Draft Mexican Spotted Owl Habitat Evaluation Memorandum

Uinta Basin Railway

Seven County Infrastructure Coalition

July 31, 2020

Contents

Tables

Figures

1.0 Introduction

The Seven County Infrastructure Coalition (Coalition), 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. STB has identified three railway alternative routes for analysis in the EIS. 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 (ESA) 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 ESA 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 could be affected by the proposed action. The BA should address the anticipated impacts to all listed and proposed species and their habitats 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 the Mexican spotted owl (*Strix occidentalis lucida*), a federally threatened species, within ½ mile of the three alternative railway route study areas:

- **Indian Canyon**, as defined by a conceptually engineered route dated November 22, 2019
- **Wells Draw**, as defined by a conceptually engineered route dated November 22, 2019
- **Whitmore Park**, as defined by a conceptually engineered route dated February 12, 2020

2.0 Mexican Spotted Owl Biology

2.1 Description

The Mexican spotted owl is one of three subspecies of spotted owl, the other two being the northern (*Strix occidentalis caurina*) and California (*S.o. occidentalis*) subspecies. The Mexican spotted owl is geographically and genetically isolated from the other two subspecies. The spotted owl is a medium-sized owl without ear tuffs. They are mottled with irregular white spots on a brown abdomen and light- to dark-brown tail and wing feathers (Gutiérrez et al. 1995). Like most owls, spotted owls are nocturnal and communicate through a complex and low-frequency repertoire of calls. Calling can be heard from March through November, but owls are generally silent during winter (USFWS 2012).

2.2 Status and Trends

The Mexican spotted owl was listed as threatened under the ESA on March 16, 1993 (58 Federal Register [FR] 14248), and critical habitat was designated for the subspecies on August 31, 2004 (69 FR 53182). A significant loss or modification of forests as a result of human activities (that is, timber harvest) and wildland fire (58 FR 14248) justified the listing at the time. Since listing, additional threats to foraging and nesting habitat have been identified, including livestock grazing, energy development, construction of roads and recreational trails, changes in fire regime, and exurban development. Disease and predation have also emerged as threats to the subspecies (USFWS 2012).

Abundance and population trends are difficult to assess for Mexican spotted owls, particularly in canyon habitats. USFWS (2012) summarizes numerous studies from Arizona and New Mexico that suggest population declines. At the time of listing, there were 26 pairs and 19 single owls recorded in Utah, but consistent surveys were not and have not yet been conducted throughout the state. Lewis (2014) compiled information for 94 sites in Utah that were active between 1987 and 2012. Occupancy-based surveys at four national parks in southern Utah found negative population trends at all sites, but greater declines at sites in xeric (that is, dry scrub vegetation) habitat as opposed to mesic habitat (Hockenbary 2011; Willey 2010).

2.3 Distribution

Mexican spotted owls are found throughout much of Utah, Colorado, Arizona, New Mexico, and parts of western Texas as well as several states in Mexico. Although the subspecies occupies a large geographic area, occurrence is highly disjunct and dependent on specific montane forest and canyon habitat requirements (see Section 2.4, Habitat Use). Most Mexican spotted owls are found on National Forest System (NFS) land, but in the rocky, canyon habitat of the Colorado Plateau, most are found on land administered by the Bureau of Land Management or National Park Service (USFWS 2012). The range of Mexican spotted owls in the United States is divided among five ecological management units (EMU): the Colorado Plateau, Upper Gila Mountains, Basin and Range East, Basin and Range West, and Southern Rocky Mountain EMUs. Despite being the largest EMU, only about 16% of known territories are located in the Colorado Plateau EMU (in which the proposed alternatives are located). The majority of nest sites (52%) are located in the Upper Gila Mountains EMU located north and east of Phoenix, Arizona.

Few nest sites are known to exist in northeastern Utah (that is, north of Moab); two nests are located near the Green River in northeast Emery County, and one nest was identified in northwest Colorado, just across the border from Uintah County, Utah. Despite an apparent prevalence of suitable habitat for Mexican spotted owls in northeastern Utah, it appears that occupancy rates are low relative to the southern parts of their range (USFWS 2012).

2.4 Habitat Use

Mexican spotted owls are considered habitat specialists because they generally roost and nest in late-seral-stage (mature) forests and rocky canyon habitats. A diverse range of other habitat types can be used for foraging or dispersal, including managed and unmanaged forests, pinyon-juniper woodlands, mixed-conifer forests, ponderosa pine forests, cliff faces, terraces between cliffs, and riparian zones. In Utah, Mexican spotted owls nest almost exclusively in rocky canyon habitats. Nesting sites are often located in landscapes with complex tributary canyons, desert scrub or riparian vegetation communities, and prominent vertical cliffs (USFWS 2012).

When USFWS (69 FR 53181) designated critical habitat for the Mexican spotted owl, it described the following primary constituent elements of canyon breeding habitat (USFWS 2015):

- Presence of water (provides a complex vegetation community and a cooler and more humid microclimate)
- Clumps or stringers of mixed conifer, pinyon-juniper, pine-oak, and/or riparian vegetation
- Relatively tall canyon walls containing crevices, ledges, and caves
- High percentage of ground litter and woody debris

The consensus among researchers is that steep, rocky canyons with cool microclimates and complex vegetative cover provided by riparian or forest vegetation types provide suitable habitat for Mexican spotted owls in Utah (Lewis 2014; Willey and Zambon 2014). Spotted owls are thought to be heat-sensitive (Barrows 1981; Ganey et al. 1993), so north-facing cliffs with caves and ledges could provide cooler sites for roosting and nesting (Rinkevich 1991; Willey 1998). Vegetative cover can augment thermoregulated roost sites (Ward 2001) and provide suitable habitat for small mammal prey.

Although pinyon-juniper woodlands are a common habitat in home ranges (Willey and van Riper 2007), the complexity of vegetation within canyon bottoms is a better predictor of habitat quality. Mixed-conifer and pinyon-juniper forests on steep slopes above or near canyons can provide nearby foraging habitat (USFWS 2015). Roost sites on cliff ledges and crevices are about as common as roost sites in trees. Roosts on vegetation occur most often in mixed-conifer forests but are also common in pinyon-juniper woodlands, desert scrub vegetation, and riparian habitat (Willey and van Riper 2007).

Willey and Zambon (2014) identified terrain steepness, vegetation density, and temperature as top variables in a Mexican spotted owl habitat suitability model for parts of southern Utah. Lewis (2014) found that presence was significantly correlated with narrower canyons and greater vegetative canopy cover. The size of canyons is also an important factor: as a general rule, canyons that are less than 2 kilometers (km) wide and greater than 2 km long are considered high-quality habitat (USFWS 2015). Willey and van Riper (2007) found that inhabited canyons ranged from 1 to 500 meters wide and roosting cliffs ranged from 6 to 411 meters tall.

2.4.1 Habitat Models

The Utah Ecological Services office of USFWS uses two separate models to identify potential habitat for the Mexican spotted owl in Utah.

- The initial model (the "1997 model") was developed by Willey and Spotskey (1997) and predicted breeding habitat throughout Utah based on slope, aspect, ruggedness, and vegetation. This model was intended for use at broad scales across large landscapes and was not intended for use at finer spatial scales (USFWS 2012; Willey 2002a).
- In 2000, another model (the "2000 model") was developed for use at multiple spatial scales (Willey and Spotskey 2000). This model incorporated data on slope, aspect, ruggedness, fine-scale vegetation, surface geology, soil moisture, and an index of surface temperature. The 2000 model identified suitable combinations of the input variables and buffered those locations by ½ mile.

Tests of the 2000 model using different techniques in different regions of Utah suggested that it was useful in identifying breeding habitat in canyon landscapes at fine scales (<1:100,000; Willey 2002b). However, it successfully identified only 4.3% of known nest sites (Lewis 2014), and land managers have found the 2000 model outputs to be unreliable. Subsequent attempts between 2000 and 2012 to improve the model had mixed results (USFWS 2012). As described below (Section 3.2, Pre-field Preparation) and per USFWS guidance, HDR defined the survey areas based on the 1997 model. The 2000 model was more restricted but identified potential habitat throughout much of Indian Canyon, some of Argyle Canyon, and limited portions of Emma Park in and near the survey areas.

Lewis (2014) modeled Mexican spotted owl habitat throughout the portion of the Colorado Plateau EMU in Utah. Input variables included elevation, aspect, curvature, surface ratio, vegetation, and geology. The model output is a continuous scale of probability of occupancy. The model mapped potential habitat over a smaller area than the models used by USFWS but captured 60.6% and 77.7% of known nest sites compared to 55.3% and 4.3% by the 1997 and 2000 models, respectively (Lewis 2014). Despite improvements in accuracy as a result of advances in spatial data, this model is not widely used by wildlife managers to predict Mexican spotted owl habitat in Utah.

Within the survey areas, this model identified potential habitat in the Emma Park and Whitmore Park areas but predicted a low probability of occupancy. The highest probability was 0.31 on a scale from 0 to 0.93 (Lewis 2014).

2.4.2 Life History

Mexican spotted owls consume a variety of prey, including small- and medium-sized rodents such as woodrats, voles, deer mice, and pocket gophers. Woodrats are the most common prey source of owls in the canyons of Utah (Ward and Block 1995; USFWS 2012).

Mexican spotted owls do not build nests but instead rely on existing structures such as crevices, caves, and ledges in canyon habitat or existing nests of other species and tree cavities in forested habitats. Nest site and home range fidelity are high, with most pairs nesting in the same location year after year. Home range size is variable as a function of habitat suitability but is generally large relative to other owl species (USFWS 2012). Willey and van Riper (2007) reported a mean range size of 1,102 hectares (4.3 square miles).

Courtship generally begins in March, and eggs are laid in late March. Clutch size ranges from 1 to 3 eggs, and re-nesting following nest failure is rare. This subspecies will forgo nesting during years when conditions are unfavorable. Incubation generally lasts 30 days, with hatching occurring in early May. Owlets generally fledge in early to mid-June, before they are able to fly. Fledglings jump to nearby cliffs, trees, or the ground and are dependent on their parents for food early in the fledging period. By August, young are generally independent, and dispersal occurs from mid-September to early October (USFWS 2012). Young can disperse from 1 to 92 km, but most successfully dispersing juveniles remain near their natal territories (Ganey et al. 1998).

Most Mexican spotted owls do not migrate and remain in their nesting territory year-round. Those owls that do migrate generally move between 5 and 50 km and do so to achieve a change in elevation down-slope for the winter. Migrating individuals leave their home territories in November or December and return between January and April. Characteristics of over-wintering habitat are unknown (Ganey and Block 2005; USFWS 2012).

3.0 Methodology

3.1 Survey Areas

The study areas for the three alternative railway routes are predominantly 1,000 feet wide and encompass about 500 feet on either side of the proposed centerlines. However, in some areas, the study areas are wider where the design team anticipates that a wider earthwork footprint might be needed to accommodate design features. Based on USFWS guidelines for Mexican spotted owl surveys (USFWS 2012, 2019), an additional ½-mile buffer was added to the study areas to establish the Mexican spotted owl survey areas. The survey areas are defined as the route study areas plus the ½-mile buffer for each study area. Surveys were limited to those areas that fall within USFWS's 1997 habitat model. The three survey areas covered a total of approximately 110 square miles (sq. mi.; 70,206 acres), including 39 sq. mi. (25,148 acres) in the Indian Canyon survey area, 64 sq. mi. (40,983 acres) in the Wells Draw survey area, and 50 sq. mi. (32,214 acres) in the Whitmore Park survey area. The survey areas for each of the three routes are shown in Figure 1.

Figure 1. Mexican Spotted Owl Habitat Evaluation Survey Areas

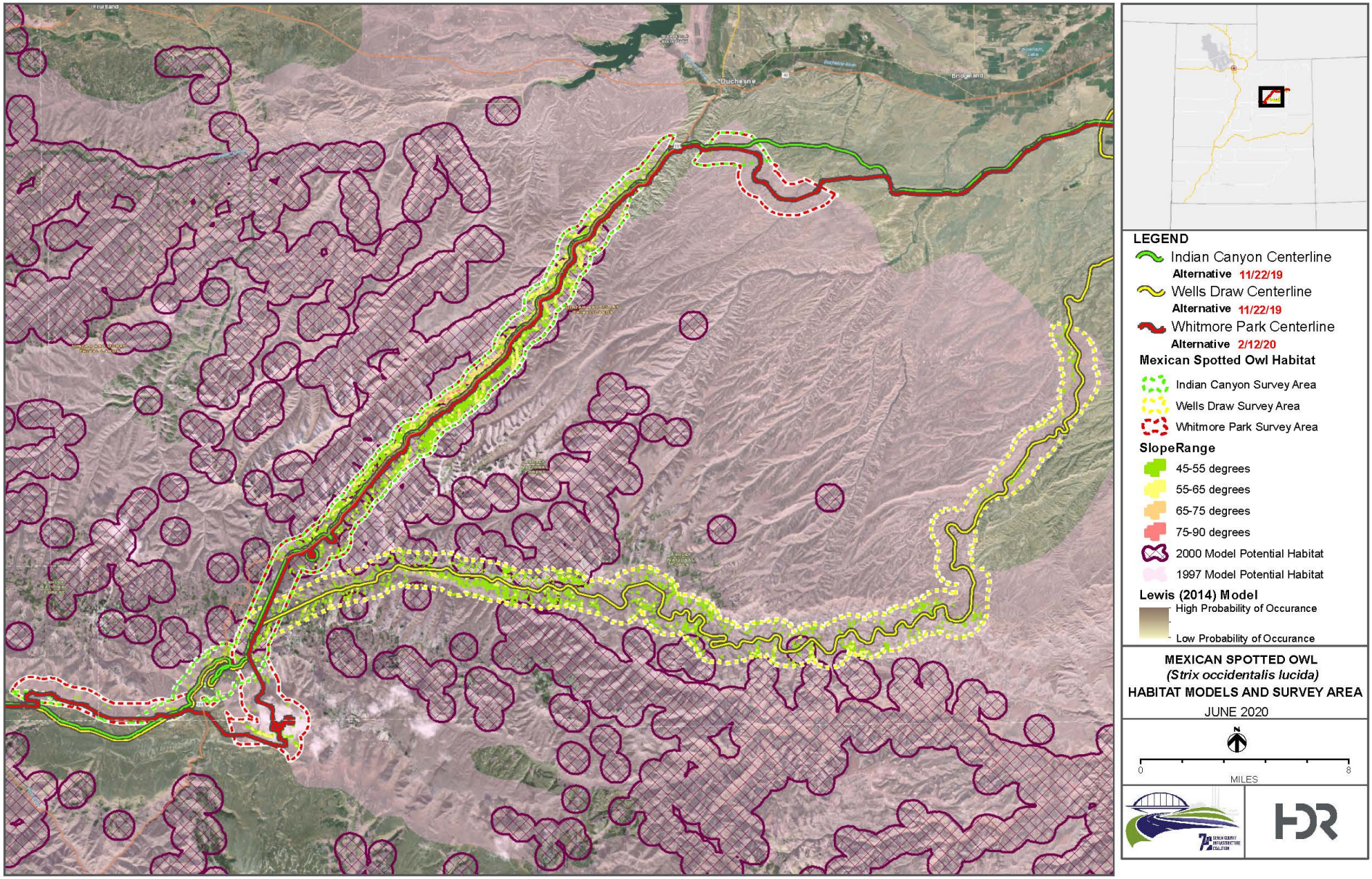
3.2 Pre-field Preparation

USFWS (2002) recommends that the 1997 model be used a "first-cut" analysis tool to identify potentially rugged areas that could provide suitable owl habitat. The 2000 model predicts the location of breeding and roosting habitat and, according to USFWS, locations identified in the 2000 model should receive a thorough field evaluation. USFWS also recommends that site-specific biological knowledge, field and peer reviews, and previously published information be used to evaluate habitat (USFWS 2002). For this reason, the field team defined the survey areas by the 1997 model, which fully encompasses the 2000 model in the survey areas.

As described in Section 2.4, Habitat Use, steep terrain is one of the primary attributes of suitable Mexican spotted owl habitat. To help identify suitable habitat, the field team derived a surrogate for slope from digital elevation models (DEMs) of the survey areas. Five-meter autocorrelated DEMs were downloaded from the Utah Automated Geographic Reference Center (AGRC 2020) and were converted to a slope raster using the Slope tool in the 3D Analyst toolbox in ESRI ArcMap 10.7.1. The output was in degrees slope between 0 and 90. Slopes in excess of 45 degrees were overlaid with both the 1997 and 2000 models to help identify potential habitat.

Tablets equipped with the ESRI data collection application Collector were prepared for use in both field navigation and data entry. The Collector application included data layers for aerial images, survey area boundaries, the 1997 and 2000 habitat models, and slopes in excess of 45 degrees. Figure 2 shows the overlay of each of these data layers plus the Lewis (2014) data layer, which was used to confirm field evaluations *a posteriori*.

Figure 2. Mexican Spotted Owl Habitat Models and Survey Areas



3.3 Field Evaluation

The field evaluation was conducted by HDR biologists familiar with Mexican spotted owl biology and habitat use. Both biologists had completed the USFWS Utah Mexican spotted owl training, and the lead biologist has previous experience conducting habitat evaluations and surveys in Utah. Field evaluations were conducted between June 15 and 20, 2020.

HDR biologists visually assessed all three of the survey areas and evaluated the habitat as high, moderate, or low quality for roosting and nesting Mexican spotted owls (Table 1). Biologists used Collector to draw polygons around landscape features and link photographs and notes to those polygons. With few exceptions, all portions of the survey areas with steep slopes (>45 degrees) and all portions of the 2000 model located in the survey areas were photographed and assessed in detail. Other areas (those within the 1997 model but not in the 2000 model and not in areas with steep slopes) were first assessed visually and in more detail only if landscape characteristics indicated attributes of suitable habitat. Inaccessible areas were viewed through spotting scopes, and photographs were taken through the spotting scope lens. Areas beyond the survey areas were also evaluated as necessary to assess the length of canyons and the total area of potentially suitable habitat.

In general, the characteristics shown in Table 1 were used to define high-, moderate-, or low-quality habitat. These characteristics were based on available literature, particularly USFWS (2012) and Willey and Zambon (2014).

Table 1. Characteristics of High-, Moderate-, and Low-quality Mexican Spotted Owl Habitat

Attribute	High Quality	Moderate Quality	Low Quality
Terrain steepness	Narrow, steep, incised canyon	Canyons with inconsistent cliff habitat	Talus/scree slopes, forested slopes, limited or no cliff habitat
Ruggedness	Tall cliffs with caves, crevices, and ledges	Short cliffs with limited caves, crevices, and ledges	Limited or no caves, crevices, and ledges
Area/extent	< 2 km wide by > 2 km long	Inconsistent or short canyon habitats	Open valley, exposed cliffs, short side canyons off wide valley
Temperature	Shaded areas, cool microclimates	Limited shade, limited vegetation	South exposure, open habitat, hot/dry microclimate
Vegetation	Late seral conditions and/or mesic vegetation	Limited vegetative cover, xeric vegetation	Limited vegetation, shrub/scrub habitats without trees
Litter/debris	Ample woody debris and litter	Limited woody debris and litter	No woody debris and limited litter
Hydrology	Perennial surface water present	Regularly occurring ephemeral or intermittent surface water	Irregular surface water or no surface water

Following the field habitat evaluation, biologists used the field data to digitize areas of moderate- or high-quality habitat in the survey areas. All other portions of the survey areas were identified as low-quality habitat.

4.0 Results

HDR biologists identified approximately 294 acres of moderate-quality Mexican spotted owl nesting and roosting habitat in the Wells Draw survey area. All other portions of the three survey areas were evaluated as low quality; no high-quality habitat was identified (Table 2). All moderate-quality habitat is located in tributary canyons north of Argyle and Ninemile Canyons in the Wells Draw survey area, as shown in Figure 3.

Figure 3. Mexican Spotted Owl Moderate-quality Habitat in the Wells Draw Survey Area

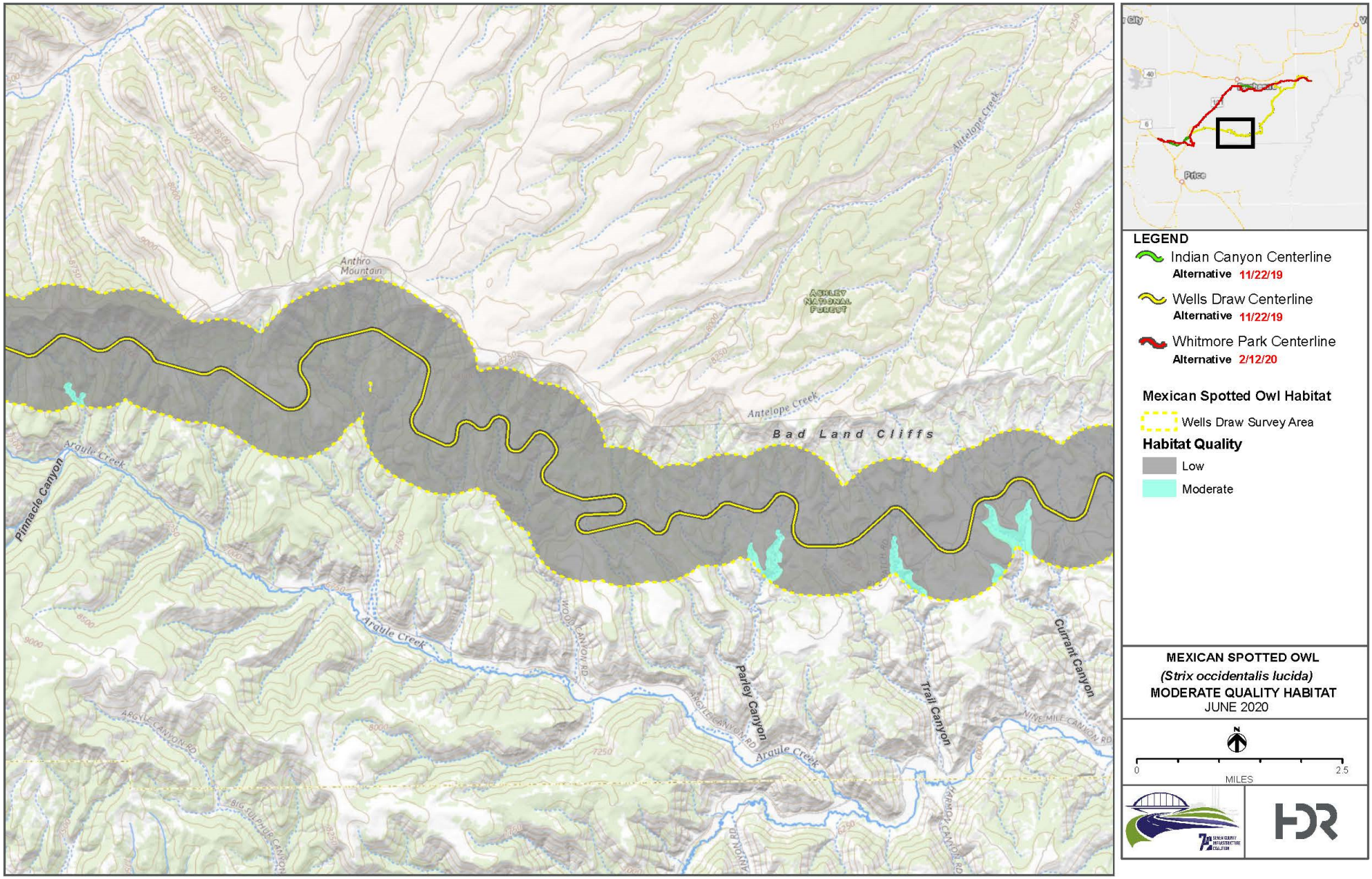


Table 2. Acreage by Land Ownership for Mexican Spotted Owl Potential Habitat

Property Ownership	Indian Canyon Survey Area		Wells Draw Survey Area		Whitmore Park Survey Area	
	Low-quality Habitat	Moderate-quality Habitat	Low-quality Habitat	Moderate-quality Habitat	Low-quality Habitat	Moderate-quality Habitat
Private	10,061	0	8,327	0	16,272	0
Tribal	4,581	0	0	0	4,616	0
BLM	50	0	27,122	294	145	0
SITLA	1,411	0	4,197	0	2,137	0
UDNR	68	0	0	0	67	0
UDOT	2	0	0	0	2	0
USFS	8,975	0	1,337	0	8,975	0
Total acres	**25,148**	**0**	**40,983**	**294**	**32,214**	**0**

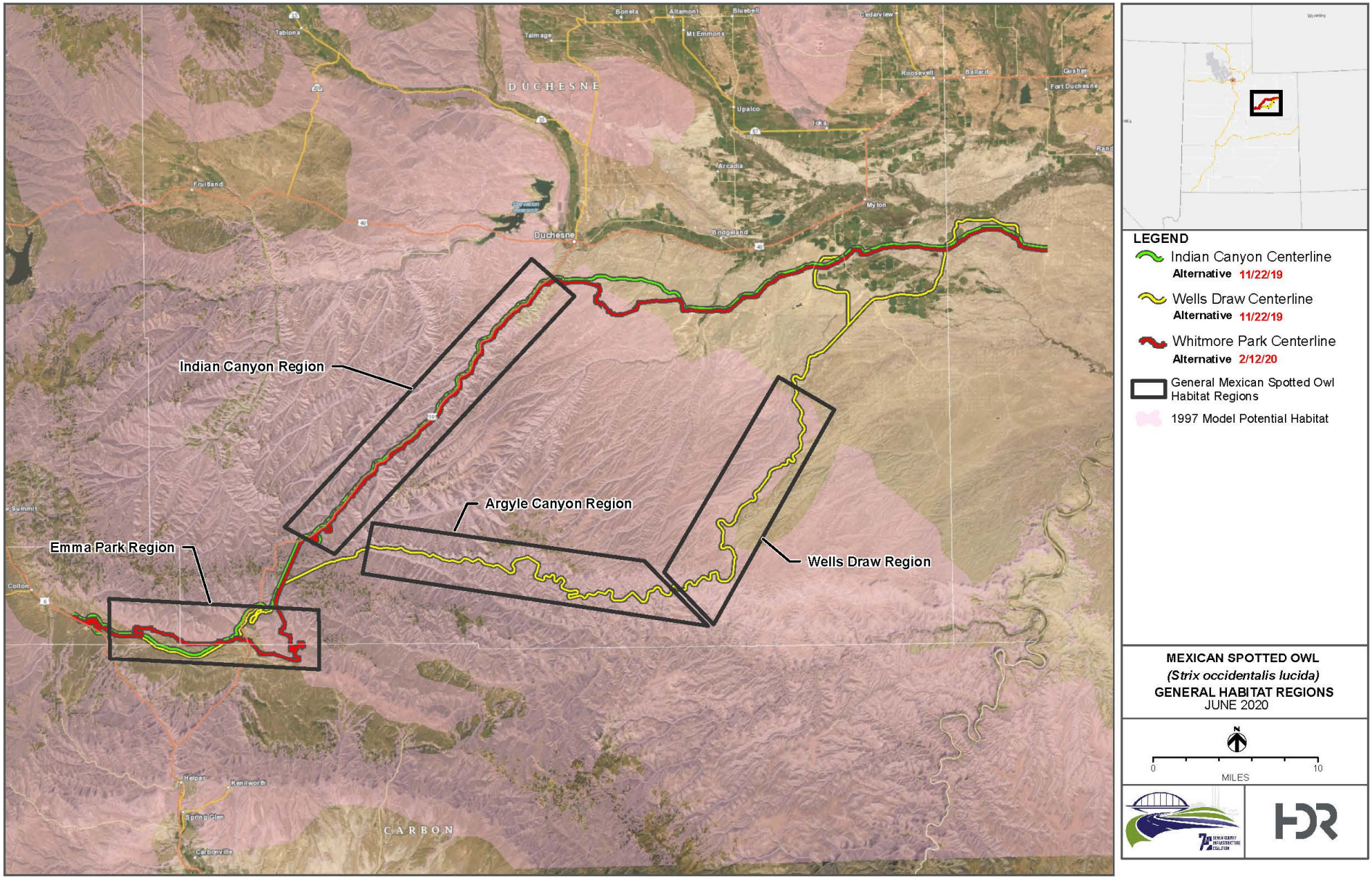
BLM = Bureau of Land Management; SITLA = Utah School and Institutional Trust Lands Administration; UDNR = Utah Department of Natural Resources; UDOT = Utah Department of Transportation; USFS = U.S. Forest Service

Low-quality habitat included (1) areas with habitat characteristics listed in the Low Quality column in Table 1, and (2) areas with no suitable habitat characteristics (that is, non-habitat). Because both low-quality habitat and non-habitat areas were included in the USFWS 1997 model, they were denoted as low quality. Low-quality habitat lacks most of the known characteristics of suitable nesting habitat and lacks most or all of the primary constituent elements listed in Section 2.4, Habitat Use. For this reason, low-quality habitat is unlikely to be used by Mexican spotted owls for nesting or foraging.

Moderate-quality habitat meets the criteria listed in Table 1 and has a moderate probability of occupancy by nesting and foraging Mexican spotted owls. These areas of moderate-quality habitat are small and isolated from known nesting habitat. This lack of connectivity likely reduces the probability of occupancy in areas identified as moderate quality in the survey areas.

The survey areas can be divided into four general regions with differing geologic and vegetation characteristics. The general vicinity of these regions can be seen in Figure 4 and includes Argyle Canyon, Indian Canyon, Wells Draw, and Emma Park. The results of the habitat evaluation in each region are summarized following Figure 4.

Figure 4. General Habitat Regions



4.1 Argyle Canyon Region

Only the Wells Draw Alternative traverses through and near Argyle Canyon. After emerging from a proposed tunnel, the alignment traverses the Bad Land Cliffs above Argyle Canyon until it reaches Wells Draw. Throughout much of this region, there is a bench below the Bad Land Cliffs that terminates in sandstone cliffs and relatively short side canyons (most less than 2 miles long) that run south to Argyle Canyon.

Although many of these side canyons within the Wells Draw survey area exhibit suitable habitat characteristics, they are generally short (less than ½ mile long), and Argyle Canyon proper does not contain sufficient cliff habitat to be considered moderate-quality habitat. One exception is an unnamed side canyon opposite Pinnacle Canyon that is about ¾ mile long and exhibits moderate-quality characteristics (Figure 5). The upper ¼ mile of this side canyon is within the survey area and is mapped as moderate quality (Figure 3).

Near the confluence of Argyle Canyon and Ninemile Canyon, Parley Canyon exhibits sufficient cliff habitat and vegetation, and is of sufficient length, to be considered moderate quality (Figure 6). In addition, Trail Canyon and Currant Canyon, which are tributaries to Ninemile Canyon, also exhibit similar characteristics (Figure 7 and Figure 8). The upper reaches of these tributary canyons are located within the survey area and are mapped as moderate quality (Figure 3). Most of Argyle and Ninemile Canyons are included in the 2000 model, but very little of the Wells Draw survey area in this region is included in the 2000 model (Figure 2).

Figure 5. Moderate-quality Mexican Spotted Owl Habitat in an Unnamed Tributary Canyon to Argyle Canyon

Figure 6. Moderate-quality Mexican Spotted Owl Habitat in Parley Canyon

Figure 7. Moderate-quality Mexican Spotted Owl Habitat in Trail Canyon

Figure 8. Moderate-quality Mexican Spotted Owl Habitat in Currant Canyon

4.2 Indian Canyon Region

The Indian Canyon and Whitmore Park Alternatives follow the same alignment through Indian Canyon. Cliffs are present throughout much of Indian Canyon, but they are inconsistent and rarely present on both sides of the canyon. Most cliffs consist of loose substrate and are generally southeast-facing. Most cliff substrate is exposed and receives high amounts of sun exposure. Side canyons with cooler microclimates and cliffs on both sides are generally short (less than ½ mile long). Although Indian Creek exhibits perennial flow, most tributary canyons are intermittent or ephemeral. Throughout much of Indian Canyon, pinyon-juniper woodlands are present on the ridges and hills above the canyon, while Douglas fir, mixed conifer, and aspen are common at the higher elevation and southern portions of the canyon within NFS-managed land. Except at the higher elevations of the canyon, most of the canyon bottom is vegetated by desert scrub vegetation. Agricultural land uses are common at lower elevations, as well as oil and gas development and cattle grazing. State Route 191 also follows Indian Canyon and is located at the base of much of the cliff substrate. All portions of the survey areas in Indian Canyon were identified as low-quality habitat for Mexican spotted owls. Most of Indian Canyon is located within both the 1997 and 2000 models (Figure 2), but local wildlife biologists do not consider it suitable habitat for the subspecies (Christensen 2020). Figure 9 is a characteristic photograph of Indian Canyon.

Figure 9. Low-quality Mexican Spotted Owl Habitat in Indian Canyon

4.3 Wells Draw Region

Only the Wells Draw Alternative is located in the Wells Draw region. Wells Draw is a wide, shallow valley with very limited cliffs. Cliffs that are present are generally exposed rimrock on mesa tops and do not form canyons. Vegetation in this region is desert scrub and pinyon-juniper woodlands. Oil and gas development is present throughout the length of the draw, as is 9 Mile Canyon Road. Although the 1997 model includes most of Wells Draw, the 2000 model does not include any portion of Wells Draw. Figure 10 is representative of Wells Draw.

Figure 10. Low-quality Mexican Spotted Owl Habitat in Wells Draw

4.4 Emma Park Region

All three alternatives traverse portions of the Emma Park region. Emma Park (and Whitmore Park to the east) is a wide, east-west-trending valley located between Reservation Ridge and the Roan Cliffs on the north and the Book Cliffs to the south. Cliffs are limited to narrow bands on hillsides and rimrock on mesas. Vegetation is generally desert scrub with some limited pinyon-juniper woodlands at higher elevations. Land use in this region is generally cattle ranching and grazing. The 2000 model does not overlap the survey area in Emma Park but does include portions of the Roan and Book Cliffs. However, the Lewis (2014) model includes all of Emma Park and Whitmore Park. Figure 11 is representative of the Emma Park region.

Figure 11. Low-quality Mexican Spotted Owl Habitat in Emma Park

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