommended Best Management Practices

- Consider developing a site-specific management plan for the prairie dog colonies using the categories laid out on pages 40 through 43 of Longmont's Wildlife Management Plan.
- Develop Best Management Practices (BMPs) for weed control including an annual monitoring schedule during and after construction of the Trail.

Figure 1. Union Reservoir Location

Figure 2. Wetland Areas Delineated at Union Reservoir

Figure 3a. Jurisdictional Wetlands and Waters of the U.S., North Side of Union Reservoir

Figure 3b. Jurisdictional Wetlands and Waters of the U.S., South Side of Union Reservoir

Figure 4. Recommended Protective Measures for Trail Design and Construction

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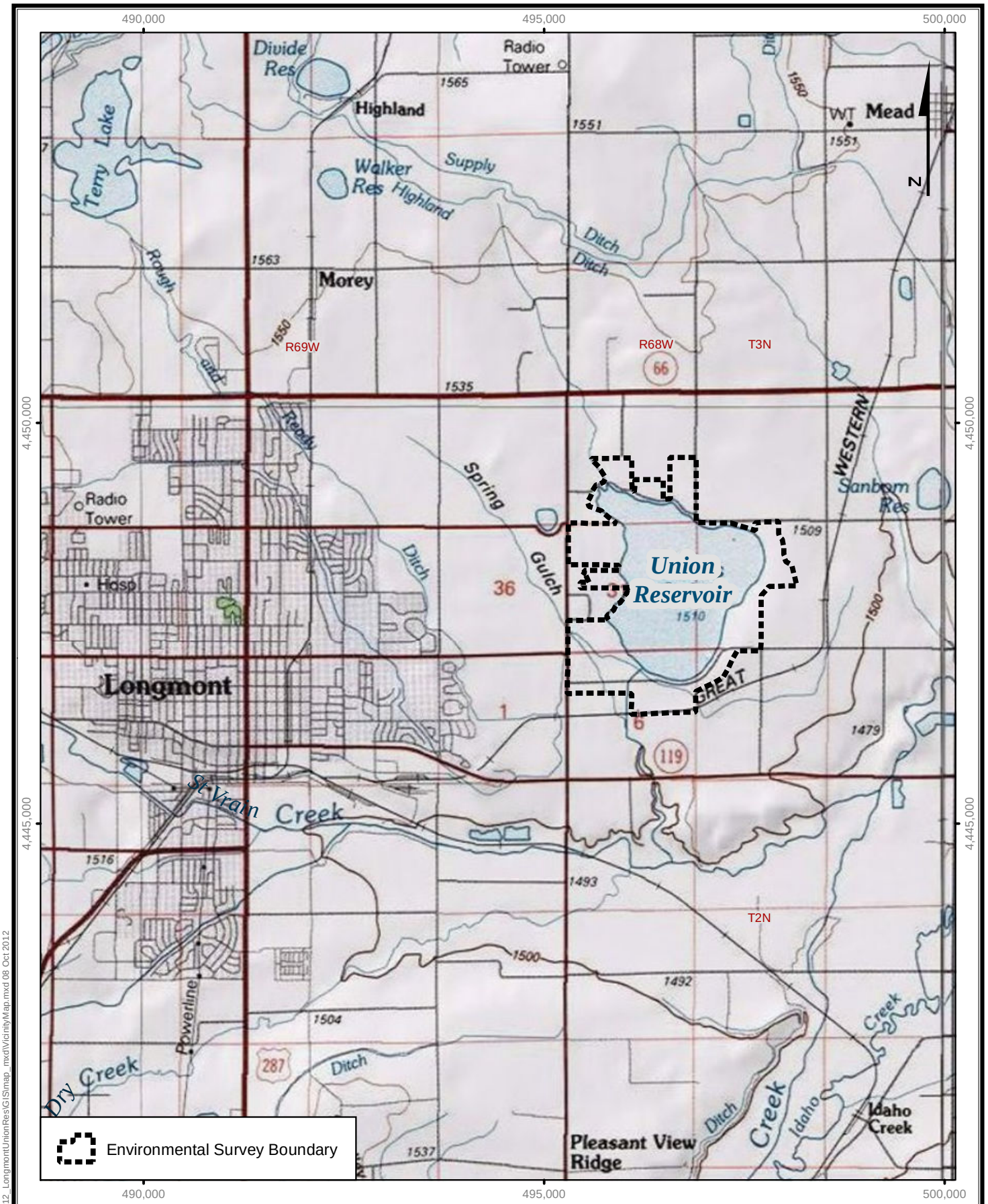

Figure 1. Vicinity Map
Union Reservoir Trail
Design Development
Weld County, Colorado 2012

Walsh
an ecology and environment company

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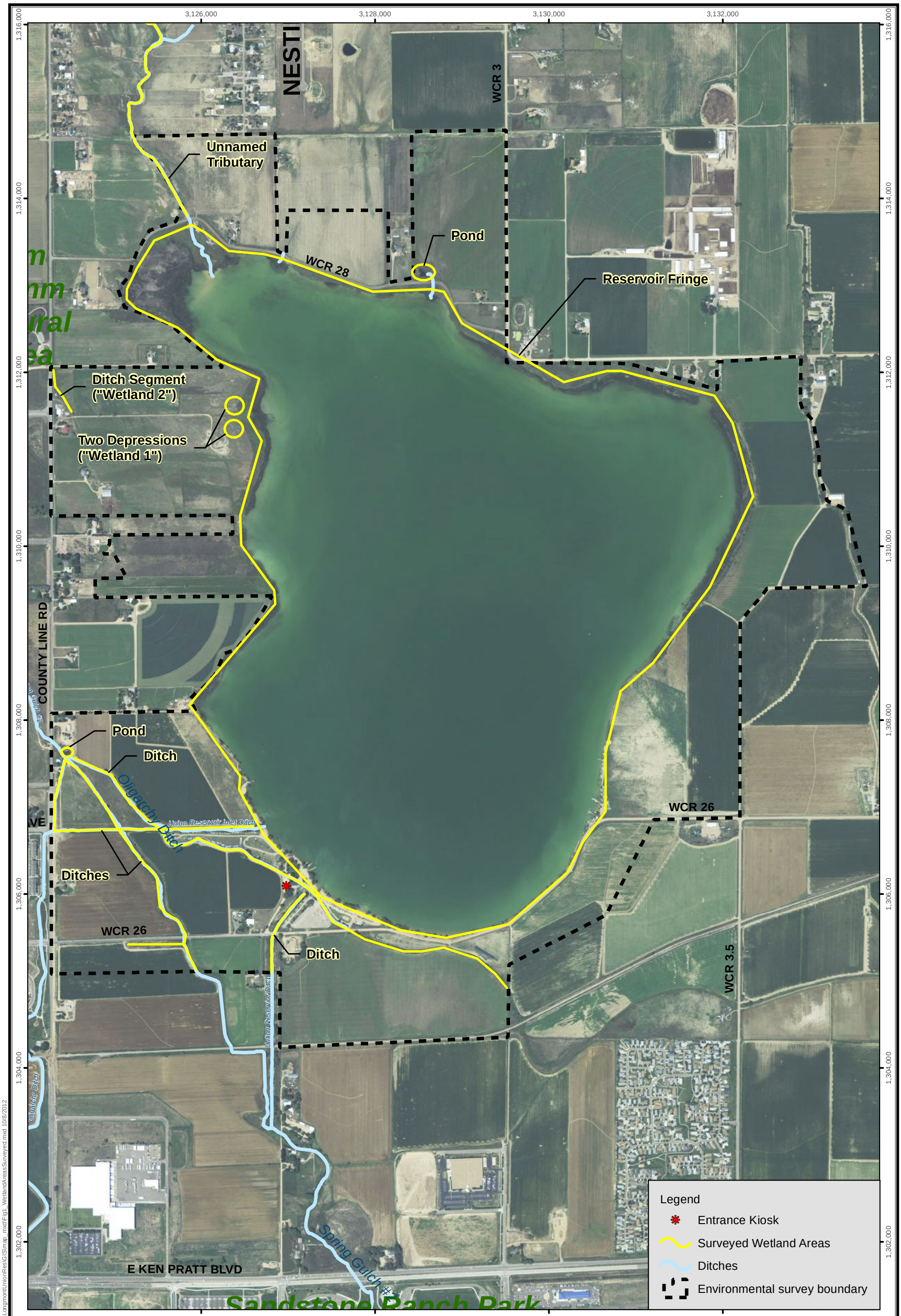

NAD 1983 StatePlane Colorado North FIPS 0501 Feet
2011 NAIP Aerial Base

Walsh
Environmental Scientists and Engineers, LLC

1:12,000

0 1,000
Feet

Figure 2.
Wetland Areas Surveyed
Union Reservior Trail Design Development
Weld County, Colorado 2012

U:\Projects\WA000843_0012_LongmontUnionResGIS\map_mxd\Fig1_WetlandAreasSurveyed.mxd 10/8/2012

3,123,998 3,125,638 3,127,278 3,128,919 3,130,559 3,132,200 3,133,840

1,313,934 1,312,293 1,310,653 1,309,012

A B S-5 S-4 S-3 S-6 S-2

N

Union Res HWL

NAD 1983 StatePlane Colorado North FIPS 0501 Feet
2011 NAIP Aerial Base

Walsh
an ecology and environment company

1 inch = 700 feet

0 700
Feet

- Entrance Kiosk
- Environmental Survey Boundary
- wetlands

Figure 3a. Delineated Wetlands and Jurisdictional Waters of the U.S.
Union Reservior Trail
Design Development
Weld County, Colorado 2012

U:\Projects\WA000843 0012 LongmontUnionResIGIS\map mxd\Wetlands 10.mxd 08 Oct 2012

3,123,998 3,125,638 3,127,278 3,128,919 3,130,559 3,132,200 3,133,840

1,309,012 1,307,372 1,305,732 1,304,091

S-6 S-2

COUNTY LINE ROAD

C Oligarchy Ditch F-1 D-1 E G Union Reservoir Inlet Ditch G G Spring Gulch #2 F-1 D-1 F-2 H Union Reservoir Ditch WCR 26 D-3 D-2 H F-3

Union Res HWL

N

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NAD 1983 StatePlane Colorado North FIPS 0501 Feet
2011 NAIP Aerial Base

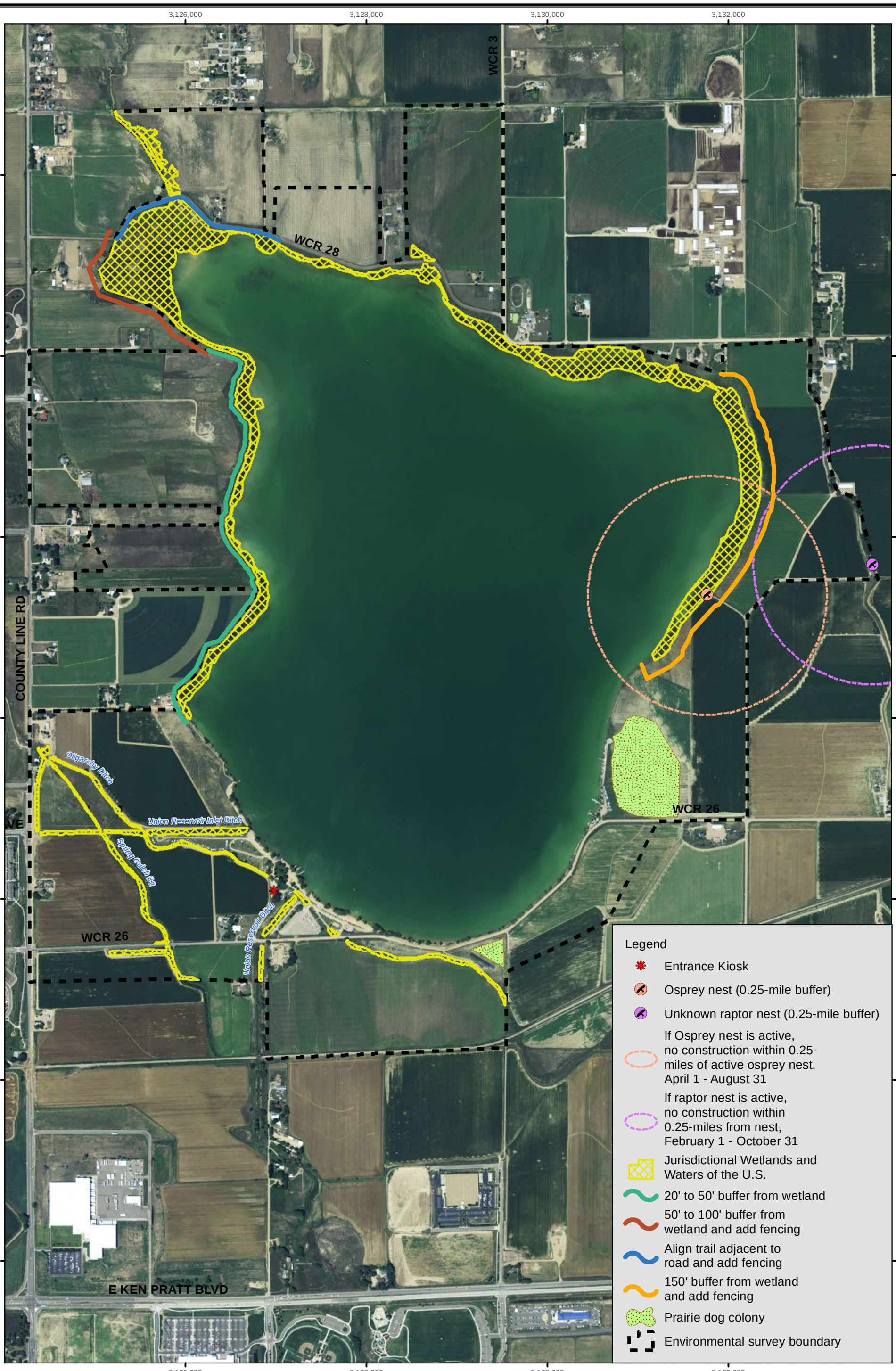
Walsh
an ecology and environment company

1 inch = 700 feet

0 700
Feet

- Entrance Kiosk
- Environmental Survey Boundary
- wetlands

Figure 3b. Delineated Wetlands and Jurisdictional Waters of the U.S.
Union Reservior Trail
Design Development
Weld County, Colorado 2012



NAD 1983 StatePlane Colorado North FIPS 0501 Feet
2011 NAIP Aerial Base

Walsh
Environmental Scientists and Engineers, LLC

1:12,000

0 1,000
Feet

Figure 4.
Recommended Protective Measures
Union Reservior Trail Design Development
Weld County, Colorado 2012

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