BIOLOGICAL OPINION
FOR THE
ORA BRIDGE PROJECT
FREMONT COUNTY, IDAHO

01EIFW00-2017-F-1009

FISH AND WILDLIFE SERVICE
IDAHO FISH AND WILDLIFE OFFICE
BOISE, IDAHO

Supervisor Laura N Berglund, Acting

Date 9/22/17

TABLE OF CONTENTS

TABLE OF FIGURES

I. INTRODUCTION

This document represents the U.S. Fish and Wildlife Service's (Service) biological opinion (Opinion) on the effects to the threatened Ute Ladies'-tresses (*Spiranthes diluvialis*) from the Federal Highways Administration's (FHWA) proposed Ora Bridge Project and the associated Army Corps of Engineers' (Corps) issuance of a 404 permit in Fremont County, Idaho. This Opinion was prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; [Act]). The FHWA's request for consultation was received on June 1, 2017.

This Opinion is primarily based on the FHWA's *Ora Bridge Biological Assessment* (HDR 2017, entire), dated May 15, 2017, and other sources of information cited herein. The biological assessment (Assessment) is incorporated by reference in this Opinion.

A. Consultation History

The Idaho Transportation Department (ITD) determined the existing Ora Bridge structurally deficient (Assessment, p. ES-1). On September 7, 2012, a species list was obtained for the project location and was updated October 17, 2014, October 12, 2016, and May 15, 2017. On December 29, 2014, the FHWA determined the proposed action would have no effect on listed species in the action area; however, after vegetation clearing for a geotechnical survey and a subsequent survey for Ute ladies'-tresses (ULT), the No Effect determination was withdrawn and consultation was initiated with the Service.

A chronology of this consultation is presented below. A complete decision record for this consultation is on file at the Service's Eastern Idaho Field Office in Chubbuck, Idaho.

September 13, 2016	The Service participates in a conference call to discuss the proposed action, history of the project, and the need for consultation.
March 1, 2017 to May 18, 2017	The Service reviews and comments on multiple versions of the draft biological assessment through a series of emails.
June 1, 2017	The Service receives the final biological assessment and request for initiation of consultation from the FHWA.
June 5, 2017	The Service acknowledges the FWHA's request for consultation and notifies the FHWA that all required information has been provided.

B. Purpose and Organization of this Biological Opinion

In accordance with the requirements of section 7(a)(2) of the Act and its implementing regulations, the formal consultation process culminates in the Service's issuance of an Opinion that sets forth the basis for a determination as to whether the proposed Federal action is likely to jeopardize the continued existence of listed species or to destroy or adversely modify critical habitat, as appropriate. The regulatory definition of jeopardy and a description of the formal

consultation process are provided at 50 CFR[1] §402.02 and §402.14, respectively. If the Service finds that the action is not likely to jeopardize a listed species, but anticipates that it is likely to cause incidental take of the species, then the Service must identify that take and exempt it from the prohibitions against such take under section 9 of the Act through an Incidental Take Statement.

Take as described under section 9(a)(1) of the Act does not apply to plants, and therefore, this Opinion does not include an incidental take statement. However, prohibited acts for federally endangered plants are described in section 9(a)(2) of the Act and are modified and applied to threatened plants under CFR §17.61 and CFR §17.71.

1. Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis for the ULT in this Opinion relies on four components:

- *Status of the Species*, which evaluates the rangewide condition of the ULT, the factors responsible for that condition, and its survival and recovery needs;
- *Environmental Baseline*, which supplements the findings of the *Status of the Species* analysis by specifically evaluating the condition of ULT in the action area, the factors responsible for that condition, and the role of the action area in the survival and recovery of the ULT;
- *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on ULT; and
- *Cumulative Effects*, which evaluates the effects of future, non-Federal activities reasonably certain to occur in the action area on ULT.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of ULT's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of ULT at the rangewide scale.

II. DESCRIPTION OF THE PROPOSED ACTION

A. Action Area

The term "action area" is defined in the regulations as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action". An

[1] CFR represents the Code of Federal Regulations which is a codification of the general and permanent rules published in the Federal Register by Executive departments and agencies of the Federal Government. It is published by the Office of the Federal Register National Archives and Records Administration. More information can be found at http://www.gpoaccess.gov/cfr/index.html

action includes activities or programs "directly or indirectly causing modifications to the land, water, or air" (50 CFR §402.02). In this case, the area where land, water, or air is likely to be affected includes approximately 305 meters (m ; 1000 feet [ft]) of the Henrys Fork of the Snake River between mileposts 101.224 and 101.565 on the E. 1300 N. Road (Assessment, p. 1). This reach includes the area of the existing Ora Bridge, and sections of Arcadia Road and Cedar Lake Lane. Photos of the action area are located in the Assessment (Figures 1 and 2).

B. Proposed Action

The term "action" is defined in the implementing regulations for section 7 as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas" (50 CFR §402.02).

The FHWA's proposed action is the removal of the existing Ora Bridge and construction of a new bridge approximately 183 m (600 ft) downstream from the existing structure. The proposed action includes improving the horizontal curves approaching the existing bridge, reducing the roadway vertical grades, and widening the roadway to allow for two-way traffic. The proposed action would also require the acquisition of a 404 permit from the Corps and a Construction General Permit from the Environmental Protection Agency for a National Pollutant Discharge Elimination System Storm Water Pollution Prevention Plan.

The proposed action includes: 1) project staging and installation of the Stormwater Pollution Prevention Measures (SPPM), 2) dewatering of the Henrys Fork, 3) construction of a temporary work bridge, 4) construction of a new substructure, 5) construction of a new superstructure, 6) construction of roadway approaches, 7) removal of the existing bridge, 8) site cleanup and erosion control seeding, and 9) removal of the SPPMs. Conservation measures are also included as part of the proposed action (Assessment, pp. 12-13). The proposed action is described in detail in the Assessment (pp. 2-13) and below.

1. Project Staging and Stormwater Pollution Prevention Measures

The proposed action includes the creation of project staging areas, which may include vegetation clearing, to provide storage for construction materials. The contractor will utilize best management practices (BMPs) for stormwater and sediment control, which will be in place throughout the entire construction period. BMPs may include placement of silt fences or other protective materials, as well as roadside swales and piping to channel stormwater runoff to infiltration ponds (Assessment, pp. 2-3). Construction of the infiltration ponds will occur outside of potential ULT habitat. The SPPMs will be removed upon establishment of erosion control seeding.

2. Dewatering

The contractor will install temporary cofferdams around the perimeter of the pier foundations for the new bridge, and place seal concrete inside the cofferdams. After the concrete has cured, the cofferdams will be dewatered to allow access for the pier construction.

3. Construct Temporary Work Bridge

The contractor will construct a temporary work bridge on the north side of the new bridge location. The temporary bridge will provide access for equipment and personnel during new bridge construction. Once construction is complete, the temporary bridge will be removed.

4. Construction of New Substructure

The construction of the north abutment includes blasting due to the existing bedrock and outcropping. The west side of the river abutment will be setback from the rock face. Construction of the bridge's south abutment will require a mechanically-stabilized earth wall or retaining wall, which requires driving piles to a depth of approximately 24 m (80 ft) below the grounds surface. The south abutment construction includes the filling and capping of a man-made pond, at the north edge of the wetland, to within 12 m (40 ft) of the retaining wall. Construction of the bridge superstructure requires three cast-in-place concrete piers for support. Two of the piers will be placed in the river; one will be located on an island in the river. Each pier will have two circular columns supported on driven pile foundations.

5. Construction of the Superstructure

The new bridge superstructure includes 72 inch (in) bulb tee pre-stressed girders with an 8 in concrete deck. The pre-stressed girders will be fabricated off-site, hauled to the site, and placed on the newly constructed abutments and piers. After the girders are set, the concrete deck will be cast-in-place. The new bridge will be a two-lane, four span structure.

6. Construction of the Roadway Approaches

Bridge construction includes approximately 357 m (1,170 linear ft) of new roadway approaches. The proposed action also includes terminating the existing roadway at a new cul-de-sac for driveway access on the south side of the roadway and parking for the informal fishing area.

7. Removal of the Existing Bridge

The existing bridge will be demolished and removed from the site. In accordance with the ITD Standards, the piers will be reduced down to the natural streambed bottom. Removal of the existing bridge includes retaining the existing roadway on the north side of the river up to approximately 40 m (130 ft) north of the existing north abutment. The existing roadway on the south side will be retained up to approximately 55 m (180 ft) south of the existing south abutment.

8. Site Cleanup and Erosion Control Seeding

Disturbed areas will be seeded with an ITD approved native seed mixture as soon as earthwork and final grading are complete. Seeding will occur during approved seeding windows.

C. Term of Action

The proposed action will occur between March 1 and November 30 for 2 to 3 years, with an expected cumulative construction time of 14 months. A detailed timeline is located in the Assessment (p. 2).

D. Proposed Conservation Measures

The proposed action includes conservation measures intended to reduce the degree of impacts on ULT and its habitat. The Service considers these measures essential to limit impacts to ULT and its habitat. If any of these measures are not implemented, there may be effects of the action that were not considered in this Opinion, and reinitiation of consultation may be required. The conservation measures to be implemented as part of the proposed action can be found in the Assessment (pp. 12-13).

1. Project Staging and Installation of the SPPMs

Project staging areas will be located in areas identified as unsuitable ULT habitat. If vegetation clearing is needed in project staging areas with dense canopy cover, it is anticipated that ULT would not be recruited in these areas due to the other site characteristics that make the location unsuitable for ULT.

Installation of the SPPMs includes constructing a temporary fence at the boundary of the project footprint. The fence will be placed in upland areas around the perimeter of all wetland areas that could potentially support ULT habitat. The fence will be removed upon completion of bridge construction.

The stormwater BMPs will be designed and installed to control surface water contamination as well as avoid disturbance to ULT habitat. Stormwater will be diverted from areas identified as suitable ULT habitat and the infiltration ponds will be located in areas where ULT have not been documented and where habitat is not suitable. The ponds would remain after completion of construction. Certified weed free straw would be used for stormwater BMPs to avoid introducing invasive species.

2. Dewatering

Cofferdams will be placed to avoid areas identified as potentially suitable ULT habitat. Dewatering activities are designed not to alter hydrologic features associated with ULT habitat.

3. Bridge Construction and Removal

Conservation measures for bridge construction apply to all aspects of the bridge construction and removal, including the temporary work bridge, the new substructure, the superstructure, the roadway approaches, and the removal of the existing bridge. The conservation measures include fueling of construction equipment in approved areas and the use of spill prevention and containment materials to avoid contamination of potential ULT habitat. The conservation

measures also include the application of stormwater prevention materials to minimize the chances of accidental contamination or impact to ULT or its habitat.

Ground disturbance will not occur during wet conditions (during or immediately following rain events) and would not take place in areas identified as potentially suitable ULT habitat. Unless otherwise specified, the conservation measures using water for dust control during ground disturbance and throughout the construction phase would be in compliance with the ITD's standard protocol. If additional soil material is needed for earthwork, those soil materials will be free of invasive species to avoid accidentally introducing unwanted species in ULT habitat.

4. Site Cleanup and Erosion Control Seeding

The protective fence around ULT habitat will remain in place until all unused materials are removed from the site. A certified weed free seed mix will be used to control erosion and avoid introducing invasive species upon completion of construction activities.

5. Removal of Stormwater Pollution Prevention Measures

Stormwater BMPs will be located in areas identified as unsuitable ULT habitat. All remaining stormwater BMPs will be removed when the erosion control seeding efforts are determined successful.

III. STATUS OF THE UTE LADIES'-TRESSES

This section presents information about the regulatory, biological, and ecological status of ULT at a rangewide scale that provides context for evaluating the significance of probable effects caused by the proposed action.

A. Regulatory Status

The Service listed ULT as threatened throughout its range under the Act on January 17, 1992 (57 CFR §17.12). Critical habitat has not been designated for the species. A draft recovery plan was prepared, but has not been finalized (USFWS 1995). The status of the species was derived from the draft recovery plan, a range-wide status review (Fertig *et al.* 2005), and additional sources as cited below.

B. Species Description

The ULT is a perennial orchid (member of the plant family Orchidaceae) that is difficult to distinguish from other vegetation because it initially emerges above ground as a rosette of thickened leaves and often grows in dense herbaceous vegetation. Its leaves are alternate in arrangement, linear-lanceolate in shape, up to 1.5 centimeter (cm; 0.6 in) wide, and 28 cm (11 in) long; with the largest leaves near the base. The slender, and usually solitary, flowering stems are 20 to 50 cm (8-20 in) tall and terminate in a spike inflorescence 3 to 15 cm (1-6 in) long with numerous white or ivory flowers (Sheviak 1984, p. 11; Fertig *et al.* 2005, p. 7). Individual

flowers are 7.5 to 15 millimeter (mm; 0.29-0.59 in) long and have a faint coumarin (vanilla-like) fragrance.

C. Life History and Population Dynamics

The life cycle of ULT consists of four stages (Figure 1): vegetative, reproductive (flowering or fruiting), seedling, and dormant.

1. Vegetative

ULT produces new vegetative shoots in October, which persist through the winter as small rosettes (Fertig *et al.* 2005, p. 69). These rosettes resume growth in the spring and develop into short-stemmed leafy, photosynthetic plants. Depending on site productivity and conditions, vegetative shoots may remain in this state all summer or develop inflorescences. Vegetative individuals can die back in the winter to subterranean roots or persist as winter rosettes. Long term demographic monitoring studies indicate that vegetative or reproductive ULT plants can revert to a below-ground existence (dormant) for as many as four consecutive growing seasons before reemerging above ground (Fertig *et al.* 2005, p. 68).

2. Reproductive

Across its range ULT can bloom from early-July to late-October, but typically blooms from mid-July through August (Fertig *et al.* 2005, p. 69). Fruits are produced in late August or September across most of the range, with seed shed shortly thereafter (Fertig *et al.* 2005, p. 67). Bees are the primary pollinators of ULT, particularly solitary bees in the genus *Anthophora*, bumblebees in the genus *Bombus*, and occasionally non-native honeybees (*Apis mellifera*; Fertig *et al.* 2005, p. 69). ULT seeds are microscopic, dust-like, and readily dispersed by wind or water. A plant may produce as many as 100,000 seeds per year (Fertig *et al.* 2005, p. 67).

3. Seedling

Because of their minute size, ULT seeds contain little stored energy to sustain embryos and are probably short-lived in soil. It is hypothesized that germinated seedlings must quickly establish a symbiotic relationship with mycorrhizal soil fungi in order to survive. The absence or rarity of appropriate fungal symbionts in the soil may be a major factor limiting the establishment of new ULT populations (Fertig *et al.* 2005, p. 67). Seedlings may develop slowly into large, dormant mycorrhizal roots or grow directly into above-ground vegetative shoots (Wells 1981), but neither have been confirmed in the wild.

4. Dormant

ULT can develop through two paths into dormancy, either from seed or from vegetative state. Data are unavailable on the number of years required for subterranean ULT roots to reach sufficient size to develop aboveground leafy shoots, though related *Spiranthes* taxa may remain dormant for 8 to 11 years (Fertig *et al.* 2005, p. 68). As noted above, vegetative or reproductive ULT plants can revert to a dormant existence for as many as four consecutive growing seasons

before reemerging above ground (Fertig *et al.* 2005, p. 68). Although considered dormant, subterranean plants remain metabolically active and derive nourishment from the mycorrhizal partners or food stores laid down when photosynthetic shoots were present. Dormancy demographics are not well understood for ULT; however, Orchidaceae have a range of dormancy from 25 to 85 percent of the population. Additional research is required to understand fully ULT dormancy demographics.

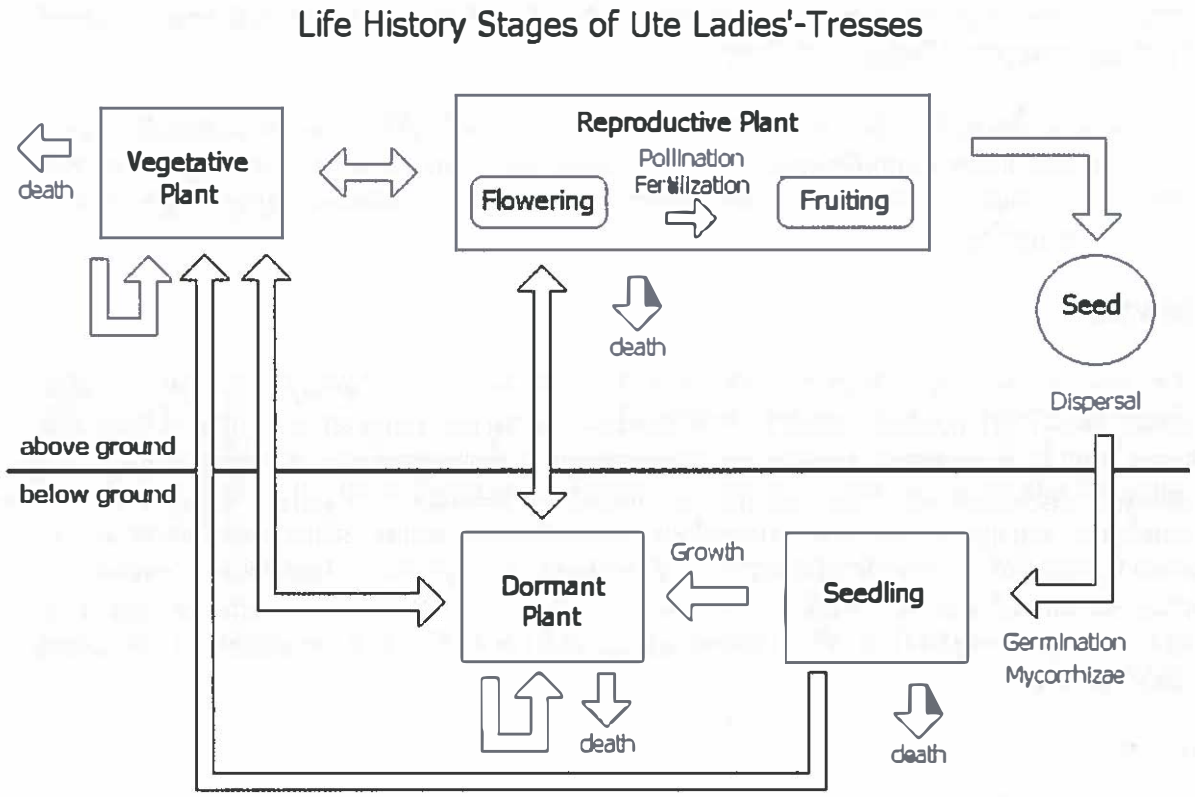

Figure 1. Life history model of Ute ladies'-tresses taken from Fertig *et al* 2005 (Figure 11). Arrows indicate transitions from one lifestage to another.

5. Population Dynamics

The relative proportion of plants in each of the four life stages can vary widely over time and between different colonies. Monitoring in Colorado and Utah found that dormant plants in a plot could change from 0 to 20 percent from year to year (Fertig *et al.* 2005, p. 70).

Flowering individuals are necessary to reliably distinguish ULT from other similar-looking plants species, and surveys during flowering season maximize the likelihood of detecting ULT among dense stands of other herbaceous plant species. Most ULT survey and monitoring studies are based on numbers of flowing plants, as these are easiest to detect in dense vegetation. Unfortunately, such counts underestimate the contribution of vegetative, fruiting, and belowground dormant plants to the total population. Also, ULT does not flower consistently from one year to the next. As a result, surveys in which only flowering stems are tallied are of limited value for assessing population trends.

Counts based only on flowering individuals tend to exhibit large annual fluctuations. Arft (1995, p. 47) discovered that the number of flowering individuals at South Boulder Creek varied 23 to 79 percent between years. Despite the variability in numbers across life stages, Arft (1995, p. 63) found that overall population trends were stable when counts for all life stages were included.

Dormant plants are especially difficult to census and *Spiranthes* can be dormant from 8 to 10 years with between 25 and 85 percent of the population dormant. Typically, ULT persists underground for many years and can only be reliably documented after several years of repeated and detailed mapping (Fertig *et al.* 2005).

There is also a strong correlation between the degree of survey effort and documented population size. The largest known populations have either undergone extensive one-year surveys or been continuously monitored for three or more years. Thus, low population size may be an artifact of incomplete sampling.

6. Habitat

ULT occurs in a variety of human-modified and natural habitats including seasonally flooded river terraces, riparian edges, moist to wet meadows along perennial streams, gravel bars, old oxbows, high flow channels, sub-irrigated or spring-fed abandoned stream channels and valleys, lakeshores, and human-modified riparian and lacustrine habitats. Typically, ULT occurs in stable wetland and seep areas within historical floodplains of major rivers. Many populations are in riparian habitats of wide valley floodplains at the base of mountains where narrow stream reaches become unconfined (Fertig *et al.* 2005, p. 22). ULT occurs at elevations ranging from 220 to 558 m (729-1830 ft) in Washington and up to 2134 m (7000 ft) in northern Utah (Fertig *et al.* 2005, p. 21).

Soil

ULT is restricted to a small, sporadic microhabitat represented by calcareous, wet-mesic, temporarily inundated meadows in shallow wetlands (Assessment, p. 16). Streamside populations of ULT typically occur on shallow alluvial soils overlying permeable cobbles, gravels, and sediments. Most sites were reported from openings where vegetation cover was not overly dense or heavily grazed (57 CFR §17.12).

Vegetation

Most ULT sites have mid-successional vegetation (well-established grasses and forbs) communities that are maintained by human disturbances such as livestock grazing, mowing, ditch and irrigation maintenance, or prescribed fire (Fertig *et al.* 2005, p. 22) . ULT may persist for some time in the grassy understory of woody riparian shrublands, but does not appear to thrive under these conditions (Fertig *et al.* 2005, p. 22).

Hydrology

Nearly all streambank, floodplain, and abandoned oxbow sites occupied by ULT have a high water table, 12.5 to 45 cm (5 to 18 in) from the surface, augmented by seasonal flooding, snowmelt, runoff, and often irrigation (Fertig *et al.* 2005, p. 22). Soils must be sufficiently stable and moist in the summer flowering season to support the species (Fertig *et al.* 2005, p. 31). Sites located in springs or sub-irrigated meadows appear to be fed by groundwater rather than surface flows. Less is known about the average depths to groundwater in these locations, but it is reasonable to assume that (as with locations where groundwater depths have been quantified) groundwater must remain relatively close to the surface in order to sustain the moist soils consistently associated with ULT.

The following is a summary of each of the major hydrology and habitat types occupied by ULT across its range: perennial streams, rivers, lakeshore/reservoirs, groundwater-fed springs or sub-irrigated meadows, human-influenced riparian habitat.

Perennial Streams

Perennial stream habitats occur most frequently in the: foothills of the southern Rocky Mountains and Wasatch Front; Colorado Plateau; and western Great Plains in Colorado, Utah, Nebraska, and Wyoming. Periodic flood events rework alluvial bars and terraces within these stream systems to create early successional conditions conducive to the establishment or persistence of ULT colonies. Most streamside populations are dominated by perennial graminoids and forbs. These habitats typically have short vegetative cover maintained by grazing, periodic flooding, or mowing. In the absence of disturbance or as sites become drier, streamside wet meadow habitats may become encroached by riparian shrub or woodland vegetation dominated by narrowleaf cottonwood, narrowleaf willow, or water birch.

Rivers

River floodplain habitats resemble those associated with perennial streams, but experience regular spring flooding and frequent large-scale floods that both create new sandbars and terraces and bury or eliminate existing surfaces. This habitat type occurs along the Green River in Colorado and Utah, the South Fork and Henrys Fork of the Snake River in Idaho, and the Missouri River in southwest Montana (Fertig *et al.* 2005, p. 25). Most of these sites are regulated by dams, which have altered their historic flooding dynamics (Moseley 1997, p. 17). On the Green River, ULT populations occur on level, post dam floodplains that average 0.8 m (2.6 ft) above base flow water levels (and which are flooded each spring) as well as slightly higher sandy benches up to 1.9 m (6.2 ft) above base flow that flood only in infrequent high-water events (Fertig *et al.* 2005, p. 26). Small, relictual orchid populations may still occur on older, pre-dam surfaces in Lodore Canyon on the Green River, but current flood levels are probably insufficient to maintain early to mid seral conditions favorable for new ULT establishment (Fertig *et al.* 2005, p. 26).

Based on historical photos, inferred successional sequences, and lead (Pb) isotope dating, researchers believe that most ULT populations in Idaho are found on alluvial surfaces that

formed before the Palisades Dam was completed in 1956 (Fertig *et al.* 2005, p. 26). Populations may occur within 0.4 to 1.2 m (1.3-3.9 ft) of the base flow water level within the typical spring flood zone (usually 20,00 cfs) or on higher terraces that are only rarely flooded in extreme high water events (such as the summer of 1997 flood with 43,000 cfs). To support ULT occurrences, soils have to be sufficiently stable and moist in the summer flowering season. One population at Black Canyon, Idaho, is found on a cobble bar that formed after Palisades Dam was completed. This site is frequently flooded, but scouring is reduced due to the presence of willow vegetation (Fertig *et al.* 2005, p. 31). At least two other colonies along the Snake River, in Idaho, are found on levees built in the last 40 years.

ULT along the Snake River are frequently associated with silverberry or narrowleaf willow shrublands intermixed with mesic creeping bent grass or sedge meadows. Wetter or earlier seral sites may be dominated by smooth horsetail. Occasionally, ULT are also found in moist swales within narrowleaf cottonwood/redosier dogwood woodlands, or along the banks of backwater sloughs. Habitat trend monitoring in Idaho has documented short-term increases in woody cover at several ULT locations, which, if not affected by flood events, may lead to loss of suitable orchid habitat.

Lakes and Reservoirs

ULT occur at two locations in Washington and are associated with lakes or reservoirs. The Wannacut Lake population is found on alkaline and moderately salty flats that have been exposed as the lake level fluctuates in response to drought. The Columbia Plateau population is distributed along the shore of Rocky Reach Reservoir and a small pond adjacent to the Columbia River on seasonally flooded low-lying gravel bars. Frequent flooding and a high water table maintain the vegetation at this site in an early mid-seral state.

Groundwater-fed Springs

ULT populations are associated with spring-fed or sub-irrigated moist meadow habitats in southwest Montana, eastern Colorado, Idaho, northern Utah, and Nevada. In Montana, wet meadows irrigated by groundwater occur in depressions, valley bottoms, and swampy lowlands characterized by a high water table and silty to loamy calcic soils with surface accumulations of crumbly, limey, marl (Heidel 2001, pp. 4-5; Fertig *et al.* 2005, p. 32). Because these wetlands mostly occur well outside of active river and stream channels, they are not directly impacted by seasonal or periodic flood events. Edaphic characters, in addition to fire and grazing, are sufficient to prevent the invasion of later seral shrub or grassland vegetation into ULT habitat (Fertig *et al.* 2005, p. 32).

Multiple spring sites support ULT populations along the Wasatch Front in the Greater Salt Lake City area of northern Utah. These sites may be found in proximity to lake or stream habitats, but their apparent hydrology is driven by groundwater rather than perennial surface flows. In at least one site, a spring-fed wet meadow with ULT has developed in a former peat bog that was abandoned following mining activity.

In the Great Basin, ULT populations are known from two spring-fed desert wetland sites. The Tooele County, Utah, occurrence is found in a sub-irrigated meadow that is currently managed as cattle pasture (Fertig *et al.* 2005, p. 33). The Nevada location was thought to have been converted to an alfalfa pasture before being rediscovered adjacent to a hummocky warm spring in 2005 (Fertig *et al.* 2005, p. 33). Since many desert spring sites in the Great Basin have been converted to agriculture or developed for livestock watering the original extent of ULT in this region will probably never be known.

Human-influenced Riparian Habitat

ULT populations have been documented from perennial stream, river, lakeshore, and spring sites directly associated with human-developed dams, levees, reservoirs, irrigation ditches, reclaimed gravel quarries, roadside borrow pits, and irrigated meadows (Fertig *et al.* 2005, p. 33). In 2005, 33 of 61 documented populations (54%) occurred in sites where the natural hydrology had been influenced by dams, reservoirs, or supplemental irrigation (Fertig *et al.* 2005, p. 33). Even sites with undisturbed hydrology, however, have been influenced by human agricultural practices, urban development, or road and dam construction. The magnitude, timing, duration, and permanence of these human-induced changes vary widely.

D. Distribution and Status

At the time of listing in 1992, the Service identified ULT in only 10 extant populations within portions of two states, Colorado and Utah (57 CFR §17.12). At that time, those 10 populations encompassed approximately 170 acres of occupied habitat with 6,000 plants. At listing, the species was presumed extirpated in Nevada (Fertig *et al.* 2005, p. 34).

Since listing, ULT was rediscovered in Nevada, and new populations were discovered in southern Idaho, southwestern Montana, western Nebraska, central and northern Washington, and southeastern Wyoming (Fertig *et al.* 2005, p. 33), and in south central British Columbia (Bjork 2007, p. 366). In 2005, 53 populations (encompassing 674-784 acres of habitat) were considered extant across the range of the species (Fertig *et al.* 2005, p. 62). The locations of known ULT local populations is shown in Figure 2 below. Based on the maximum number of plants reported for each known occurrence from 1985 to 2005 the total rangewide number of ULT is estimated to be least 83,316 plants (Fertig *et al.* 2005, p. 62). This estimate assumes that annual variation in plant numbers was more due to missing dormant plants than a response to environmental change (Fertig *et al.* 2005, p. 62).

In 2005, Utah had the most populations (23), the largest amount of occupied habitat (234-308 acres), and the highest number of reported plants (47,859) of any state (Fertig *et al.* 2005, p. 63). Colorado was second with 24,166 plants in eight extant occurrences and 173 to 200 acres of occupied habitat. The majority of known populations (66 percent) occupied between 0.1 and 10 acres, whereas relatively few (4.9%) occupied more than 50 acres (Fertig *et al.* 2005, p. 63). Between 1993 and 2005 there were five states added to the range of ULT, of which, Idaho contributed the greatest number of plants (7,807 individuals over 74-83 acers), while Montana contributed the largest number of populations (11). Individual populations ranged in size from 1 to 28,693 plants within 0.1 acre to 125 acres of occupied habitat (Fertig *et al.* 2005, p. 63).

In Idaho, ULT was first discovered in 1996 along the South Fork of the Snake River in Jefferson, Madison, and Bonneville Counties (Fertig *et al.* 2005, p. 12; Mosely 1997, p. 1). In 2002, a new occurrence was discovered at the Chester Wetlands segment of the Idaho Department of Fish and Game's Sand Creek Wildlife Management Area on the Henrys Fork River (ICDC 2006, p. 1). The Chester Wetland occurrence is approximately 40 kilometers (km; 25 miles [mi]) north-northeast of the nearest occurrence on the Snake River. In 2003, an occurrence was discovered on private land along the Texas Slough, a drainage-way in the Snake River's historical floodplain (Fertig *et al.* 2005, p. 16). The species is now known from Bonneville, Fremont, Jefferson, and Madison Counties along the Snake River and from wetland sites along the Henrys Fork River (Fertig *et al.* 2005, p. 12). Idaho populations occur in the Idaho Falls, Palisades, and Lower Henrys watersheds (Fertig *et al.* 2005, p. 12).

In Idaho, 24 populations of ULT are present (Miller 2010, p. 2). These sites were assessed in 2009 and 2014; however, summary information for the species is available only from 2009 (Miller, 2017, *in litt*). The 24 populations represent eight element occurrences within Idaho. Four populations are found on U.S. Forest Service lands, sixteen on Bureau of Land Management lands, and four on private lands. The few populations found on private land and on Fort Hall reservation do not receive monitoring. From the 2009 census work, approximately 3,117 plants were counted in the Idaho populations (Miller 2010, p. 2).

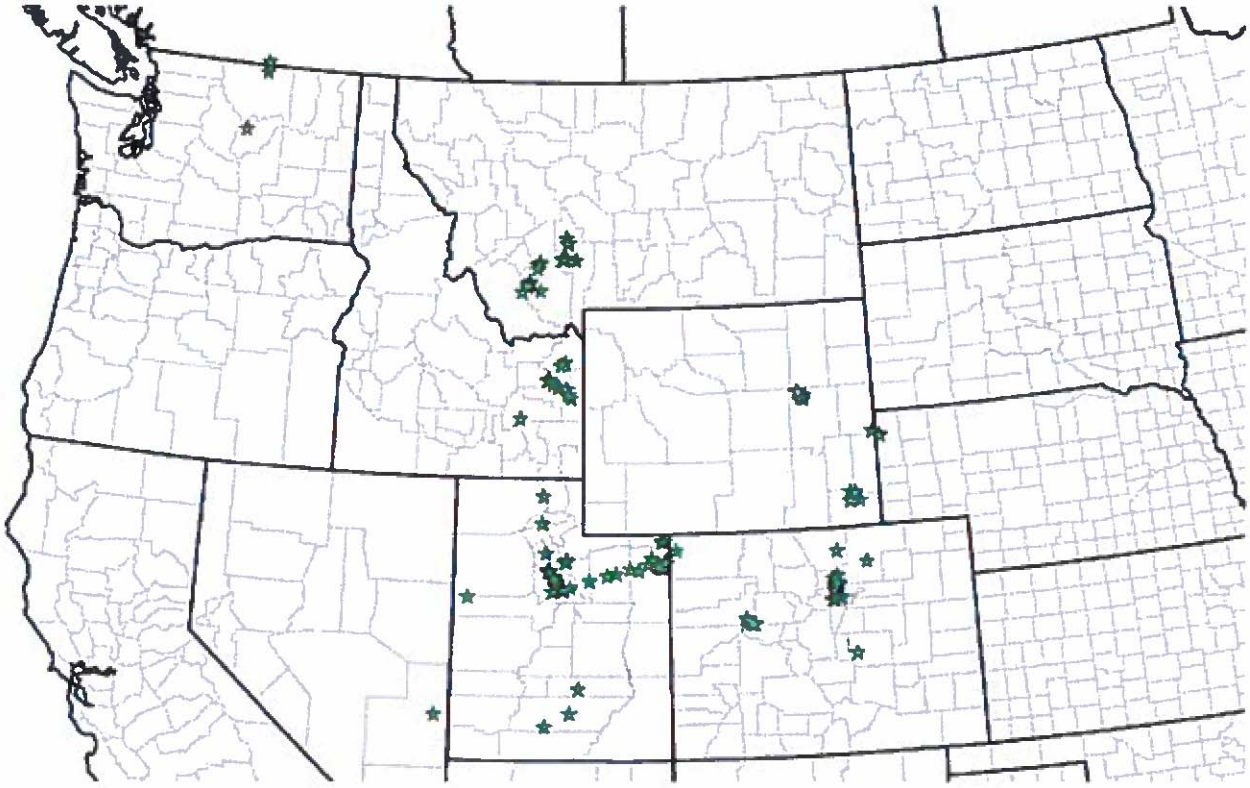

Figure 2. Distribution map of Ute ladies'-tresses in western North America 2017. Occurrences are indicated by a green star (Hadley 2017, *in litt*).

E. Threats

At the time of listing, the Service identified habitat loss and modification as the primary threat to the species, but also noted that small population sizes and low reproductive rates rendered ULT vulnerable to other threats (57 CFR §17.12). The Service's listing rule identified several specific forms of habitat loss and modification as threats to ULT, including: urbanization, water development and conversion of lands to agriculture, excessive livestock grazing, excessive or inappropriate use of herbicides or other chemicals, and the proliferation of invasive exotic plant species. In addition, the Service concluded that the species could be subject to over-collection.

Today many of these threats affect ULT, at least at the site-specific level (Fertig *et al.* 2005, p. 81), and some newer threats have emerged. For example, over-collection has not materialized as a specific threat to ULT, while vegetation succession and losses or reductions in pollinators appear to be new threats. Current threats include competition from invasive species, vegetative succession, road and infrastructure construction, and changes in hydrology.

F. Recovery Measures for ULT

The Service developed a draft recovery plan for ULT (USFWS 1995), but this has not been finalized. This draft plan has three primary objectives for achieving recovery:

1. Obtaining information on life history, demographics, habitat requirements, and watershed processes that will allow specification of management and population goals and monitoring progress;

2. Managing watersheds to perpetuate or enhance viable populations of the orchid; and

3. Protecting and managing ULT populations in wet meadow, seep, and spring habitats.

The draft recovery plan identified several action items needed to achieve these objectives. To date, progress has been made on elucidating the life history, demography, pollination biology, genetic structure, and habitat dynamics of ULT (Fertig *et al.* 2005, p. 91). The known habitat of ULT has broadened with the discovery of riverine populations in Utah, Idaho, and Washington, and there is a need to expand conservation targets in objective 3.

Monitoring of species numbers, certain demographic parameters, and habitat characteristics has improved our understanding of population fluctuations, habitat preferences, and threats to habitat conditions. Research has continued on pollination biology, genetics, and root-associated fungi. Research and monitoring have been conducted on the relationship of stream flows, groundwater levels, and stream channel form to surfaces on which the orchid occurs.

Less progress has been made on defining conservation units by watershed, developing watershed-based recovery goals, and informing the public about the merits of the watershed approach. Additionally, trend data and basic monitoring information are not available for most of the known occurrences, making it difficult to identify management needs and develop conservation priorities.

IV. ENVIRONMENTAL BASELINE FOR THE UTE LADIES'-TRESSES

The preamble to the implementing regulations for section 7 (USFWS 1986, p. 19932) contemplates that the evaluation of ". . . the present environment in which the species or critical habitat exists, as well as the environment that will exist when the action is completed, in terms of the totality of factors affecting the species or critical habitat . . . will serve as the baseline for determining the effects of the action on the species or critical habitat." The regulations at 50 CFR §402.02 define the environmental baseline to include "the past and present impacts of all Federal, State, or private actions and other human activities in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process." The analysis presented in this section supplements the above *Status of the Species* evaluations by focusing on the current condition of the ULT in the action area, the factors responsible for that condition, inclusive of the factors cited above in the regulatory definition of the environmental baseline, and the role the action area plays in the survival and recovery of the ULT. Relevant factors on lands surrounding the action area that are influencing the condition of the ULT were also considered in completing the status and baseline evaluations herein.

A. Status of ULT in the Action Area

The action area is approximately 9.3 km (5.8 mi) from the Chester Wetlands, the nearest ULT occurrence. Because of the suitability of the habitat in the action area and the proximity to existing ULT individuals, surveys were conducted in the project area in 2012, 2014, and 2016. Prior to the 2012 survey, ULT were not known to exist in the action area.

1. Population in the Action Area

All three surveys within the action area identified ULT in a specific microhabitat within the scrub-shrub wetland complex adjacent to, but not directly connected to, the river (Assessment, p. 17 and Figure 4). In 2012, the first survey discovered ULT in the action area (Assessment, p. 21). This survey found eight groupings of 57 plants. The 2014 survey found five groupings of 26 plants. The 2016 survey found four groupings of 210 plants. Although surveyors observed fewer individuals in 2014 when compared to the 2012 survey results, given the life cycle characteristics of the species, fewer individuals in 2014 may be a result of the timing of the survey or environmental factors and not an indication of human actions. As addressed in the *Status of the Species*, counts based only on flowering individuals tend to exhibit large annual fluctuations and may not accurately capture the population trends.

In 2014, an area (Group 1) was mechanically treated to clear vegetation for a geotechnical investigation. Prior to the treatment, Group 1 consisted of a dense stand of willows and was unsuitable habitat for ULT. The mechanical treatment removed willows to between 6 and 12 inches of the ground and left the roots remaining intact. The 2016 ULT survey identified ULT in the same microhabitat locations as the 2012 and 2014 surveys and an additional 111 new individuals in Group 1. We assume that trimming the willows in 2014 to support the geotechnical investigation improved the habitat condition and allowed ULT to establish in Group 1.

Island Park Dam was completed in the late 1930s and resulted in a modification of the hydrograph. The change in the hydrograph is assumed to be responsible for the increase of dense vegetation in the riparian corridor, including the area of Group 1. Because ULT have an estimated dormancy of 8 to 10 years, we assume ULT have not been dormant in Group 1 since the modification of the hydrograph (1938), but instead were the result of seed germination. At the time of the 2016 survey, willows had regrown to a height of approximately 1 m (3 ft). We assume that in time, willows in the area of Group 1 will grow to the previous height and density (2014 conditions) and the habitat will revert to a state unsuitable for ULT. As such, we assume the individuals in Group 1 will not continue to contribute reproductively to the local population. While future vegetation treatments are not expected or certain to occur, it should be noted that if they do occur, the ULT local population could temporarily increase as a result.

While evaluating the ULT plants from Group 1 it is helpful in understanding the environmental baseline; including them in the local population trend analysis artificially inflates the population numbers and does not accurately characterize the local population. Therefore, we base the local population on the three years of surveys (2012, 2014, and 2016) excluding Group 1.

Because of the variability of dormancy rates within ULT local populations and a lack of data, the total population in the action area is unknown. As such, we estimated a range of dormancy (15-85%) for each year of surveys. The 2012 survey observed 57 plants with an estimated local population of 76 to 380 individuals. The 2014 survey found 26 plants with an estimated local population of 35 to 174 plants. The 2016 survey found 210 plants; 99 plants were found in groups 2, 3, and 4, and 111 were observed in Group 1. Excluding individuals in Group 1, the 2016 estimated local population range is 132 to 660.

We assume that where these three ranges intersect represents the most accurate range for the local population. The intersection of the three years of survey results in a local population of 132 to 174 individuals (this includes the dormant life stage). This captures the upper range for 2012 (the lowest detection year) and the lower range for 2016 (the highest detection year).

2. Habitat Condition in the Action Area

The Ashton Dam is approximately 1219 m (4,000 ft) upriver of the action area, however, it is operated as "run of the river". The Island Park Dam, upriver of the Ashton Dam, restricts fluctuations in the hydrograph that are natural to undammed rivers. As such, the riverbanks, gravel bars, and islands associated with the river are more densely vegetated with either taller emergent marsh species or woody species such as willows and dogwoods. The increased vegetation cover and relatively stable banks and gravel bars have reduced the suitability of those areas as habitat for ULT. However, suitable ULT habitat is present in the action area on the south side of the river in the mixed emergent marsh and scrub-shrub wetland complex adjacent to, but not directly connected to, the river (Assessment, p. 17 and Figure 3).

The area where the wetland complex is located has been highly disturbed and was formerly used as a gravel borrow pit. There is a large manmade berm paralleling the river and separating the wetland complex from the riparian area adjacent to the river. There are several manmade ponds within the wetland complex as well as areas of emergent marsh. Several of the emergent marsh

wetlands have standing water and are not suitable for ULT habitat. Suitable ULT habitat is confined to specific microhabitat areas with minimal shrub canopy and no standing water.

Given the conditions of the river and its associated banks, islands, and gravel bars, it is unlikely that any individuals exist in areas other than the microhabitat areas within the wetland complex. It is assumed that any dormant plants would likely occur within these microhabitats as the hydrograph in the action area has been modified since the completion of the Island Park Dam and dormant plants are unlikely to have persisted (Assessment, Appendix D).

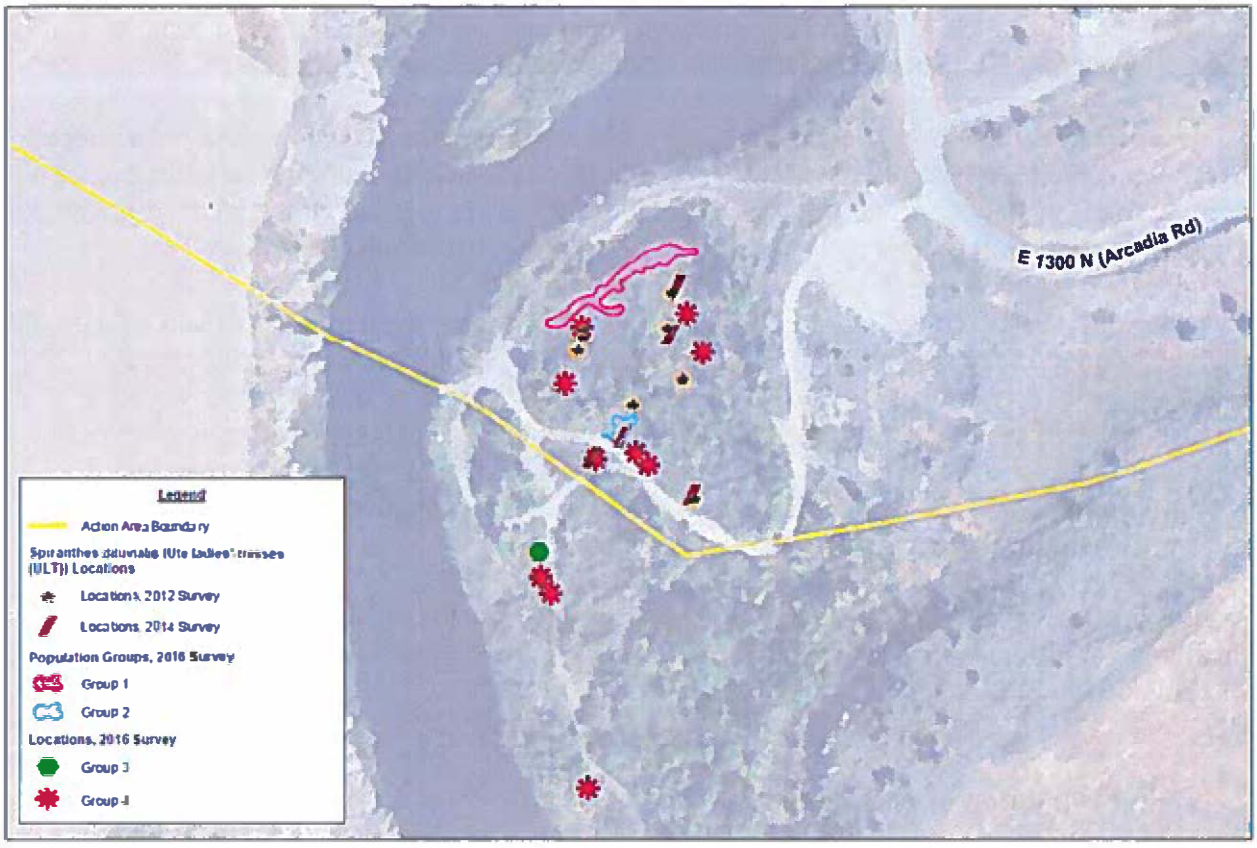

Figure 3. Ute ladies'-tresse distribution within the action area. Taken from the Assessment (Figure 4).

3. Threats in the Action Area

Human-caused and human-related factors represent the main threats to ULT in Idaho and within the action area. Current threats to ULT in the action area include vegetative succession, recreation, and changes in hydrology. It is assumed ULT were present prior to 2012 (initial discovery); however, without survey data prior to 2012, past effects of human activities, including the use of the informal fishing area, on the species or habitat in the action area are unknown (Assessment, p. 21). Continued recreational use of the action area for informal fishing presents a threat from trampling and has been reported as a potential threat at several sites along the Snake River. However, because of the long term use of the informal fishing area and the congruent existence of ULT in the action area it is difficult to quantify the precise level of this threat.

V. EFFECTS OF THE PROPOSED ACTION

A. Direct and Indirect Effects of the Proposed Action

The implementing regulations for section 7 define "effects of the action" as "the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline" (USFWS 1986, p. 19958). "Indirect effects" are caused by or result from the agency action, are later in time, but are still reasonably certain to occur (USFWS 1986, p. 19958).

In the following evaluation, the Service in part relied upon the effects analysis in the Assessment, which is based on a series of assumptions about ULT presence, distribution, and dormancy in the action area. Because of the construct of these assumptions, the analysis is more likely to result in an overestimate, rather than underestimate, of the impacts of the proposed action on ULT. When examining the potential impacts to a species that is listed as threatened under the Act, and there is substantial imprecision or uncertainty in some of the information, using assumptions that are more likely to overestimate, rather than underestimate, effects is a reasonably cautious and prudent approach for assessing impacts to populations of that species. Absent the consideration of the full potential of effects, detrimental impacts to the species can go unrecognized (National Research Council 1995, p. 167). The Service also relied on the published scientific literature to analyze the information presented in the Assessment and the anticipated impacts of the proposed action.

1. Effects at an Individual Plant Scale

Direct effects are those effects caused directly by the proposed action. Only the placement of the retaining wall and the associated earthwork at the south abutment will have a direct effect on ULT in the area of Group 1. Because of the effectiveness of the BMPs, design features, and the location of ULT within the action area, all other activities that are part of the proposed action (including project staging, the SPPMs, and dewatering) are not anticipated to affect ULT.

Group 1 is where willows were mechanically treated in 2014 (Assessment, p. 23). Approximately 45 square meters (m^2 ; 485 square feet [ft^2]) in Group 1 will be directly destroyed. The total area in Group 1 is approximately 343 m^2 (3,692 ft^2). In the 2016 survey, 111 individual ULT plants were observed. ULT populations are known to have a dormancy rate between 25 and 85 percent, meaning that the 111 flowering individuals identified in Group 1 could represent between 15 and 75 percent of the individual plants in Group 1. This results in a range for Group 1 of 148 to 740 plants.

We assume the individual plants in Group 1 resulted from a response to the vegetation treatment. As discussed in the *Environmental Baseline* section, we assume Group 1 is the result of recruitment rather than a response by dormant individuals. Therefore, for the purposes of estimating the number of individuals impacted by the proposed action, we assume the lower dormancy rate of 25 percent. Based on a 25 percent dormancy rate, 148 individuals could be present within Group 1. Given the total area and number of individuals, assuming even distribution, there are approximately 0.4 ULT individuals/m^2 (0.04 ULT/ft^2) in Group 1. The

proposed action anticipates 45 m^2 (485 ft^2) of ground disturbance and direct destruction of ULT individuals in Group 1. Using 0.4 ULT/m^2, 20 individual ULT (either dormant or vegetative) are anticipated to be negatively impacted as a result of the proposed action.

The placement of the retaining wall and associated earthworks at the south abutment are expected to permanently affect the existing habitat. However, as addressed in the *Environmental Baseline* section, the baseline condition of the habitat in Group 1 is unsuitable for ULT reproduction. As such, there are not expected to be impacts to ULT habitat from the proposed action.

Indirect effects are those effects that are caused by or will result from the proposed action and are reasonably certain to occur later in time. Indirect effects are not anticipated from the proposed action. Indirect effects to ULT could include effects to habitat from increased sportsman use. However, the proposed action does not create new parking areas and therefore sportsman use is not expected to change. As such, the proposed action is not anticipated to increase overall use of the area.

2. Effects at the Local Population and State Scales

Approximately 3,117 plants were counted in the 24 Idaho populations during the 2009 census (Miller 2010, p. 2). The action area contains a population of ULT, which until the 2012 survey was unknown, and increases the documented number of occurrences and population numbers of ULT in Idaho. The local population in the action area is estimated to range from 132 to 174 plants. The baseline condition of the habitat where individual ULT are anticipated to be affected (Group 1) is generally unsuitable habitat for ULT and not conducive for ULT growth and reproduction. Prior to vegetation clearing the condition of that habitat was unsuitable for ULT. During the 2016 survey, the vegetation had regrown to a height of 1 m (3 ft) and was expected to return to pre-clearing height within a few years, again making the habitat unsuitable for ULT. As such, the 20 ULT individuals in Group 1 expected to be destroyed as a result of the proposed action, are expected to return to a dormant state and remain in that state unable to contribute reproductively to the existing population. Therefore, the effect of the destruction of the 20 individual ULT as a result of the proposed action is not expected to have a measurable effect to the reproductive viability and population numbers of the local, state, or rangewide population.

B. Effects of Interrelated or Interdependent Actions

The implementing regulations of section 7 define interrelated actions as those that are a part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. The Service has not identified any actions that are interrelated or interdependent with the proposed action.

VI. CUMULATIVE EFFECTS

The implementing regulations for section 7 define cumulative effects to include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions that are unrelated to the proposed action are

not considered in this section because they require separate consultation pursuant to section 7 of the Act. No cumulative effects have been identified in this consultation.

VII. CONCLUSION

After reviewing the current status of the ULT, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the proposed action to replace the Ora Bridge in Idaho is not likely to jeopardize the continued existence of the Ute Ladies'-tresses. The Service's rationale for this determination is presented below. No critical habitat will be affected because none has been designated for this species.

Implementation of the proposed action will result in adverse effects to ULT in the action area (343 m^2 identified in the *Effects* section) due to direct destruction. Only 20 individual ULT plants are expected to be in the 343 m^2 area because the habitat is generally unsuitable for ULT. These individuals are expected to be directly impacted during project activities. As described in the *Effects* section, the ULT that are expected to be impacted are assumed to be the result of recruitment into the area of mechanical treatment. Those individuals, if left unaffected from the propose action, would be expected to be precluded from reproduction as a result of the increased density of the regenerated vegetation. Because of the low number of ULT likely to be in this area and the unsuitable nature of the habitat, the Service finds the level of impact unlikely to reduce appreciably the viability of the ULT population rangewide.

The species occurs in other areas of the Henrys Fork, southeastern Idaho, and adjacent states, and total species' numbers are estimated around 80,000. The proposed action is likely to have adverse effects to small numbers of ULT, but these effects are not likely to significantly change numbers and distribution of ULT in the action area, local population, or State. The loss of the 20 individuals from the estimated 3,000 individuals that occur in Idaho will not appreciably reduce the likelihood of the species' survival or recovery.

VIII. INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering.

Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement.

Section 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species, therefore we are not providing an incidental take statement in this biological opinion. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

IX. REPORTING REQUIREMENTS

FHWA shall submit a post-project report within 6 weeks of project completion. The report will include the project name, starting and ending dates for the work completed, and if any project actions changed from the proposed action. If the 343 m^2 area of impacts to ULT is exceeded, FHWA shall immediately notify the Service. The report shall be submitted to the Field Office Lead of the Service's Eastern Idaho Field Office in Chubbuck, Idaho.

X. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop new information on listed species.

The Service recommends monitoring for ULT presence in the action area until project completion to support the Service's assumptions of ULT presence in the action area.

XI. REINITIATION-CLOSING STATEMENT

This concludes formal consultation on FHWA's proposal to replace the Ora Bridge in Fremont County, Idaho. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this Opinion; or (3) a new species is listed or critical habitat designated that may be affected by the action.

XII. LITERATURE CITED

Arft, A. M. 1995. The genetics, demography, and conservation management of the rare orchid *Spiranthes diluvialis*. PhD dissertation. University of Colorado, Boulder, CO.

Bjork, Curtis. 2007. *Spiranthes diluvialis* Sheviak (ORCHIDACEAE). Madrono 54: 366-367.

Fertig, W. B., R. Black, and P. Wolken. 2005. Rangewide Status Review of Ute Ladies'-Tresses (*Spiranthes diluvialis*). Prepared for the U.S. Fish and Wildlife Service and the Central Utah Water Conservancy District. September 30, 2005. 101 pp.

HDR Inc. (HDR). 2017. Idaho Transportation Department Biological Assessment for Ora Bridge (Fremont County). Salt Lake City, Utah. 29 pp., plus appendices.

Heidel, B. 2001. Monitoring Ute Ladies'-Tresses (*Spiranthes diluvialis*), in Jefferson County, Montana, final report, 1996-2000. Report prepared for the Bureau of Land Management Montana State Office and Butte Field Office by the Montana Natural Heritage Program, Helena, Montana.

Idaho Conservation Data Center. (ICDC). 2006. 2003-2004 Ute ladies'-tresses (*Spiranthes diluvialis*) monitoring, inventory, and surveys at Chester Wetland, Idaho. Idaho Conservation Data Center, Idaho Department of Fish and Game, Boise, Idaho. 17 pp. plus appendices.

Miller, J. J. 2010. 2009 Ute ladies'-tresses (Spiranthes diluvialis) Monitoring on the South Fork Snake River, Idaho: Sixth Year Results. Idaho Natural Heritage Program. Idaho Department of Fish and Game, Boise, Idaho. 58 pp. plus appendices.

Moseley, R. K. 1997. 1997 Ute Ladies' Tresses (*Spiranthes diluvialis*) Inventory: Snake River Corridor and other Selected Areas. Unpublished report prepared for the Upper Snake River District Bureau of Land Management by the Idaho Conservation Data Center, Boise, Idaho. 18 pp., plus appendix.

National Research Council. 1995. Science and the Endangered Species Act. National Academy Press. Washington D.C. 271 pp.

Sheviak, C. J. 1984. *Spiranthes diluvialis* (Orchidaceae), a new species from the western United States. *Brittonia* 36(1): 8-14.

U.S. Fish and Wildlife Service (USFWS). 1986. Interagency Cooperation – Endangered Species Act of 1973, as amended; Final Rule. Federal Register, June 3, 1986. Vol. 51, No. 106 [also see 50 Code of Federal Regulations Part 402].

U.S. Fish and Wildlife Service (USFWS). 1992. Endangered and Threatened Wildlife and Plants; Final Rule To List the Plant Spiranthes Diluvialis (Ute Ladies'-Tresses) as a Threatened Species. Federal Register. Vol. 57: No. 12. 2048-2054. January 17, 1992.

U.S. Fish and Wildlife Service (USFWS). 1995. Ute ladies'-tresses (*Spiranthes diluvialis*) recovery plan. U.S. Fish and Wildlife Service, Denver, Colorado. 46 pp.

Wells, T. C. E. 1981. Population Ecology of Terrestrial Orchids. In: Syng H (ed) The Biological Aspects of Rare Plant Conservation. John Wiley & Sons, Ltd., New York, pp. 281-295.

***In Litt* References**

Handley, J. 2017, *in litt.* Email from Joy Handley, Botanist (Wyoming Natural Diversity Database) to Kristen Lohr, Biologist, (U.S. Fish and Wildlife Service, Boise, Idaho). Subject: Project Update: Distribution of Spiranthes diluvialis. July 26, 2017.

Miller, J. 2017, *in litt.* Email from Jennifer Miller, Plant Research Ecologist (Idaho Natural Heritage Program, Idaho Department of Fish and Game) to Evan Ohr, Biologist, (U.S. Fish and Wildlife Service, Chubbuck, Idaho). Subject: Spiranthes diluvialis report. June 28, 2017.