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Sent: Thursday, May 7, 2020 5:05 PM
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Subject: UBRY ESA Surveys Methodology
Attachments: UBRY_ESA_Surveys_2020-05-07.pdf

Josh and Debbie,

Attached is the Habitat Survey Methodology for Federally Threatened, Endangered, and Proposed Species. Please review and let us know if you have any comments.

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Uinta Basin Railway: Habitat Survey Methodology for Federally Threatened, Endangered, and Proposed Species

BACKGROUND

The Seven County Infrastructure Coalition (Coalition or applicant), a governmental entity comprising Carbon, Daggett, Duchesne, Emery, San Juan, Sevier, and Uintah Counties, is proposing a new railway that would connect the Uinta Basin's various industries to the national rail network. Currently, the Uinta Basin does not have rail service, and freight needs are met primarily through trucking over a limited highway network. The railway (proposed action) would be constructed and operated under the authority of the U.S. Surface Transportation Board (STB). STB, in conjunction with other regulatory bodies, is preparing an Environmental Impact Statement (EIS) for this railway, which has the potential to cause environmental impacts. The Coalition, through its consultant, HDR, is conducting engineering and environmental activities in support of the EIS.

The Endangered Species Act (16 United States Code [USC] Sections 1531–1544) provides for the conservation of threatened and endangered species and the ecosystems on which they depend. Section 3 of the Endangered Species Act prohibits the “taking” of any endangered species and defines “taking” broadly to include actions that are not necessarily intended to cause harm to the species (an “incidental taking”).

Section 7 of the Endangered Species Act requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) before taking any action that could affect a federally listed threatened or endangered species or designated critical habitat for an endangered species. In addition, federal agencies must ensure that their actions are not likely to jeopardize the continued existence of any listed species or to destroy or adversely modify any designated critical habitat.

A Biological Assessment (BA) must be prepared whenever a listed or proposed species and their habitat are in the area of the proposed action. The BA should address the anticipated impacts to all listed and proposed species found in the area. The BA is used to determine whether formal consultation or additional meetings with USFWS are necessary. The contents of a BA are discretionary but generally include results of on-site inspections to determine presence of listed or proposed species and an analysis of the likely effects of the action on the species or habitat based on biological studies, literature review, and expert opinion.

This memorandum describes the methodology for determining potentially suitable habitat for federally threatened, endangered, and proposed species in the study area of the applicant's preferred Whitmore Park Alternative for the proposed Uinta Basin Railway as well as any additional buffer areas for certain species as described in this memorandum (see Appendix A for a map of the Whitmore Park Alternative study area). The study area is predominantly 1,000 feet wide with about 500 feet on either side of the proposed centerline. However, in some areas, the study area is wider where the design team anticipates that a wider earthwork footprint might be needed to accommodate design features.

FEDERALLY THREATENED, ENDANGERED, AND PROPOSED SPECIES

PLANT SPECIES

HDR's database research and consultation with agencies found that four federally listed plant species and two proposed species could occur or are known to occur in or near the Whitmore Park study area (Table 1). (For the consultation letters from USFWS, see Appendix A, Pertinent Correspondence, in the *Biological Resources Baseline Environment Technical Memorandum* [Coalition 2020a]).

The study area does not include designated or proposed critical habitat for any federally listed plant species. There is suitable habitat for Pariette cactus (*Sclerocactus brevispinus*) and Uinta Basin hookless cactus (*Sclerocactus wetlandicus*) in the study area, and there is potentially suitable habitat for Barneby ridge-crest (*Lepidium barnebyanum*) and Ute ladies'-tresses (*Spiranthes diluvialis*) in the study area. Suitable habitat might exist for Graham's beardtongue (*Penstemon grahamii*) and White River beardtongue (*Penstemon scariosus* var. *albifluvis*) in the study area.

Table 1. Federally Listed and Proposed Plant Species That Could Occur or Are Known to Occur in or near the Whitmore Park Study Area

Common Name ^a	Scientific Name	Federal Status	Potentially Suitable Habitat in the Study Area? ^b
Barneby ridge-crest	<i>Lepidium barnebyanum</i>	Endangered	Potentially suitable habitat might exist in study area.
Pariette cactus	<i>Sclerocactus brevispinus</i>	Threatened	Suitable habitat exists in study area.
Uinta Basin hookless cactus	<i>Sclerocactus wetlandicus</i>	Threatened	Suitable habitat exists in study area.
Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	Threatened	Potentially suitable habitat exists in study area.
Graham's beardtongue	<i>Penstemon grahamii</i>	Proposed threatened	Potentially suitable habitat might exist in study area.
White River beardtongue	<i>Penstemon scariosus</i> var. <i>albifluvis</i>	Proposed threatened	Potentially suitable habitat might exist in study area.

^a Sources: Species lists from USFWS (2020) and Appendix A, Pertinent Correspondence, in the *Biological Resources Baseline Environment Technical Memorandum* (Coalition 2020a)

^b Sources: NatureServe, no date; UDWR, no date; Utah Native Plant Society, no date

Barneby ridge-cress (*Lepidium barnebyanum*)

Barneby ridge-cress is a white-flowered perennial herb that grows in cushion-shaped tufts and is endemic to the Indian Canyon drainage in Duchesne County, Utah. Barneby ridge-cress is found on soils that are shallow, fine-textured shale soils, and intermixed with rock fragments. It grows with similar cushion-shaped plant species along semi-barren ridges in mixed desert shrub and pinyon-juniper communities at elevations ranging from 6,100 to 6,450 feet.

Based on a USFWS potential habitat geographic information systems (GIS) shapefile polygon for this species, potentially suitable habitat might exist in the Whitmore Park study area. Occurrences have also been identified within a ½-mile radius and a 2-mile radius of the Whitmore Park study area.

Pariette cactus (*Sclerocactus brevispinus*)

Pariette cactus is a small, barrel-shaped cactus with pink flowers that is endemic to Duchesne and Uintah Counties, Utah. This species is restricted to one area in the Pariette Draw along the Duchesne County–Uintah County border. It grows on highly saline and alkaline fine soils, limited to clay badlands and in saltbush and sagebrush flats in areas that are sparsely vegetated between 4,590 and 4,920 feet in elevation. Some individual plants have been found in marginal habitats outside the main population areas.

Suitable habitat exists in the Whitmore Park study area.

Uinta Basin hookless cactus (*Sclerocactus wetlandicus*)

Uinta Basin hookless cactus is a barrel-shaped cactus with pink flowers that grows in Carbon, Duchesne, and Uintah Counties, Utah. These cacti are found in xeric, fine-textured soils overlain with cobbles and pebbles, growing in salt desert shrub and pinyon-juniper communities, at elevations ranging from 4,460 to 6,560 feet.

Suitable habitat exists in the Whitmore Park study area.

Ute ladies'-tresses (*Spiranthes diluvialis*)

This white-flowered orchid is found in moist to very wet meadows, along streams, in abandoned stream meanders, and near springs, seeps, and lake shores where competition for light, space, water, and other resources is normally kept low by periodic or recent disturbance.

Potentially suitable habitat exists in the Whitmore Park study area along water courses and in wet meadows where vegetation is relatively open and below 7,000 feet. There are about 11.4 acres of wet meadow and perennial stream habitat in the Whitmore Park study area (Coalition 2020b).

Graham's beardtongue (*Penstemon grahamii*)

Graham's beardtongue is a perennial herb with lavender flowers that is restricted to the Uinta Basin in Carbon, Duchesne, and Uintah Counties, Utah, and adjacent Rio Blanco County, Colorado. It grows on semi-barren knolls, ridges, and steep slopes in a mix of fragmented shale and silty clay soils closely associated with the Mahogany zone (oil-shale bearing) of the Green River Formation. It grows in sparsely vegetated communities of pinyon-juniper and desert shrub between 4,600 and 6,700 feet in elevation. Graham's beardtongue has been proposed to be listed as a threatened species under the Endangered Species Act and is managed under a

2014 Conservation Agreement and Strategy for Graham's beardtongue and White River beardtongue.

The Green River Formation is found in the Whitmore Park study area. Potentially suitable habitat might exist in the study area.

White River beardtongue (*Penstemon scariousus* var. *albifluvis*)

White River beardtongue is a perennial herb with pale lavender flowers that is endemic to oil shale barrens of the Green River Formation in the Uinta Basin in Utah and Colorado. It prefers calcareous soils, often white or red, fine-textured and mixed with shale. It grows in sparsely vegetated mixed desert shrub and pinyon-juniper communities at elevations between 5,000 and 6,800 feet in elevation. White River beardtongue has been proposed to be listed as a threatened species under the Endangered Species Act and is managed under a 2014 Conservation Agreement and Strategy for Graham's beardtongue and White River beardtongue.

The Green River Formation is found in the Whitmore Park study area. Potentially suitable habitat might exist in the study area.

WILDLIFE SPECIES

HDR's database research and consultation with agencies found that eight federally listed wildlife species could occur, or are known to occur, in or near the Whitmore Park study area (Table 2): two bird species, five fish species, and one mammal species. (For the consultation letters from USFWS, see Appendix A, Pertinent Correspondence, in the *Biological Resources Baseline Environment Technical Memorandum* [Coalition 2020a]).

The study area does not include designated or proposed critical habitat for any federally listed wildlife species. Potentially suitable habitat was identified for two of these eight species (Mexican spotted owl and Canada lynx).

Table 2. Federally Listed Wildlife Species That Could Occur or Are Known to Occur in or near the Whitmore Park Study Area

Common Name ^a	Scientific Name	Federal Status	Potentially Suitable Habitat in the Study Area? ^b
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened	USFWS habitat models identify potentially suitable habitat in and within 0.5 mile of the study area.
Western yellow-billed cuckoo	<i>Coccyzus americanus</i>	Threatened	There is no suitable habitat large enough in or within 0.5 mile of the study area.
Bonytail chub	<i>Gila elegans</i>	Endangered	There is no suitable habitat in the study area.
Colorado pikeminnow	<i>Ptychocheilus lucius</i>	Endangered	There is no suitable habitat in the study area.
Humpback chub	<i>Gila cypha</i>	Endangered	There is no suitable habitat in the study area.
June sucker	<i>Chasmistes liorus</i>	Endangered	There is no suitable habitat in the study area.
Razorback sucker	<i>Xyrauchen texanus</i>	Endangered	There is no suitable habitat in the study area.
Canada lynx	<i>Lynx canadensis</i>	Threatened	Potentially suitable habitat exists in the study area.

^a Sources: Species lists from USFWS (2020) and Appendix A, Pertinent Correspondence, in the *Biological Resources Baseline Environment Technical Memorandum* (Coalition 2020a)

^b Sources: NatureServe, no date; UDWR, no date

Mexican spotted owl (*Strix occidentalis lucida*)

Mexican spotted owl is a nonmigratory owl and occupies a variety of habitats in different parts of its range, habitats including various forest types and steep rocky canyons, this last habitat being the primary habitat used in Utah. These owls are basically intolerant of even-age forest management practices, and forests used for roosting and nesting often contain mature or old-growth stands with a complex structure. They require cool summer roosts, such as near canyon bottoms, in dense forests, on shady cliffs, or in caves. Mexican spotted owls do not build their own nests but use suitable naturally occurring sites and nests built by other animals. Nests are either in trees (typically large Douglas-fir), in trunk cavities, or on cliffs.

Although no observations have been documented in the study area or within a 2-mile buffer of the Whitmore Park study area, USFWS habitat models identify potentially suitable habitat in the study area and within 0.5 mile of the study area.

Western yellow-billed cuckoo (*Coccyzus americanus*)

Western yellow-billed cuckoos prefer to nest in tall cottonwood and willow riparian woodland with dense understory foliage. They prefer patches of at least 25 acres of dense riparian forest

with a canopy cover of at least 50% in both the understory and overstory. USFWS's suitable habitat guidelines for this species for Utah require patches of multilayered vegetation that are at least 12 acres in extent and at least 100 meters (328 feet) wide by 100 meters long.

There is no suitable habitat large enough in or within 0.5 mile of the Whitmore Park study area. Additionally, no observations have been recorded in the study area or within a 2-mile buffer of the study area.

Bonytail (*Gila elegans*)

Bonytails are native to the Colorado River system and its larger tributaries, including the Green and Yampa Rivers; however, few bonytails exist in the wild. Bonytails prefer eddies, pools, and backwaters near swift currents in large rivers.

There is no suitable habitat in the study area. However, suitable habitat is available downstream. Indian Creek, Willow Creek, and the Price River are located in the study area. All of these waterways ultimately drain to the Green River system.

Colorado pikeminnow (*Ptychocheilus lucius*)

The present distribution of Colorado pikeminnows is restricted to the Upper Colorado River basin of Colorado, Utah, New Mexico, and Wyoming, primarily in the Green River in Utah and in the Yampa and Colorado Rivers in Colorado and parts of Utah. Adult Colorado pikeminnows prefer medium to large rivers in habitats ranging from deep, turbid rapids to flooded lowlands. Young pikeminnows prefer slow-moving backwaters.

There is no suitable habitat in the study area. However, suitable habitat is available downstream. Indian Creek, Willow Creek, and the Price River are located in the study area. All of these waterways ultimately drain to the Green River system.

Humpback chub (*Gila cypha*)

Humpback chubs inhabit large rivers and are native to the Colorado River system, but their current distribution in Utah is confined to a few whitewater areas in the Colorado, Green, and White Rivers. Young fish are spawned in backwater areas and remain in slower water until they are large enough to move into whitewater areas.

There is no suitable habitat in the study area. However, suitable habitat is available downstream. Indian Creek, Willow Creek, and the Price River are located in the study area. All of these waterways ultimately drain to the Green River system.

June sucker (*Chasmistes liorus*)

June suckers are endemic to Utah Lake and its tributaries (the Provo and Spanish Fork Rivers).

There is no suitable habitat in the study area, nor is there downstream habitat.

Razorback sucker (*Xyrauchen texanus*)

Razorback suckers are found in the Green, Yampa, White, Duchesne, Gunnison, San Juan, and upper Colorado Rivers. The species prefers slow backwater habitats and impoundments and is often associated with sand, mud, and rock substrate in areas with sparse aquatic vegetation where temperatures are moderate to warm.

There is no suitable habitat in the study area. However, suitable habitat is available downstream. Indian Creek, Willow Creek, and the Price River are located in the study area, all of which ultimately drain to the Green River system.

Canada lynx (*Lynx canadensis*)

The preferred habitat of Canada lynxes is boreal and montane regions dominated by coniferous or mixed forest with thick undergrowth, but lynxes also occasionally enter open forest, rocky areas, and tundra to forage for abundant prey. The major limiting factor is the abundance of snowshoe hares.

Potentially suitable habitat exists in the study area.

METHODOLOGY

A combination of GIS and field survey methods is proposed for determining and quantifying suitable habitat for the federally threatened, endangered, and proposed species in the study area of the Whitmore Park Alternative. The proposed method will vary by species and currently available data. Only those species with existing or potentially existing habitat in the study area will be addressed.

Table 3 provides a list of these species.

Table 3. Federally Listed and Proposed Species with Existing or Potentially Existing Habitat in the Whitmore Park Study Area

Common Name	Scientific Name	Federal Status	Potentially Suitable Habitat in the Study Area?
Plant species			
Barneby ridge-cress	<i>Lepidium barnebyanum</i>	Endangered	Potentially suitable habitat might exist in study area.
Pariette cactus	<i>Sclerocactus brevispinus</i>	Threatened	Suitable habitat exists in study area.
Uinta Basin hookless cactus	<i>Sclerocactus wetlandicus</i>	Threatened	Suitable habitat exists in study area.
Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	Threatened	Potentially suitable habitat exists in study area.
Graham's beardtongue	<i>Penstemon grahamii</i>	Proposed threatened	Potentially suitable habitat might exist in study area.
White River beardtongue	<i>Penstemon scariosus</i> var. <i>albifluvis</i>	Proposed threatened	Potentially suitable habitat might exist in study area.
Wildlife species			
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened	USFWS habitat models identify potentially suitable habitat in study area.
Canada lynx	<i>Lynx canadensis</i>	Threatened	Potentially suitable habitat exists in study area.

Barneby ridge-cress (*Lepidium barnebyanum*)

Although USFWS has a potential habitat GIS polygon for Barneby ridge-cress, the polygon is broad, and habitat surveys have not been conducted throughout the entire polygon area (USFWS 2019). To identify suitable habitat in the study area, HDR will perform on-the-ground site investigations where the USFWS-provided polygon overlaps the Whitmore Park study area in accordance with suitable habitat criteria described in the Barneby ridge-cress recovery plan (USFWS 1993). On-the-ground site investigations will entail surveyors traversing the entire study area that overlaps with the USFWS potential-habitat polygon to identify suitable habitat. If suitable habitat is identified, it will be mapped using sub-meter global positioning system (GPS) technology.

Pariette cactus (*Sclerocactus brevispinus*)

HDR will use the detailed known-occurrence habitat polygons provided by USFWS to determine habitat acreage in the Whitmore Park study area for Pariette cactus.

Uinta Basin hookless cactus (*Sclerocactus wetlandicus*)

HDR will use the detailed known-occurrence habitat polygons provided by USFWS to determine habitat acreage in the Whitmore Park study area for Uinta Basin hookless cactus.

Ute ladies'-tresses (*Spiranthes diluvialis*)

HDR has used GIS methods to develop potentially suitable habitat polygons for Ute ladies'-tresses consisting of areas along water courses and in wet meadows where vegetation is relatively open and below 7,000 feet in elevation. Based on suitable habitat criteria described in the USFWS survey requirements for this species (see Appendix B of this memorandum for a revised version of the 1992 *Interim Survey Requirements for Ute ladies'-tresses Orchid* (*Spiranthes diluvialis*) [USFWS 1992]), HDR will field-verify these areas in order to refine the area of potentially suitable habitat.

Graham's beardtongue (*Penstemon grahamii*)

The potential habitat polygons provided by USFWS do not overlap with the Whitmore Park study area. However, the Green River Formation, which is the preferred substrate for Graham's beardtongue, is found in the Whitmore Park study area. Coordination with USFWS will be needed to determine whether surveys outside the provided potential habitat polygons are needed for Graham's beardtongue.

White River beardtongue (*Penstemon scariousus* var. *albifluvis*)

The potential habitat polygons provided by USFWS do not overlap with the Whitmore Park study area. However, the Green River Formation, which is the preferred substrate for White River beardtongue, is found in the Whitmore Park study area. Coordination with USFWS will be needed to determine whether surveys outside the provided potential habitat polygons are needed for White River beardtongue.

Mexican spotted owl (*Strix occidentalis lucida*)

Although USFWS has a potential habitat model for the Mexican spotted owl, the model is broad, and habitat surveys have not been conducted throughout the area (USFWS 2019). To refine the area of potentially suitable habitat, HDR will perform on-the-ground site investigations in

accordance with suitable-habitat criteria described in the Mexican spotted owl recovery plan (USFWS 2012) in and within 0.5 mile of the study area. On-the-ground site investigations will entail surveyors traversing the entire study area that overlaps with the USFWS potential habitat model to identify suitable habitat. If suitable habitat is identified, it will be mapped using sub-meter GPS technology.

Canada lynx (*Lynx canadensis*)

Snowshoe hares (*Lepus americanus*) are the primary prey for Canada lynx. USFWS has a potential habitat polygon for snowshoe hares (*Lepus americanus*). HDR will use the potential habitat polygon for snowshoe hares to estimate the area of potentially suitable lynx habitat. Through coordination with USFWS and the U.S. Department of Agriculture Forest Service, HDR might refine the estimated area of potentially suitable habitat.

REFERENCES

[Coalition] Seven County Infrastructure Coalition

- 2020a Biological Resources Baseline Environment Technical Memorandum. Technical memorandum prepared by HDR for the Uinta Basin Railway. April 3.
- 2020b Waters of the United States Baseline Environment Technical Memorandum. Technical memorandum prepared by HDR for the Uinta Basin Railway. April 3.

NatureServe

- No date NatureServe Explorer. <http://explorer.natureserve.org>. Accessed November 22, 2019.

[UDWR] Utah Division of Wildlife Resources

- No date Utah Conservation Data Center [online database]. <https://dwrcdc.nr.utah.gov/ucdc/default.asp>. Accessed November 27, 2019.

[USFWS] United States Fish and Wildlife Service

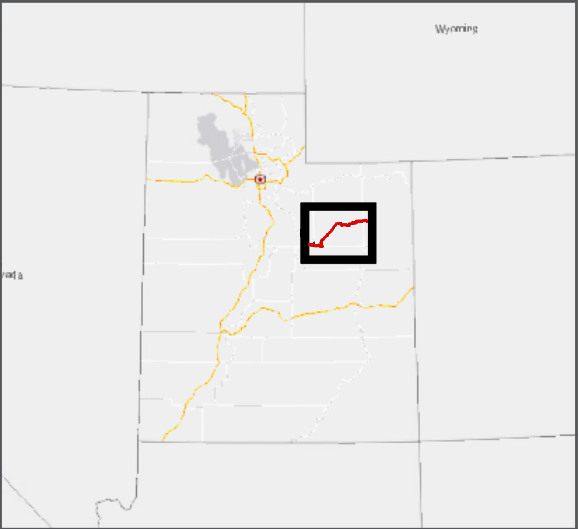
- 1992 Interim Survey Requirements for Ute Ladies-tresses Orchid (*Spiranthes diluvialis*). November 23.
- 1993 Barneby Ridge-cress Recovery Plan. Prepared by USFWS Region 6. July 23.
- 2012 Mexican Spotted Owl Recovery Plan, First Revision (*Strix occidentalis lucida*). Prepared by USFWS Southwest Region. September 5.
- 2019 Notes from a meeting with USFWS biologists regarding USFWS federally listed plant and animal species in the Uinta Basin Railway alternative study areas. December 17.
- 2020 List of threatened and endangered species for the Whitmore Park alignment. Species list provided by the Utah Ecological Services Field Office. February.

Utah Native Plant Society

- No date Utah Rare Plant Guide. https://utahrareplants.org/rpg_species.html#All. Accessed November 25, 2019.

APPENDIX A

Whitmore Park Alternative Study Area

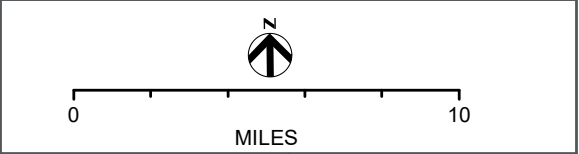


LEGEND

Whitmore Park Study Area

WHITMORE PARK STUDY AREA

MAY 2020



APPENDIX B

Interim Survey Requirements for Ute ladies'-tresses Orchid

Interim Survey Requirements for Ute Ladies'-tresses Orchid (*Spiranthes Diluvialis*)

November 23, 1992

The U. S. Fish and Wildlife Service (Service) has established the following interim requirements and guidelines for surveys to determine the presence or absence of the Federally threatened plant species *Spiranthes diluvialis*, Ute ladies'-tresses orchid. These guidelines were developed by the Service in consultation with biologists and ecologists knowledgeable about the species. These guidelines and recommendations are designed to supplement, not substitute for, professional methods, expertise, and judgment typically used to conduct rare plant surveys.

Because the species is so rare, very little is known about its habitat preferences and population ecology. These interim survey requirements have been developed in order to gain more information about the species, identify potential habitat, streamline and standardize survey procedures. As more information becomes available through these surveys, the interim requirements will be revised and simplified as appropriate.

Documentation of compliance with these requirements and recommendations is accomplished through submission to the Service of a survey report. The Service will respond with a letter indicating acceptance of the report.

All Federal agencies have a responsibility under Section 7(a)(1) of the Endangered Species Act to conserve Federally listed threatened and endangered species. The Service encourages all Federal agencies to review their properties and projects and make funds available to conduct surveys in all appropriate potential habitat, including habitat outside the areas specified in these guidelines.

1. Introduction

Spiranthes diluvialis occurs in seasonally moist soils and wet meadows near springs, lakes, or perennial streams and their associated flood plains below ~~6,500~~ 7,000 feet elevation in Utah, Colorado, and Nevada. Typical sites include old stream channels and alluvial terraces, sub-irrigated meadows, and other sites where the soil is saturated to within 18 inches of the surface at least temporarily during the spring or summer growing seasons. Associated vegetation typically falls into the Facultative Wet wetland vegetation classification category (from the National List of Plant Species that Occur in Wetlands developed by the Service). The species occurs primarily in areas where the vegetation is relatively open and not overly dense, overgrown, or over grazed. Although very rare now, it is estimated that it was once common in low elevation riparian areas in Colorado, Utah, and Nevada.

The moist soil conditions and vegetation composition of known *Spiranthes diluvialis* sites suggest that wetlands regulated under the Clean Water Act qualify as potential *Spiranthes diluvialis* habitat. Therefore, jurisdictional wetlands, as well as other drier sites matching the description above, should be surveyed.

~~2. Qualification of Surveyor~~ **Replaced by the 2011 USFWS Utah Surveyor Guidelines**

~~*Spiranthes diluvialis* is difficult to identify in the field, and since the orchid is rare and flowers for such a short time, few people have had the opportunity to become acquainted with the species. The Service does not want to exclude any person from conducting surveys. Therefore, the Service has developed a minimum set of qualification criteria that demonstrate whether a surveyor is sufficiently acquainted with *Spiranthes diluvialis* to collect consistent and accurate information for the survey report. Documentation that these criteria have been met is accomplished by submitting a statement of surveyor qualifications as part of the survey report.~~

~~The survey report shall contain a statement of qualifications of the individual conducting the survey, including:~~

- ~~a. Description of botanical expertise and training (e.g., graduate degree in botany, ecology, or other appropriate discipline).~~
- ~~b. Experience in conducting rare plant surveys (list dates, locations, and plants included in previously conducted surveys).~~
- ~~c. Actions taken to become acquainted with the known locations and appearance of *Spiranthes diluvialis* (such as visiting herbaria to look at specimens, conversations or site visits with others familiar with the species for a description of ecology and likely occurrences).~~
- ~~d. Documentation of correct identification of *Spiranthes diluvialis* in the field. The surveyor is required to enclose a photograph of the species taken at a known site and a statement certifying when and where the photograph was taken.~~
- ~~e. References, particularly documenting contact with known *Spiranthes diluvialis* experts.~~

~~3. Areas Requiring a Survey~~ **Out of Date. Use Fertig 2005 instead.**

~~The following areas in Colorado have been determined to have a high probability of occurrence of *Spiranthes diluvialis* based on current and historical records of the species. Surveys are required for appropriate sites below 6,500 feet elevation within these areas:~~

- ~~a. Boulder and Jefferson counties.~~
- ~~b. The South Platte River 100 year flood plain and perennial tributaries from the Front Range as far east as Brush, Morgan county.~~
- ~~c. The Fountain Creek 100 year flood plain and perennial tributaries from the Front Range to the southern boundary of El Paso county.~~

- d. ~~_____ The Yampa River 100 year flood plain and its perennial tributaries from Steamboat Springs west to the Utah border.~~

~~A perennial stream is usually represented by a sold blue line on a USGS 7 2 minute quad map.~~

4. ~~Habitat Description and Sites Requiring a Survey~~ Out of Date. Use Fertig 2005 instead.

~~*Spiranthes diluvialis* is typically found associated with alluvial deposits of silty, sandy, gravelly, or cobbly soil. The species may occasionally also be found in highly organic soils or peat. The species seems to prefer well drained soils with fairly high moisture content (soil around the roots will form a soft ball). Soils may exhibit some gleying or mottling but are generally not strongly anaerobic. *Spiranthes diluvialis* is found in some heavily disturbed sites, for example, old gravel mines that have since been developed into wetlands, and along well traveled footpaths built on old berms. The species is also found in grazed pastures with introduced pasture grasses.~~

~~*Spiranthes diluvialis* is found with grasses, sedges, and rushes, in shrubs, and riparian trees such as willow species. It rarely occurs in deeply shaded sites and prefers partially shaded open glades or pastures and meadows in full sunlight. Common associated species on the Front Range include:~~

~~Horsetail (*Equisetum* spp.)
Milkweed (*Asclepias incarnate*)
Verbena (*Verbena hastate*)
Agalinis (*Agalinis tenuifolia*)
Lobelia (*Lobelia siphilitica*)
Blue-eyed grass (*Sisyrinchium* spp.)
Triglochin (*Triglochin* spp.)
Carpet bentgrass (*Agrostis stolonifera*)
Reedgrass (*Calamagrostis*)
Goldenrod (*Solidago* spp.)~~

~~Sites below 6,500 feet elevation occurring within the areas described in Section 3 exhibiting the following features shall be surveyed for *Spiranthes diluvialis*:~~

- a. ~~_____ Seasonally high water table (within 18 inches of the soil surface for at least one week sometime during the growing season, growing season defined as when soil temperatures are above 41 degrees Fahrenheit).~~
- b. ~~_____ In or near wet meadows, stream channels, or flood plains.~~
- c. ~~_____ Vegetation falling into the Facultative Wet or Obligate Wet classification, including introduced pasture grasses.~~
- d. ~~_____ Jurisdictional wetlands as specified under the Clean Water Act.~~

~~Heavily grazed and weedy sites shall be surveyed for the orchid if they otherwise meet the criteria indicating potential suitability as *Spiranthes* habitat as listed above.~~

5. Sites Not Requiring a Survey

Some sites are either clearly not appropriate *Spiranthes diluvialis* habitat or have very low potential to be *Spiranthes diluvialis* habitat. A survey for *Spiranthes diluvialis* is not required for such sites. Sites below 7,000 feet elevation occurring within the areas described in Section 3 **not** requiring a survey for *Spiranthes* include:

- a. Highly disturbed or modified sites such as:
 1. Highway right-of-ways built on filled and compacted soil material.
 2. Highway right-of-ways build on rock fills, either revegetated or not revegetated.
 3. Rock or soil fills with steep back slopes (may or may not be associated with a road).
 4. Active construction sites where all vegetation has been stripped exposing bare soil.
 5. Construction sites where construction has been completed within the last five years, but the area has not been revegetated.
 6. Landscaped and maintained (mowed) bluegrass lawns.
- b. Upland sites, including, for example:
 1. Prairie dog towns.
 2. Short grass prairie.
 3. Sagebrush or shadscale rangeland.
- c. Sites entirely inundated by standing water, including, for example, monocultures of cattails (*Typha latifolia*) or Olney=s three-square (*Scirpus americanus*). Note that although inundated areas need not be surveyed, mesic slopes surrounding or adjacent to standing water must be surveyed if they otherwise meet the criteria indicating potential suitability as *Spiranthes diluvialis* habitat.
- d. Sites composed entirely of heavy clay soils. However, *Spiranthes diluvialis* is found in areas where more well-drained soils or peat overlay a clay layer.

- e. Very saline sites. *Spiranthes diluvialis* occurs in alkaline conditions and is somewhat tolerant of saline conditions. However, it has not been found in highly saline sites as indicated by dense monospecific stands of saltgrass (*Distichlis spicata stricta*).
- f. Sites entirely composed of dense strands of:
 1. Reed canary grass (*Phalaris arundinacea*)
 2. Tamarisk or Salt-cedar (*Tamarix ramosissima*)
 3. Greasewood (*Sarcobatus vermiculatus*)
 4. Teasel (*Dipsacus sylvestris*)
 5. Common reed (*Phragmites australis*)

6. Timing of Survey

Because *Spiranthes diluvialis* is very difficult to locate unless it is flowering, because timing of flowering varies, and because the species may not flower every year, the following requirements must be met:

- a. Reconnaissance may be conducted at any time of year to determine whether a site exhibits the characteristics described in Section 5 and therefore does not require a survey. If potential habitat is found to exist on the site, then a survey must be conducted at the appropriate time.
- b. Surveys shall be conducted during the blooming season, which is normally between July 20 and August 31. However, surveys may be conducted earlier or later if flowering is occurring in a nearby known population comparable to the site being surveyed. Surveyors shall verify that a nearby population is flowering at the time the survey is conducted either by calling a Service representative or including a dated photograph of the flower population. The date of the survey shall be noted in the survey report.
- c. *Spiranthes diluvialis* does not necessarily flower every year. Therefore, in drainages where *Spiranthes diluvialis* is known to occur, the Service recommends that surveys be conducted annually for three consecutive years. Also, for any site within required survey areas where habitat alteration has not yet occurred following an initial approved survey. Surveys shall be conducted annually for three consecutive years or until habitat alteration commences.

Under very special circumstances, earlier surveys may be possible for sites small enough to allow a complete "hands and knees" search for vegetative parts of *Spiranthes diluvialis*. The Service shall be contacted for prior approval and procedural requirements for such early surveys.

Surveys will be considered final for three years. If habitat alteration has not begun within three years, the Service must be contacted regarding the need for a survey update.

7. Maps

The Service recommends that, where available, Soil Conservation Service (S. C. S.) maps (for location of wetland soils) and National Wetland Inventory maps be consulted prior to site surveys to help identify likely potential habitat. Surveyors should be aware that *Spiranthes diluvialis* is not limited to mapped wetlands. In order to avoid duplication of effort and gain more information about the ecology and distribution of *Spiranthes diluvialis*, a USGS 7.2 minute quad map must be submitted with the survey report showing routes taken for all search sites regardless of whether a population of the species was located during the search.

For survey sites too small to be adequately represented on a USGS 7.2 minute quad map, an engineering drawing or more detailed map showing the area that has been surveyed must be included in the report. The site(s) should be indicated and labeled on the accompanying USGS 7.2 minute quad map.

8. Ecological and Site Features

In order to gain more information about the ecology and site characteristics of *Spiranthes diluvialis*, so that better predictions about its location and distribution can be marked, the following information must be collected and reported for each site surveyed:

- a. For sites disqualified as potential *Spiranthes diluvialis* habitat, describe the basis on which the site was disqualified.
- b. For sites requiring a survey, the following information must be collected. This information can be brief and qualitative for sites where *Spiranthes diluvialis* is not found (a few words, a phrase, or a descriptive sentence is sufficient).
 1. List the most frequent or dominant associated plant species of both the over story and under story vegetation (e.g., over story of mature cottonwood trees with an under story of orchard grass and smooth brome).
 2. Describe the plant community, including a qualitative assessment of dominance (e.g., riparian willow community, willows dominant, with native grasses *Deschampsia caespitose* and sedges).
 3. Describe the ecological condition/management history of the site (such as cultivated field, old gravel mine, good condition native grassland with winter cattle grazing, recently flooded stream edge).

4. Describe the geomorphology of the site, including, for example, the nature of the material (e.g., alluvium), the landscape position (e.g., bench above old stream bed).
5. Describe the soils including, for example, texture, whether moist, presence of mottling or other hydric soil indicators, and list the map unit from the S. C. S. county soil survey if available.
6. Describe the hydro logic characteristics, for example, depth to water table (if possible to determine without major excavation), inferences about frequency, duration, and season of flooding, presence of standing water, high water mark of a stream or water body in relation to location of surveyed site.
7. Describe any other site characteristics that appear relevant to understanding the ecology, population biology, or distribution of *Spiranthes diluvialis*.

In addition, for **each** site where a population of *Spiranthes diluvialis* is found, the following information must be collected and included in the survey report:

- a. Map the population on a USGS 7.2 minute quad map and on a finer scaled map or engineering drawing if appropriate.
- b. Count the number of individuals if fewer than 500.
- c. Estimate the number of individuals if more than 500. Include a description of the method used for population estimation.
- d. Note the phenological stage of the plants (e.g., proportion of plants that are flowering, proportion of flowers that have set seed).
- e. Note the specific geomorphologic, hydrologic, and soil conditions where the population occurs if it varies from the site description above.
- f. Note any other possibly relevant ecological information.
- g. Include a photograph of the population that illustrates its setting and habitat.

9. Survey Report

The survey report submitted to the Service should follow the outline below:

- a. Name and qualifications of surveyor.
- b. Brief project description indicating proposed impact to the site.
- c. Site location (address and legal description).
- d. Dates surveys were conducted.
- e. Ecological and site features as described above.
- f. Appendices.
 1. Maps
 2. Photographs

10. Notification

The Service shall be notified immediately if a new population of *Spiranthes diluvialis* is discovered. For sites located in Colorado and Utah, the surveyor shall notify either:

Bernardo Garza, U.S. Fish and Wildlife Service, P.O. Box 25486 – DFC, Denver, Colorado 80225, telephone 303-236-4377 or

Rita Reisor, U.S. Fish and Wildlife Service, 2369 West Orton Circle, West Valley City, Utah 84119, telephone 801-975-3330

11. Service Approval

Survey reports for sites in Colorado shall be submitted to either of the two Colorado addresses above. The Service will review submitted reports and reply with a written letter of acceptance within 30 days of receipt of the report. If the survey report is judged insufficient for any reason, the Service will notify the author within 30 days and discuss revisions. If the report is judged insufficient due to an inadequate survey, the Service will make every effort to notify the author promptly so that a satisfactory survey may be completed during the allowed survey time. However, given the narrow survey time frame, it may not be possible to rectify an inadequate survey effort during the current field season.

Surveys will be considered final for three years. If habitat alteration has not begun within three years, the Service must be contacted regarding the need for a survey update.

12. Service Follow-up

Survey reports and maps will be retained by the Service. Ecological information will be summarized and used to improve our understanding of *Spiranthes diluvialis* habitat and help predict actual and potential habitat. The Service will prepare periodic reports to keep the public informed about the distribution and ecology of *Spiranthes diluvialis*. The reports will include recommendations for protection strategies and habitat management practices and will identify additional research needs.

Survey requirements will be revised as appropriate based upon the most current available information.