WETLAND DELINEATION REPORT FOR WETLANDS AND WATERS WITHIN THE HIDDEN VALLEY RANCH STUDY AREA

Pagosa Springs, Colorado

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December, 2012

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Introduction

In 2012 a wetland delineation and assessment was conducted at the Hidden Valley Ranch, by Research Services LLC. The delineation was conducted by the request of Pagosa Land Company, Pagosa Springs Colorado and was prepared by Christopher Peltz (Ecologist/Hydrologist), following protocols outlined in the U.S. Army Corps of Engineers Wetland Delineation Manual (USACE, 1987) with regionally specific considerations as outlined in the USACE Regional supplement: Western Mountains, Valleys, and Coast Region (Version 2.0) (USACE, 2010). The project's purpose was to evaluate and quantify the extent of wetlands and deepwater habitats created through the construction of a series of small reservoirs on the Hidden Valley project area.

On two occasions field surveys were conducted at the Hidden Valley site (July and October, 2012). During both surveys, vegetation surveys and assessments of physical conditions related to persistent wetland hydrology and hydric soil conditions were completed. The two assessments were timed to coincide with greatest floristic expression (July) and to follow the cessation of the typical summer "monsoon" season (October), so as to exclude areas with only seasonally elevated water tables.

The wetlands occurring at the Hidden Valley ranch are the result of seven impoundments constructed in Hidden Valley Creek. These impoundments range in height from <10 ft. to >60 ft. and were designed to create backwater habitats and the conditions for wetland vegetation to colonize and persist. These backwater habitats and adjacent wetlands cover an area that extends for ~1.7 miles from Sonlight road (107^{o} 2'49.2^{0} W, 37^{0} 20'29^{0} N), to the impoundment at the southern end of the Hidden Valley Ranch property (107^{0} '37.5^{0} W, 37^{0} 19'1.9^{0} N).

The total acres of wetlands surveyed at the Hidden Valley Ranch (**Table 1**) were calculated at 77.2 acres, with ~50 of those acres classified as Lacustrine, ~26 acres as Palustrine, and ~2 acres classified as Riverine.

Table 1. Total acres of wetland habitat by system (Cowardin, 1979)

Wetland System	Total Acres
Lacustrine	49.5
Palustrine	25.5
Riverine	2.2
Grand Total	77.2

The following report presents the data from the field assessments, air photo analysis, and a Geographic Information System (GIS) data compilation and analysis. Detailed maps of the project area are located in Appendix A and include site level delineation data for each of the seven Lacustrine and Palustrine areas as well as the three Riverine areas. Site photos are provided in Appendix B and include illustrative examples of the various wetland habitats found on the property. Air photo comparisons from 1995 and 2012 are found in Appendix C and illustrate some of the conditions found prior to the construction of the impoundments. The field data sheets are provided in Appendix D and follow conventions outlined in the USACE -Western Mountains, Valleys, and Coast – Version 2.0 data sheet examples. Appendix E includes soil maps and previous wetland determinations as provided by the Natural Resource Conservation Service and Fish and Wildlife Service. Appendix F is the Wetlands and Deepwater Habitats Classification chart developed by the FWS and based on Cowardin and others 1979. Additionally, two spreadsheets are provided (WetlandHabitats_Final.xls, and WetlandPoints_Final.xls) which detail individual coordinate positions (<1 meter) of surveyed wetland perimeters as well as areas, centroids, and perimeters for all delineated habitats. A GIS dataset was developed which includes all field data and any other supporting geographic data, and is included with the submission documents.

One caveat of the delineation pertains to the excavation of soil pits. Due to the large area of the wetland areas and the steep topographic and floristic gradients found at the edge of observed wetland areas, soil

pits were not dug. However, at locations where hydric soils were observed from the surface, soil conditions were noted and recorded as part of the GIS survey.

Project Area

The project area is located approximately 6 miles north of Pagosa Springs, Archuleta County, Colorado, along Hidden Valley Creek from its intersection with Sonlight Road to ~1.7 miles south of the road.

The centroid of the site is located at:
107°2’36.803 West and 37°19’39.272 North

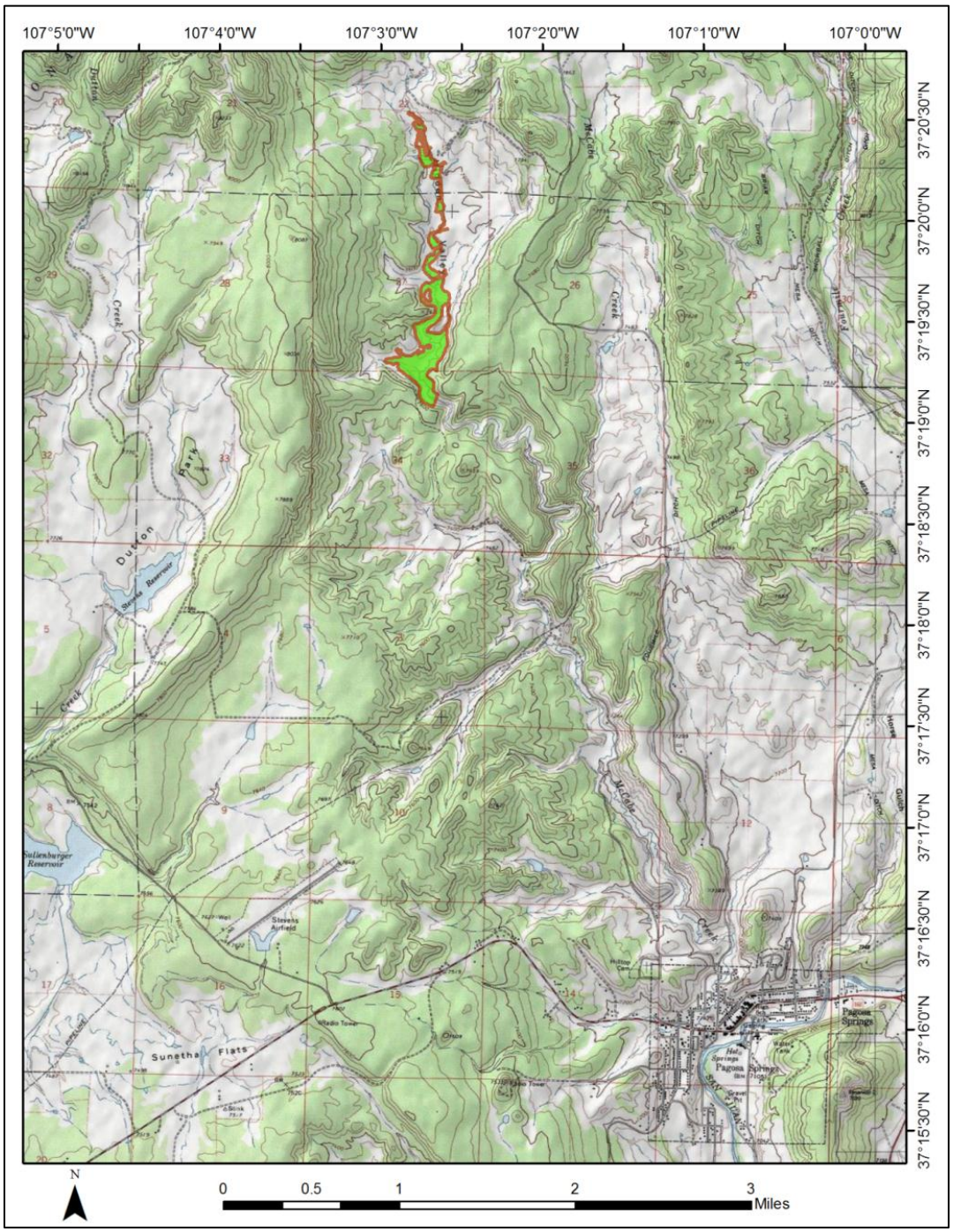

Figure 1. Location map of the Hidden Valley project area. The project area is located ~6 miles north of Pagosa Springs, in Archuleta County, Colorado, 81147.

Setting and Characteristics

The Hidden Valley Ranch is located in Colorado on the southern edge of the San Juan Mountains approximately six miles north of Pagosa Springs. The Project area is located in the center of the ranch along Hidden Valley Creek. The creek is a tributary to McCabe Creek and the San Juan River near the eastern side of Pagosa Springs (**Figure 2**). Hidden Valley Creek is a perennial stream rising near McCabe Peak, with an upstream watershed area (from the lower dam) of ~6.3 square miles and has a stream length of ~12.3 miles from its source to its confluence with the San Juan River. The area is characterized by the both the Volcanic and Sedimentary Mid-Elevation Forests ecoregion, which occurs at 7000 to 9000 feet and are typical of the western and southern portions of the Southern Rockies with Ponderosa pine, Douglas-fir, Gamble oak and Aspen dominating forested areas, woody shrubs include willows (Salix), cinquefoil (Potentilla), with herbaceous vegetation dominated by sedges (Carex), rushes (Juncus) and a variety of grasses (Poacea) and other low herbaceous species, especially buttercup (Ranunculus).

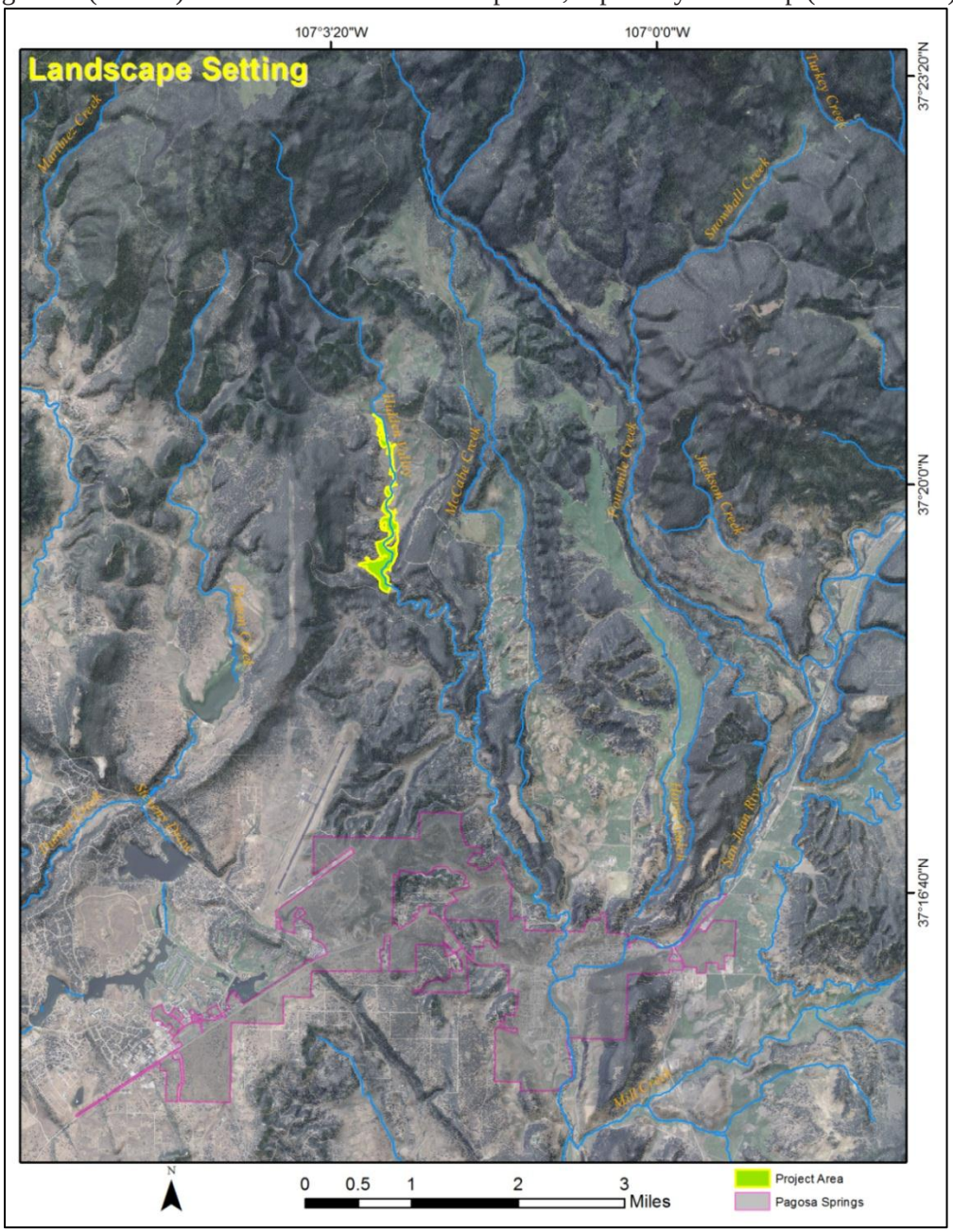

Figure 2. Landscape setting of the Hidden Valley Ranch, with project area indicated in green and local streams indicated in blue.

Climate

The project site is located at an elevation of ~7,500 feet and is near the intersection of two distinct climatic zones. The site resides in part both in the San Juan Mountains region with climatic conditions typical of the Southern Rocky Mountain physiographic region (**Table 2**) characterized by average annual average temperatures in the 40^0s, with summer high temperatures in the range of $70^0 – 80^0$ (F) and winter lows ranging from 0 – 10 degrees (F). Average annual precipitation is 22 inches, with the 2012 precipitation totals through October slightly higher than long term records (**Figure 3**). Though the Southern Rocky Mountain climatic conditions may dominate, the region resides on the edge of the warm summer inter-montane zone characterized by higher average temperatures, with summer highs in the 80s and winter lows in the 10-15 degree range. This region is also characterized by large summer convective storms, the "North American Monsoon," which often contributes the largest percentage of total annual precipitation and is generally strongest from August to the end of September.

Table 2. Historic climate conditions in Pagosa Springs (WRCC – 1906 – 1998) – http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?co6258 (green cells indicate months when field sampling was conducted).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Maximum Temperature (F) Historic	37.4	42.0	48.5	58.6	67.9	78.1	82.7	80.0	73.5	63.1	49.0	39.5	60.0
2012 Average Temp (F)	26	26	38	46	54	67	66	65	59	46	40		
Average Minimum Temperature (F) Historic	1.4	7.0	15.6	23.7	30.1	36.1	45.0	44.4	36.4	26.3	15.4	4.9	23.9
Precipitation (in.) Historic	2.09	1.76	1.94	1.34	1.26	0.89	2.01	2.70	1.98	2.27	1.56	1.85	21.66
2012 Precipitation totals (in.) from Upper San Juan SNOTEL Site (10,200 ft.)	3.5	6.6	1.4	3	1	0.4	4.1	2.2	1.2	0.2			

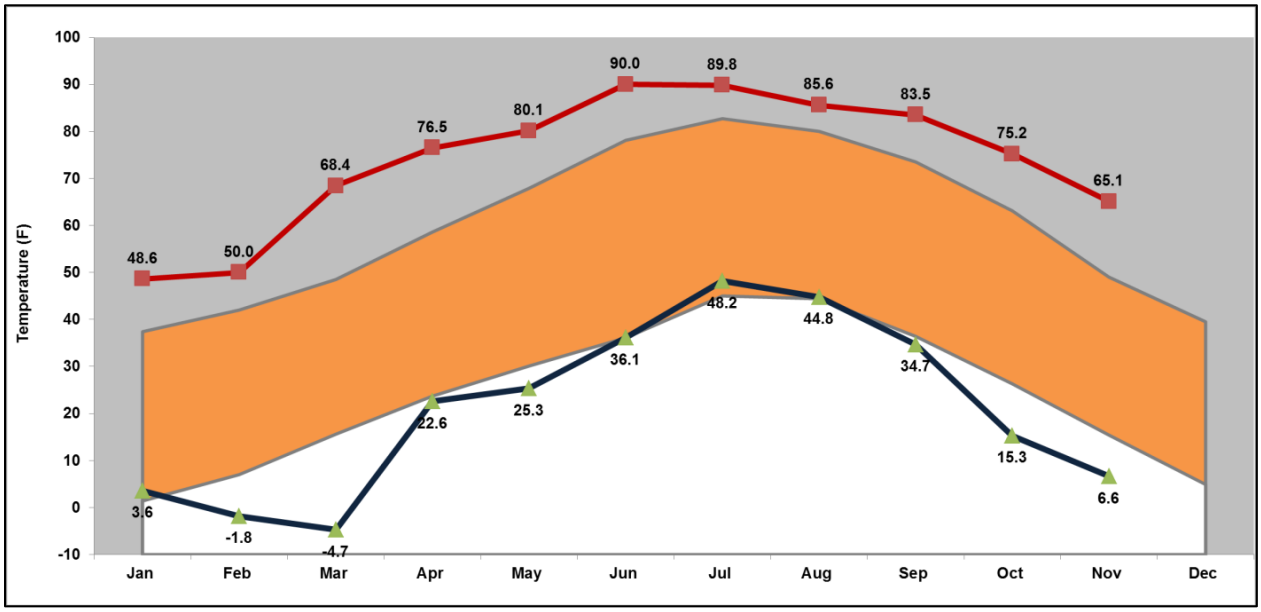

Figure 3. Average typical monthly temperature variation (tan) with 2012 maximum (red) and minimum (blue) temperatures. 2012 was warmer than the period of record with average high and low temperatures exceeding the period of record range for June, July and August, and high temperatures being exceeded for every month.

Soils

The Natural Resource Conservation Service (NRCS) has published a soils map for the lower 2/3^{rds} of the project area (**Figure 4**). The soil survey area is characterized primarily by Herm clay loam, Carracas clay loam and Gold Bug loam. These soils are generally well drained and typically include a well-developed organic layer. Though the NRCS survey extends to cover only the lower portion of the study area, it can be reasonably assumed that the soil series would be similar in the undefined area and would likely follow the local topography.

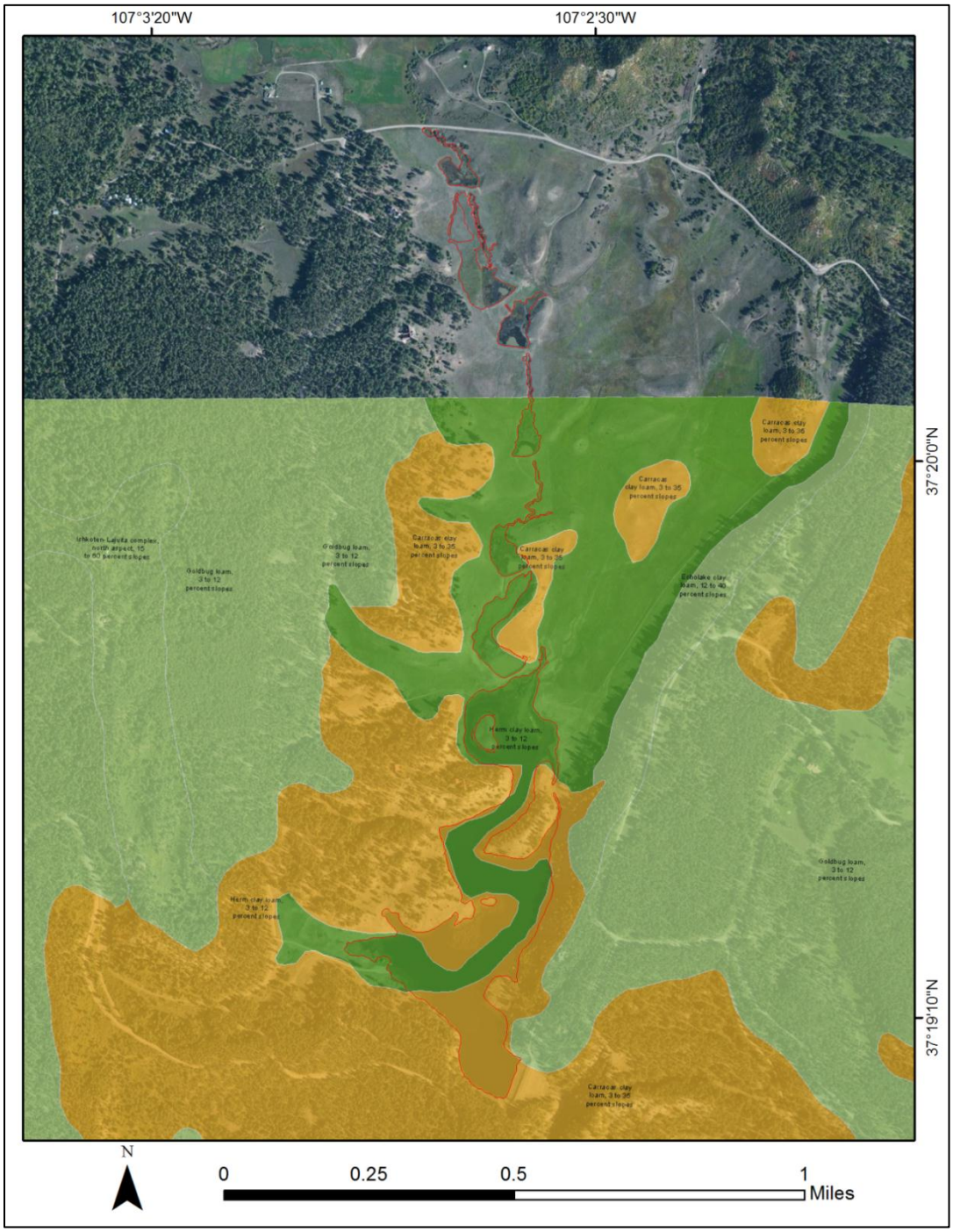

Figure 4. Hidden Valley Ranch soil classification as provided by the NRCS Soil Conservation Service, Herm clay loam, 3 to 12 percent slopes (Dark Green), Carracas clay loam, 3 to 35 percent slopes (Tan), and Goldbug loam, 3 to 12 percent slopes (Light Green)– data can be found at http://websoilsurvey.nrcs.usda.gov/.

Regulatory Basis

The USACE has regulatory authority over the discharge of dredged or fill material into waters of the U.S. under Section 404 of the Clean Water Act. The term "waters of the U.S." includes (1) all waters that are or may be used in interstate or foreign commerce (including sightseeing or hunting), including all waters subject to the ebb and flow of the tide; (2) wetlands; (3) all waters such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce; (4) all impoundments of water mentioned above; (5) all tributaries of waters mentioned above; (6) the territorial seas; and (7) all wetlands adjacent to the waters mentioned above. Under this definition, and in the absence of wetlands, the limits of USACE jurisdiction in non-tidal waters extend to the ordinary high water mark (OHWM). The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." Jurisdiction typically extends upstream to the point where the OHWM is no longer perceptible. Federal jurisdiction is dependent upon a demonstrated nexus between the subject water feature and navigable waters or interstate commerce.

Based on the above mentioned jurisdiction, the USACE and EPA define wetlands as "Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions." In order to be considered a jurisdictional wetland under Section 404, an area must possess three wetland characteristics: hydrophytic vegetation, hydric soils, and wetland hydrology. Each characteristic has a specific set of mandatory wetland criteria that must be satisfied in order for that particular wetland characteristic to be met. Several parameters may be analyzed to determine whether the criteria are satisfied. Thus, for jurisdictional purposes, the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) jointly define wetlands as follows (From USACE, 1987):

"*Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions*."

Wetlands have the following general diagnostic environmental characteristics:

(1) *Vegetation.* The prevalent vegetation consists of macrophytes[1] that are typically adapted to areas having hydrologic and soil conditions. Hydrophytic species, due to morphological, physiological, and/or reproductive adaptation(s), have the ability to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions.

(2) *Soil.* Soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions.

(1) *Hydrology*. The area is inundated either permanently or periodically at mean water depths <6.6 ft, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation

USACE applies the above three characteristics of wetlands when making wetland determinations. However, in certain situations, one or more indicators each of wetland vegetation, hydric soil, and wetland hydrology may not be readily identifiable. Recent human activities or natural events can create "atypical situations" in which positive indicators of hydrophytic vegetation, hydric soils, or wetland hydrology may or may not be found. In these circumstances additional investigations may be needed to determine the presence or absence of wetland indicators. In other situations, normal seasonal or annual variation in environmental conditions can lead to the development of "problem areas" in which, as with atypical situations, one or more indicators each of wetland vegetation, hydric soil, and wetland hydrology may not be readily identifiable. Additional investigation may also be needed in these situations to determine the presence or absence of wetland indicators.

[1] Macrophyte - An aquatic plant that grows in or near water and is either emergent, submergent, or floating. In lakes macrophytes provide cover for fish and substrate for aquatic invertebrates, produce oxygen, and act as food for some fish and wildlife. http://en.wikipedia.org/wiki/Macrophyte

Methods

Survey methods generally followed the USACE Wetland Delineation Manual (1987) with the addition of reference materials outlined in the USACE Regional Supplement: Western Mountains, Valleys, and Coast Region (USACE, 2008). The delineation manual and supplement outline the major characteristics of wetland habitats in the Mountain West and detail the major characteristics of wetlands as they pertain to regulatory delineation (National Research Council, 1995), and are as follows:

- **Presence of wetland or Hydrophytic[2] vegetation:** Plant life growing in water, soil, or on a substrate that is periodically deficient in oxygen due to excess water, presence of water, and hydric soils (hydrophytic vegetation and hydric soil generally reflect a site's medium- to long-term wetness history).
- **Evidence of hydric soils and/or anoxic soil conditions:** Soils saturated, flooded, or ponded, during the growing season for a duration that creates anaerobic conditions in the upper profile of the soil 0 – 12 inches depth.
- **Evidence of wetland hydrology:** evidence that the site has a continuing wetland hydrologic regime and that hydric soils and Hydrophytic vegetation are not transitory in nature or are relicts of a past hydrologic regime.

Vegetation surveys in the field generally followed methods outlined in USACE (1987) and Mueller-Dombois and Ellenberg (2002). Plant identification used nomenclature from the USDA PLANTS database (http://plants.usda.gov/java/), and wetland status following the hierarchy in **Table 3.**

Table 3. USDA PLANTS Database Wetland Status, Indicator Code, and Description

Status	Code	Description
Obligate Wetland	OBL	Almost always is a hydrophyte, rarely in uplands
Facultative Wetland	FACW	Usually is a hydrophyte but occasionally found in uplands
Facultative	FAC	Commonly occurs as either a hydrophyte or non-hydrophyte
Facultative Upland	FACU	Occasionally is a hydrophyte but usually occurs in uplands
Obligate Upland	UPL	Rarely is a hydrophyte, almost always in uplands

* A positive (+) or negative (-) sign is sometime used with the Facultative categories to more specifically define the regional frequency of occurrence in wetlands. The positive sign indicates a category more frequently found in wetlands, a negative sign indicates less frequently found in wetlands.

Additionally, field guides from Webber and Wittmann (2012) Colorado Flora Western Slope; Komarek (1994) Flora of the San Juan's: Field Guide to the Mountain Plants of Southwestern Colorado; and Whitson et al. (1992) Weeds of the West were also consulted. Wetland habitats were identified following the terminology described in Dahl and others (2009) and is outlined in (**Table 4**), which for the Hidden Valley project area included Riverine, Palustrine, and Lacustrine wetland systems, with wetland classes including unconsolidated bottom, aquatic beds, and emergent classes. A full description of the wetland classes and key components and identification tools are found in (**Table 5**) and a hierarchal chart is provided in Appendix F.

[2] Hydrophytic vegetation: "Sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present. Wetland vegetation may consist of more than one plant community (species association). Emphasis is placed on the assemblage of plant species that exert a controlling influence on the character of the plant community, rather than on indicator species. Thus, the presence of scattered individuals of an upland plant species in a community dominated by hydrophytic species is not a sufficient basis for concluding that the area is an upland community. Additionally, the presence of a few single individuals of a hydrophytic species in a community dominated by upland species is not a sufficient basis for concluding that the area has hydrophytic vegetation" (USACE, 1987 - http://www.wetlands.com/coe/87manp3a.htm).

Table 4.Wetland Habitats and codes from Dahl and others (2009)

System	Subsystem	Class	Subclass	Modifier	Code
Riverine	Upper Perennial	Unconsolidated Bottom	Cobble-Gravel		R3UB1
Riverine	Upper Perennial	Unconsolidated Bottom	Streambed		R3SB3
Riverine	Upper Perennial	Aquatic Bed	Rooted Vascular		R3AB3
Riverine	Upper Perennial	Emergent			R3EM
Palustrine		Emergent	Persistent	Semi-perm. flooded	PEM1F
Palustrine		Emergent	Persistent	Permanently flooded	PEM1H
Palustrine		Emergent	Persistent	Saturated	PEM1B
Lacustrine	Littoral	Emergent		Permanently flooded	L2EM
Lacustrine	Limnetic	Aquatic Bed	Rooted Vascular	Permanently flooded	L1AB3H
Lacustrine	Limnetic	Aquatic Bed	Floating Vascular	Permanently flooded	L1AB4H

Field Sampling

Two field surveys were conducted. The initial survey was conducted on July 25th and 26th and October 10th and 11th, 2012. Field surveys were conducted in July and October to maximize the opportunity for floristic identification (July) but also to evaluate the extent of the saturated soil fringe and Hydrophytic vegetation at a driest period of the year. Field sampling followed methods outlined in USACE (1987) with the inclusion of a high-resolution (<1 meter) GPS survey of the wetland edge. The GPS survey was conducted on both dates and utilized a Trimble Juno SB© GPS receiver with ArcPad© software. As part of the survey the wetland edge was marked on the GPS with linear distances between each survey point minimized and with the goal of capturing any and all changes in observed vegetation communities and wetland hydrology.

As part of the field GPS survey 2,701 points were collected with UTM locations for each point included in both the GIS and the Excel file WetlandPoints_Final.xls. The results of the field survey are presented in Appendix A.

Table 5. Description from: Dahl and others. 2009. Data Collection Requirements and Procedures for Mapping Wetland, Deepwater and Related Habitats of the United States. http://www.fws.gov/wetlands

Type	Hierarchy	Description
Riverine	**System**	Wetlands and deepwater habitats contained in natural or artificial channels periodically or continuously containing flowing water or which form a connecting link between the two bodies of standing water. The riverine system is bounded on the landward side by upland, by the channel bank (including natural and man-made levees), or by wetland dominated by trees, shrubs persistent emergents, mosses, or lichens.
Upper Perennial	Subsystem	High gradient and fast water velocity. There is no tidal influence, and some water flows throughout the year, substrate consists of rock, cobbles, or gravel with occasional patches of sand.
Unconsolidated Bottom	Class	Unconsolidated bottom includes all wetlands with at least 25 percent cover of particles smaller than stones, and a vegetative cover less than 30 percent.
Cobble-Gravel	Sub-Class	The unconsolidated particles smaller than stones are predominantly cobble and gravel, although finer sediments may be intermixed.
Streambed	Class	Streambed wetlands are contained within the intermittent subsystem of riverine habitats as well as all channels that are completely dewatered at low tide in estuarine habitats.
Cobble-Gravel	Sub-Class	At least 25% of the substrate is covered by unconsolidated particles smaller than stones; cobbles or gravel predominate.
Aquatic Bed	Class	Areas dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years. May include pondweeds (Potamogeton spp.), wild celery (Vallisneria americana), waterweed (Elodea spp.), and duckweed (Lemna spp.).
Rooted Vascular	Sub-Class	Vascular species which occur within the photic zone.
Emergent	Class	Perennial plants visible in most growing seasons and characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens.
Persistent	Sub-Class	Plant species which normally remain standing at least until the beginning of the next growing season. Grasslike plants dominate e.g., cattails, bulrushes, saw grass, sedges; and true grasses such as reed, manna grasses, slough grass, and whitetop.
Palustrine	**System**	All nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens. Wetlands lacking such vegetation are also included if they exhibit all of the following characteristics: • are less than 8 hectares (20 acres) • do not have an active wave-formed or bedrock shoreline feature • at low water the depth is less than 2 meters (6.6 ft.) at the deepest part All water bodies visible on the aerial imagery that are less than 8 hectares (20 acres) in size are considered to be in the Palustrine System unless depth information is available, or unless bedrock shoreline features are visible. System is bounded by upland or by any of the other four systems (Lacustrine, Riverine, Estuarine, and Marine).
Semi-Permanently Flooded	Modifier	Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land's surface.
Permanently Flooded	Modifier	Water covers the land surface throughout the year in all years
Saturated	Modifier	Substrate is saturated to surface for extended periods during the growing season, but surface water is seldom present.
Lacustrine	**System**	Wetlands and deepwater habitats with all of the following characteristics: 1. Deepwater situated in a topographic depression or a dammed river channel lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% aerial coverage; 2. Total area exceeds 8 hectares (20 acres). Basins or catchments less than 8 hectares in size are included if they have at least one of the following characteristics: a) wave formed or bedrock feature forms all or part of the shoreline boundary at low water (no vegetation). b) water depth is greater than 2 meters (6.6 feet) in the deepest part of the basin. Lacustrine habitats formed by damming a river channel are confined by the contour approximating normal spillway elevation or summer pool elevation. Rivers with dams or other impoundments which significantly impact the ecological character of the river is considered lacustrine to the upstream point that approximates spillway or normal pool elevation, or where riverine characteristics return.
Littoral	Sub-System	Shoreward boundary to 2 meters (6.6 feet) below annual low water or to the maximum extent of nonpersistent emergent plants, if at depths > 2 meters
Limnetic	Sub-System	Extends outward from Littoral boundary and includes all deepwater habitats within the lacustrine System.
Floating Vascular	Sub-Class	Floating vascular plants occur mainly in the lacustrine, palustrine, and riverine systems and in the less saline waters of the estuarine system.

Results

Based on field the field survey, air photo interpretation and GIS analysis the total acres of wetland habitat in the project area equal 77.2 acres. The total calculated wetland area at Hidden Valley Ranch is sub-divided into three different systems, as described in USACE (1987) and Cowardin (1979), and include; Lacustrine (49.5 acres), Palustrine (25.4) and Riverine (2.2) habitats (**Table 6).**

Table 6. Total acres of wetland habitat by system

System	Acres
Lacustrine	49.5
Palustrine	25.4
Riverine	2.2
Grand Total	**77.2**

As part of characterizing the wetland types each delineated area was assigned a wetland type and the dominant vegetation community was identified. Wetland vegetation types include three categories Scrub-Shrub or Mesic, Emergent, and Aquatic Bed (Cowardin, 1979). The two most distinct wetland habitats include the Emergent and Aquatic types as both of these types are easily distinguished from upland areas by the presence of permanently elevated water tables and easily to identify hydrophytic vegetation, which includes sedges (*Carex aquatilis*), rushes (*Scripus spp., Juncus spp.*) and cattails (*Typha latifolia*).

The project site also contains 4.6 acres of Scrub-Shrub (Mesic) with the dominant vegetation community being Carex and poacea species, as well as a mix of some upland species, which at the Hidden Valley site included field clover (*Melilotus spp*), and western wheat grass (*Eleymus tracaulus*). 20 acres of the project area is categorized as Emergent, with dominant vegetation communities being dominated by Carex, Juncus, and Equisetum species. The largest wetland area is categorized as Aquatic (52.7 acres) with the main species being *Typha latifolia*, *Scripus*, *Carex aquatilis*, and *Equisetum laevigatum* (**Table 7**).

Table 7. Wetland habitats and total acres found at the Hidden Valley Ranch

Type	Acres	Dominant Vegetation	Acres
Scrub-Shrub (Mesic)	4.6	Poa	2.7
Emergent	20.0	Carex	11.5
Aquatic	52.7	Typha	13.1
		Aquatic	49.9
Grand Total	**77.2**		**77.2**

The USACE utilizes several wetland codes which use the convention outlined in Appendix F. In following this convention wetland types were calculated (**Table 8**) and are as follows: 0.7 acres of Palustrine – Emergent – Persistent – Intermittently Flooded (PEM1J), 2.2 acres of Riverine – Upper Perennial – Unconsolidated Bed – Cobble Gravel (R3UB1), 3.3 acres of Palustrine – Emergent – Persistent – Seasonally Flooded; 4.2 acres (PEM1H) - Palustrine – Emergent – Persistent – Cobble/Gravel – Permanently Flooded; 6.5 acres (PEM1B) - Palustrine – Emergent – Persistent – Cobble/Gravel – Saturated; 9.3 acres (PEM1F) - Palustrine – Emergent – Persistent – Cobble/Gravel – Semi-permanently Flooded; 9.8 acres (L2AB3) – Lacustrine – Littoral – Aquatic Bed – Rooted Vascular; 41.2 acres (L1AB4) – Lacustrine – Littoral – Aquatic Bed – Floating Vascular.

Table 8. Wetland codes and associated acres

Code	PEM1J	R3UB1	PEM1E	PEM1H	PEM1B	PEM1F	L2AB3	L1AB4	Total
Acres	0.7	2.2	3.3	4.2	6.5	9.3	9.8	41.2	77.2

A range of plant species were observed at the Hidden Valley property (Table 9). Plant nomenclature followed conventions presented in the USDA Plants database and include the plants listed in **Table 9**, associated wetland codes listed in the wetland status column.

Table 9. Plant species found in wetland habitats at Hidden Valley Ranch

Genus	Species	Common	Wetland Status
Calamagrostis	*canadensis*	bluejoint	FAC, OBL
Carex	*aquatilis*	water sedge	OBL
Carex	*nebrascensis*	Nebraska sedge	OBL
Deschampsia	*caespitosa*	tufted hair grass	FAC, FAC+
Elymus	*elymoides*	Squirrel tail	UPL
Elymus	*trachycaulus*	slender wheatgrass	UPL
Equisetum	*laevigatum*	smooth horsetail	OBL
Heterotheca	*villosa*	Hairy golden aster	
Juncus	*arcticus*	Mountain rush	FACW, OBL
Linaria	*dalmatica*	Dalmatian toad flax	
Melilotus	*officinalis*	Clover	UPL, FACU+
Poa	*pratensis*	Bluegrass	FAC
Poa	*palustris*	fowl bluegrass	FACU, FACW+
Prunus	*virginiana*	Choke cherry	FACU-, FAC
Salix	*exigua*	Coyote willow	OBL
Scirpus	*acutus*	Bull rush	OBL
Trisetum	*spicatum*	Spiked false-oats	UPL, FACW-
Typya	*latifolia*	Common reed	OBL

Conclusions

On two occasions in 2012 a wetland survey was conducted at the Hidden Valley Ranch, the results of these surveys have been presented, and along with the GIS data and associated figures the total acreage of wetland habitats surveyed amount to 77.2 acres. Of the total acres ~25 acres are terrestrial and include both emergent and shrub-scrub (mesic) wetlands, the remainder is open water and shallow water wetlands. Overall the wetlands surveyed were of high functional condition and provide high quality habitat for both amphibians and wetland associated birds, including red-wing blackbirds, cranes, and bald eagles. There were several locations within the area that had some negative effects of grazing (erosion) however these areas were small and would most likely become high functioning wetland areas if grazing animals were restricted during the spring and late summer periods.

References

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